PRICE LIST OF

PSYCHOLOGICAL

AND

PHYSIOLOGICAL

INSTRUMENTS AND APPARATUS

MANUFACTURED
AND IMPORTED BY

ELMER G. WILLYOUNG & CO.

PHILADELPHIA, PENNA.

ANNOUNCEMENT.

In presenting this little catalogue of instruments and apparatus for psychological and physiological investigation, our first of this character, we take some pride in the knowledge that it is also the first list, solely devoted to this class of apparatus, which has ever been issued in America.

Not only is the list an American one but the apparatus also, with but few exceptions, is American. Practically none of it has ever been listed or regularly upon the market before. Many of the pieces were developed in the laboratory in response to the regular demands of daily work as in the case of the instruments devised by Dr. Scripture and Dr. Fitz. Others are our own designs of pieces regularly in laboratory use but in which we have felt that we could effect improvements in form or detail.

In designing all of the various instruments here listed we have endeavored to go upon the idea that an instrument should not be a *fetish* to be set up under a bell glass for the worship of all, save the professor in charge (and often even of him), but a *machine* destined for regular use and to be built upon the same lines as other machines. These lines are, as we understand it, *high accuracy and finish in functional parts*, combined with *strength and plainness in purely structural parts.* Hence, in the present list, working parts are made very accurately and assembled to work with the necessary degree of smoothness, while supporting and structural parts, such as base castings and frame work (except in a few cases), are japanned black without machining. The result is a line of apparatus excellently adapted to its requirements, convenient in its use, durable and dignified in appearance, and priced considerably lower than the old plan of high polish and brilliant lacquer would have permitted.

We take pleasure in announcing that we are the *sole authorized makers* of the apparatus *devised by Dr. Scripture* and bearing his name, which is here listed. Also, that we are the *sole authorized makers* of the several pieces devised by *Dr. G. W. Fitz*, of Harvard University, also here listed. Our designs for all of these pieces have been made either from models or sketches furnished by the gentlemen mentioned, and have received their criticism and approval.

Of the apparatus devised by Dr. Scripture, much of it is described in his new work "*Thinking, Feeling, Doing*," just issued from the press of Flood & Vincent, Meadville, Penna., as one of the Chatauqua Circle works. Feeling that a large number of the Circles studying this work will desire to experimentally demonstrate some of the phenomena discussed, Dr. Scripture has selected from the entire list certain fundamental pieces which seemed most desirable, and from them has formed four different sets of apparatus which we have designated as Normal No. 1, Normal No. 2, Normal No. 3 and Normal

No. 4. Of these the No. 1 contains sufficient apparatus to illustrate the fundamental phenomena of re-action time, taste, smell, color, vision, etc. Set No. 2 contains in addition pieces enabling some of these fundamental phenomena to be shown in a more elaborate manner, Set No. 3 is somewhat more complete, while Set No. 4 will enable nearly every experiment mentioned in the book to be performed. Any of these sets will also be found of advantage in school work—in particular Set No. 4.

We have also listed apparatus for use with Dr. Sanford's "Experimental Psychology." In arranging this latter apparatus we are indebted to Dr. Sanford for many helpful suggestions and desire here to express our appreciation of the same. The list is by no means to be regarded as a final list, as the time has not been sufficient for such a list to be worked out. It is hoped, however, that in the course of a few months it will be possible to issue such a final list.

Besides the apparatus here priced, we have a number of additional pieces in preparation, which will be announced as early as possible.

We are making somewhat of a specialty of the manufacture of apparatus for research, either from our own ideas or from those which may be given us. When orders are given us for such special apparatus, we propose furnishing drawings for inspection, suggestion and approval, before going on with the work.

We have very close relations with all of the leading manufacturers of psychological and physiological apparatus in England and Europe, and keep most of their catalogues on file. We are prepared to import their goods at the very lowest rates and guarantee safe delivery. We ask the favor of being allowed to give you prices on all such importations as you may require.

ELMER G. WILLYOUNG & CO.

Section I.

Most of the instruments and apparatus in this section have been devised by Dr. E. W. Scripture, (Director Yale Psychological Laboratory) or by Dr. Scripture in conjunction with ourselves.

[LETTER OF AUTHORIZATION.]

The great hindrance to the teaching of experimental psychology has lain in the lack of adequate, easily obtainable apparatus. In the past years I have tried to help along by manufacturing for others some articles in the laboratory workshop, but I have found it necessary to restrict this to a few special pieces. To overcome these difficulties, I have found an apparatus-maker who is willing to make pieces strictly according to my directions. In order that matters may be kept under proper control, the firm of Elmer G. Willyoung & Co., Philadelphia, has been constituted the sole authorized makers of all apparatus, diagrams, etc., listed under my name, which are required to experimentally illustrate my book, "THINKING, FEELING, DOING," and also of some other apparatus of my invention similarly listed. All such apparatus has been made from designs and models carefully tested and approved.

E. W. SCRIPTURE,

Director of the Psychological Laboratory, Yale University,

New Haven, Conn

August 1, 1895.

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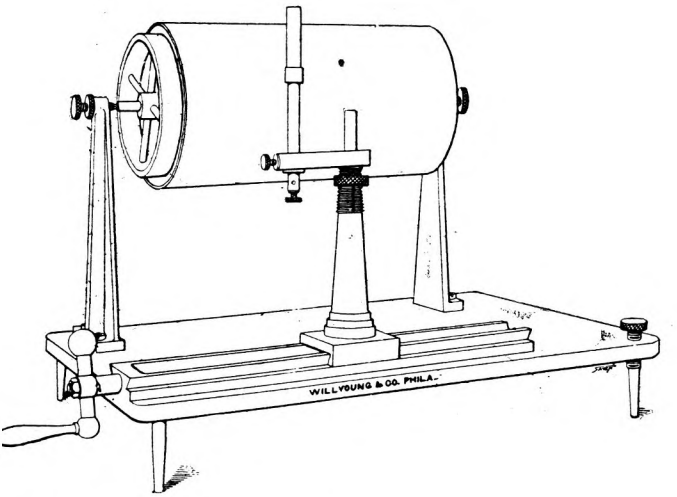
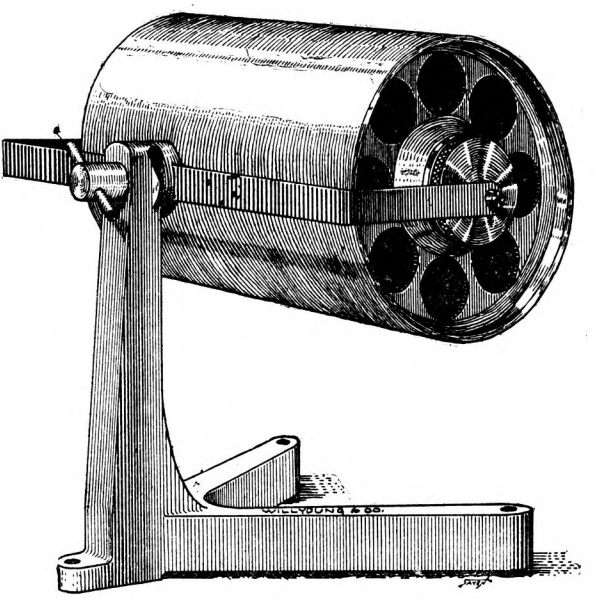
*S1. **Scripture's Revolving Drum** **$35 00**

A brass cylinder, 12 in. long and 6¼ in. diameter, is supported above a solid metal base; at one end is a grooved pulley with milled rim so that the drum may either be whirled between the thumb and finger or driven by a belt from a small motor. Upon the base in front of the drum are two metal ways in which slides a vertical stand arranged to take the time marker (S6.) This stand is moved along the ways at any desired speed by means of a screw of 4 threads to the inch, one end of which works in a fixed bearing, while the screw itself passes through the base of the stand as a nut. A small handle upon the end of the screw allows it to be rotated and the slide advanced at any desired rate. Records may be made either upon the drum itself by smoking its surface, or upon a sheet of glazed paper, also smoked, stretched around the drum and its ends glued together.

**We can arrange a tuning fork to mark directly upon this drum if desired. Price quoted on application.*



S 1.



S 1 A.

*S1A. **Student's Drum.** (W. S. Pattern) **$13 00**

This drum, of our own design, has been brought out in response to the demand for a simple, low priced yet well made, drum for student's work. The drum is of brass, 6 in. long by 4 in. in diameter, and revolves upon conical and nearly frictionless bearings. These bearings are mounted in a rigid fork itself clamping to a vertical iron casting. The clamping surfaces are accurately faced together so that the drum may readily be set with its axis at any angle from horizontal to vertical. A milled wheel at one end allows the drum to be twirled between thumb and finger, or, if preferred, a motor may be used, a grooved pulley being also cut at the same end of the drum. Screw holes are provided in the base casting so that the drum may be firmly fastened down.

*S1B. **Student's Drum, with Advancing Time Marker Attachment** (W. S. Pattern) **$20 00**

This is the same as S1A, save that an attachment for holding and advancing the time marker is also provided. This attachment consists of a screw of four turns to the inch, fastened to the fork carrying the drum and mounted in front of the latter. A carriage adapted to hold the time marker (S6) fits as a nut upon this screw and advances in the line of the drum's axis with revolution of the screw. The screw is revolved either by hand or by a belt connection from the drum proper, pulleys being provided for the purpose.

*S1C. **Students Drum, with Automatic Time Marker Attachment** (W. S. Pattern) **$24 00**

This is the same as S1B, save that the marker carriage is thrown in and out of gear by an electro-magnetic clutch, the screw itself being in continuous operation, as also the drum (both should be driven by a separate motor). The circuit operating this clutch should be connected up in such a way that the marker is automatically thrown *into* action just *before* the beginning of a reaction experiment, and *out* just after its finish. This may readily be accomplished by **Scripture's Multiple Key,** S60.

S2. **Glazed Paper for Recording Drums** **$1 00**

In packages of 100 sheets, cut to fit the above drums, and with one end gummed so as merely to require moistening. This is a special brand of paper approved by Dr. Scripture, and will give excellent results.

S2A. **Fixing Varnish** . . . . . .

We advise use of the following where it is desired to preserve smoke records permanently:

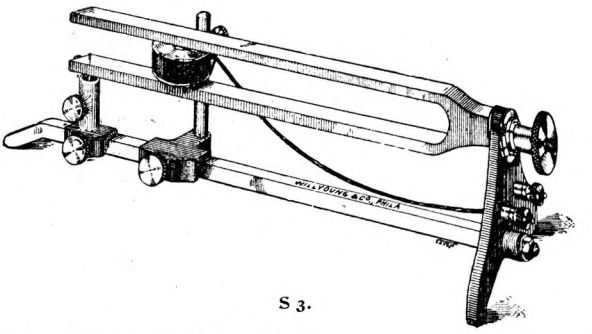
Stock solution; sat. solution of white shellac in alcohol.

For use take

Stock solution, 1 part.
Alcohol (95 per cent.), 4 parts.

and float over the paper which has been cut from the drum.

**We can arrange a tuning fork to mark directly upon these drums if desired. Price quoted on application.*



S 3.

S3. ***Electro-magnetic Fork and Stand** **$28 00**

Wet contact only. The stand is solidly made of metal. The fork slips into a slot in the end casting and is clamped fast by the milled nut on the end of the shank. The mercury cup is of iron and provided with an adjustable screw by means of which the mercury level may be varied; it also slides along the base bar so that forks of different rates of vibration may be used, if desired. The electro-magnet also slides along the base bar in order to vary the effective force, and a vertical and rotational adjustment exist. The binding posts for battery connection are on the heavy end casting and but one loose wire exists in the fork circuit itself. The fork accompanying this stand is adjusted to give 100 complete vibrations per second. The contact point is a small piece of platinum wire clamped to one prong of the fork; it can be readily removed.

S4. ***Electro-magnetic Tuning Fork and Stand** **$28 00**

Same as S3, but with dry contact instead of wet. The mercury cup is omitted and a platinum faced flat surface used instead; against this surface a flexible spring attached to one prong of the fork makes contact. Adjustments equivalent to those for S3 are provided.

S5. ***Electro-magnetic Tuning Fork and Stand** **$31 00**

Same as S3, but with *both* wet and dry contacts, as described for S3 and S4.

S5A. **Scripture's Electric Fork.** Has fork of 200 vibrations per second, mounted upon wooden stand. Dry contact only. The end of one prong is polished, so as to make the fork available for manometric flame experiments **$16 00**

S6. **Time marker** **$6 00**

For use with the Recording Drum S1--S1C, inclusive. It consists of a very light armature tipped with a long and flexible point and actuated by a small electro-magnet, itself governed by the Electro-magnetic Fork S3, etc. For all rates up to about 125 complete vibrations per second this marker is excellently adapted, and gives very smooth curves.

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*If a fork of 200 complete vibrations a second instead of 100 be furnished, deduct $1 50.

S6A. **Time Marker** **$13 00**

(A modified form of the "Deprez Signal" designed by us.) This Marker has exceedingly small mass and moment of inertia. Adjustments for amplitude, as also all adjustments necessary to bring pointer properly against surface to be recorded upon. For all rates up to 250 complete vibrations per second almost perfect sine curves can be obtained.

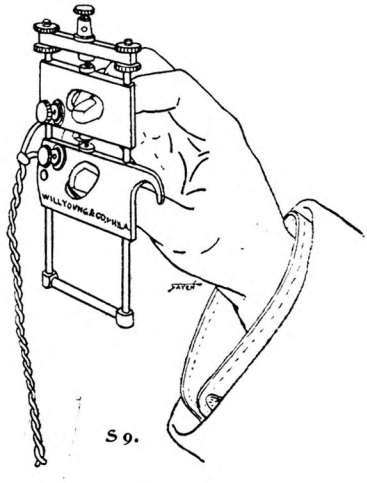
S7. **Spark Coil** **$12 00**

For use with the recording drums S1 to S1C. Complete, with separate condenser, which may be placed *around* the break, thus producing a strong spark with a minimum current. Full directions are sent with each coil.

To perform the experiments of fig. 6, two of these coils and two simple recording points will be needed.

S8. **Scripture's Telegraph Key** **$4 00**

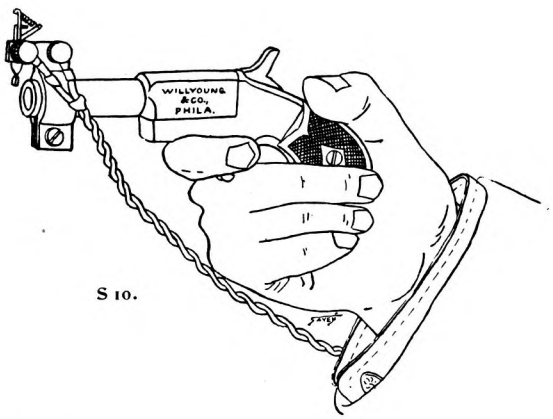
This is a modified form of the ordinary telegraph key, and has both a front and back contact. Adjustments are provided so that the slightest movement of the fingers breaks the circuit. Mounted upon hard wood base.



S 9.

S9. **Scripture's Re-action Key** **$8 00**

(For detailed description see *Studies from the Yale Psychological Laboratory, 1892-93.*) Two slides run on steel guides. The lower one may be clamped to the guides at any point, thereby limiting the range of movement of the upper slide. Either break or make-circuit records may be obtained by merely varying the points of connection, and then, also, with either flexion or extensor movements.

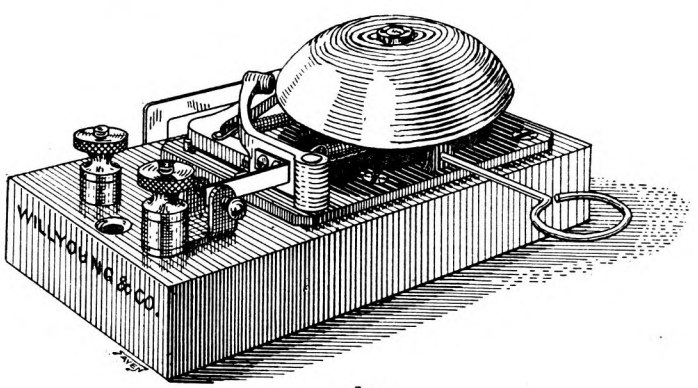


S 10.

S10. ‡**Scripture's Pistol Key** **$5 00**

For use in showing time lost after signal before runner starts. A small blank cartridge pistol is furnished; in front of and a little above the muzzle is a little wing-shaped lever attached to a device clamping to the barrel. This wing is thrown up by the wind from the discharge of the pistol and breaks an electric circuit by means of which a record is made of the exact time of starting. Complete, with pistol and 5 feet of double flexible conductor for connecting to drum.

NOTE—This key will be fitted to any style of pistol or revolver at a total cost of from $3.50 up, depending somewhat upon the style of pistol.



S 11.

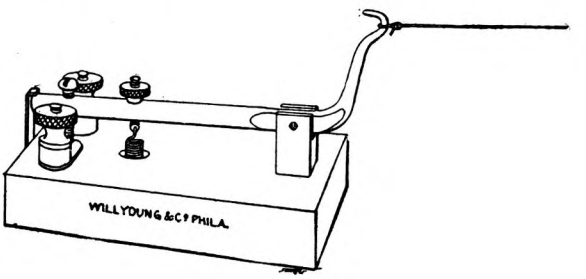
S11. **Simple Bell Signal** **$4 00**

For use as a substitute for the pistol-key where the noise of the latter is objectionable. A small bell is mounted upon a wood base and is

‡The pistol furnished with this key is thoroughly well made, and is one of the best obtainable blank cartridge pistols.

struck by a spring hammer to be tripped by a small handled pull. Just as the hammer strikes the bell, an electric circuit is broken, thus making the record.

S12. **Scripture's Runner's Key** **$2 50**
For use with S10 or S11. Upon a wood base is mounted a pivoted lever held by a spring against a contact point; a thread attached to the lever causes it to lift when the hammer starts, thus breaking an electric circuit and making a record.



S 12.

S13. **Scripture's Touch Key** **$5 50**
For measuring time required to re-act to touch. A long, flexible spring is mounted in a wooden handle and bears against a short rigid arm, also attached to the handle, so as to keep closed an electrical circuit. When the end of the spring, tipped with hard rubber, touches the subject it is pressed away from the short arm and breaks the contact. The circuit is led into the butt of the handle by a pair of twined flexible cords 4 feet in length.

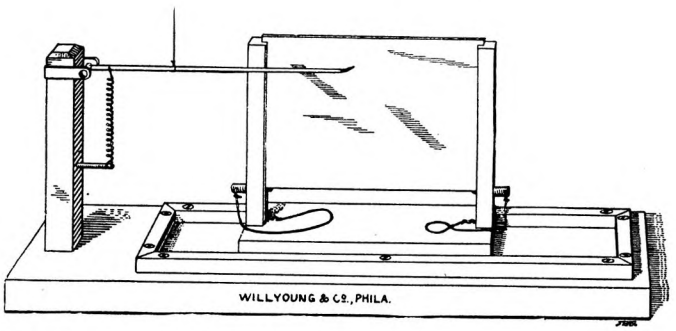
S 13.

S14. **Scripture's Mouth Key** **$6 00**
This is a special form of telephonic transmitter, having a contact so arranged with reference to the vibrating diaphragm as to break a circuit leading to the recording drum at the sound of the voice.

S15. **Scripture's Foil Apparatus** **$12 00**
For fencing re-actions. Consists of a fencer's foil with 6 feet of flexible conductor attached to the handle; one rod with white disc for signal; two metal discs, and a number of flexible conductors. The signal rod has a device attached to it so that when moved a circuit is broken so as to make a record on the drum. As furnished, the apparatus is com-

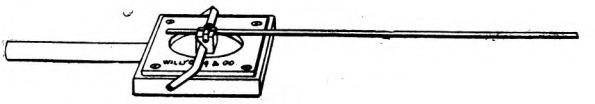
plete to illustrate the experiments of Fig. 26, in "*Thinking, Feeling, Doing.*" See also, "Tests of Mental Ability as Exhibited in Fencing," by E. W. Scripture, in *Studies from the Yale Psychological Laboratory, Vol. II.*

S16. **Scripture's Thought and Action Apparatus** **$15 00**
(See *Thinking, Feeling, Doing, Fig. 28*) For testing quickness of action. Upon a straight rod are mounted three light upright sticks; the rod is placed horizontally and so as to be perpendicular to the front of the body with the upper ends of the sticks about at the height of the shoulders. The far stick carries a little flag which may be suddenly thrown to one side, thus acting as a signal to the subject, and at the same time making a circuit and producing a spark record upon the drum. At the signal the subject strikes out and knocks down the two remaining sticks. Both sticks make a record as they are thrown down, the first giving the reaction time, while the second shows the length of time required for the fist to pass over the intervening distance, *i. e.*, the velocity of the blow. All this may be done by an arm movement of any kind and of any extent. The flag and the nearest stick form a signal and a reaction key for experiment on sight. By moving the flag in one of two ways, or fast and slow, the time of discrimination, time of choice, etc., can be determined for two, three or four possible cases. The use made of the apparatus, as in T. F. D., is only one of a large number.



S 17.

S17. **Scripture's Graphic Recorder** **$5 00**
This has been designed to take the place of the apparatus of Fig. 31, (*T. F. D.*), at a small cost, and will perform the functions of the latter apparatus in a manner sufficiently satisfactory for many demonstration purposes. It consists essentially of a base board, supporting at one end a pillar upon which is delicately pivoted a light bamboo marker. This marker is held horizontally by a light spring, and is so balanced that it yields to the slightest vertical forces. A smoked glass plate moves before the point of the marker upon a horizontal guide, the movement being given it by the hand, so that the curve of steadiness is traced upon the glass. The plate is adjustable vertically so as to secure a number of traces on the same glass.



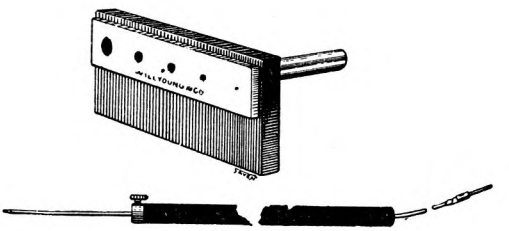
S 18.

S18. **Marey's Receiving and Recording Capsules,** each **$4 00**

This is very similar to the well known "*Cambridge*" pattern, with one or two small improvements suggested by experience. The rubber sheet is clamped between the body of the tambour and a small removable brass plate, so that it may be readily replaced.

S19. **Tongue Attachment for Tambour** **$4 00**

This consists of a device which may be held against the chin by a light band passing around the neck, and which is itself arranged to hold a tambour. The tip of the tongue rests against a light stud projecting from the tambour so that a record of the tongue's steadiness may be obtained.



S 20.

S20. **Scripture's Steadiness Gauge** **$6 00**

(As first described in *Studies from the Yale Psychological Laboratory, Vol. II, p. 116.*) For measuring steadiness and accuracy. A hard rubber block 2¾ in. x 1⅜ in. x ¼ in. thick, has mounted upon it a strip of brass in which are placed, at equal distances apart, five holes of 1, 2, 3, 4 and 5 mms. diameter, respectively; these holes are plugged with hard rubber so that the surface of the brass plate is flush throughout. One terminal of a circuit connects to this plate through a bell or sounder (S20A or S20B), and the other terminal to a fine steel needle held in an insulating handle. The length of needle and handle is 2½ feet over all.

Attempting to land the needle upon the rubber of the holes the circuit is closed and the bell or sounder struck. A short brass rod at the back of the block allows it to be clamped.

S20A. **Electric Bell** **$1 50**

Giving single taps. For use with S20; as also in experiments on rhythm.

S20B. **Giant Telegraph Sounder** **$4 00**

For same purpose as S20A.

S21. **Manometric Capsule** **$6 00**

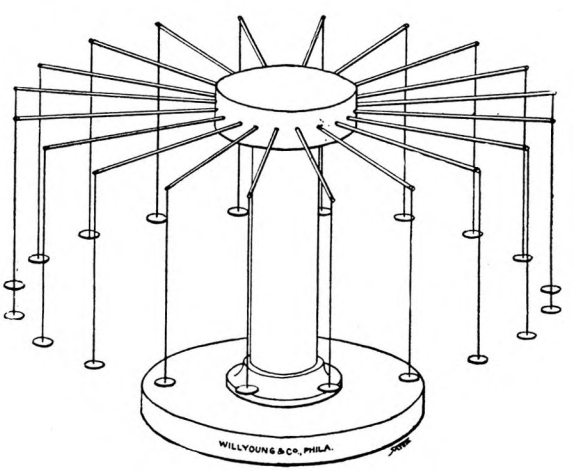
Newly designed. The shell consists of light brass castings; one of these is carried back into a lug drilled with a ⅜ inch hole so that it may be slipped over and held up on a ⅜ inch rod. A set screw clamps it in any position. Has funnel mouthpiece.

S22. **Scripture's Spring Dynamometer** **$4 25**

A wooden base has an upright pillar from which is hung a spring scale of 12 lbs. capacity. A rest is provided for the thumb near the base of the pillar, the fingers being fitted to a special hook fixed to the scale. With swinging stop, as described in T. F. D., p. 80.

S23. **Hypnotism Apparatus** **$5 00**

For inducing the hypnotic state by strain of the eye muscles. A light metal band faced with canvas is clamped and held upon the forehead by a tape; from the front of this band projects a lead wire terminating in a highly polished nickel-plated ball ⅝ inch in diameter. By bending the lead wire the ball may be placed in any desired position with reference to the eyes.



S 24.

S24. **Scripture's Touch Weights** **$3 00**

For determining the threshold of touch. Twenty circles of black card board 1 cm. in diameter, and varying in thickness so as to have weights of 1, 2, 3, 4, etc. up to 20 mgs., are hung by light threads from the ends of light wooden sticks. These sticks are all plugged into the top of a light wooden stand. Each stick and its corresponding hole is marked so as to designate the weight of its disc. In using, the sticks are pulled out of their holes, according to the particular weight desired, and held in the hand.

S25. **Scripture's Apparatus for Least Noticeable Pressure $6 00**

Consists of a special form of balance with beam mounted over a heavy metal base. The scale pans are fastened to the ends of the beam and *above* it. At one end of the beam a light rod terminating in a leather-faced metal disk ⅝ inch in diameter is rigidly fastened at right angles; the hand may be placed under this disk. Funnel and box of sand accompany this.

S26. **Scripture's Apparatus for Least Noticeable Pressure $8 00**

Same as preceding, but with longer arm and central supporting pillar, vertically adjustable, so that the face or any portion of the body may be gotten under the disk and experimented upon.

S27. **Scripture's Simple Aethesiometer $2 00**

Consists of a pair of 5 inch compasses with points tipped with hard rubber. An arc is attached to one leg and the angle is read by using the other leg as an index. The sector is graduated so that the length of chord joining the points is given in mms.; range of measurement—0 to 80 mms.

S28. **Scripture's Complete Aethesiometer $15 00**

A beam 20 cms. long and graduated from its middle point in both directions by mm. divisions, carries a pair of sliding metal fittings in each of which is fixed a light rod. These rods may be moved vertically upward against the pressure of little helical springs. An index attached to each rod moves over a little scale so as to show the amount of downward pressure exerted by the rods. The slides may be moved apart to whatever distances desired, this distance being read off upon the beam by indices attached to the slides. The touch threshold may therefore be determined for widely different distances, and at varying pressures, these pressures being kept constant, for as many successive experiments as desired, by merely causing the rod indices to stand at the same points on the pressure scales.

S29. **Scripture's Test Weights $6 00**

For experiments on the "Threshold of Difference." A set of 11 hard rubber cylinders, 32 mms. diameter by 38 mms. long, and with their ends also closed by hard rubber, are more or less filled with lead so as to have weights of 100, 103, 106, 109, etc., up to and inclusive of 130 gradules. The weight is stamped upon the end of each cylinder.

S30. **Scripture's Pencil for Hot and Cold Spots $2 00**

A thin metal tube of about the size of an ordinary lead pencil is drawn out to a point at one end. Over the entire tube to within about ½ inch of the point is a hard rubber jacket. The tube may be filled with hot or cold water, as desired, of which the temperature will remain fairly constant for a long time. A little stopper allows the tube to be stopped up.

S31. **Scripture's Improved Apparatus for Mapping Hot and Cold Spots.** *Price on application.*

(See "*Science*," *Vol. XIX, No. 483, p. 258.*) This apparatus greatly reduces the labor in making hot and cold spot maps, by making the

process almost perfectly automatic, and by causing the record to be made mechanically rather than by seeking out the proper position with the eye.

The hot and cold stimulus is obtained from a point forming a part of a small but thick walled copper box through which hot or cold water of any predetermined temperature is kept flowing. This box is fastened to the extremity of an arm, and box and arm, as a whole, have motion by rack and pinion movements in the three planes of space. Attached to the arm is a pencil point while fixed permanently under the point is a plate upon which may be placed a square of cross-sectioned paper. The box point is passed over the skin systematically so as to cover the surface; whenever a hot spot (or cold as the case may be) is touched, a key is closed by the free hand and the pencil (moving with the box) carried down against the paper by means of a little electro magnet acting upon it. Since the pencil point executes the same motion as the point, the result is an accurate map of the spots direct on the sectioned paper. The temperature of the box is shown by a thermometer fitting into the top.

S32. **Accessory Apparatus for Scripture's H. & C. S. Apparatus.** *Price on application.*

To work with the above piece of apparatus, S31, with a maximum of convenience and accuracy, an easy method of securing a continuous flow of water at the requisite uniform temperature is necessary. For those not possessing convenient means of securing this flow, we advise this group of accessory apparatus:—Heater on stand with Bunsen burner and electric control for maintaining temperature constant; vessel for cold water; the requisite rubber tubing, etc., for making connections. Heater and cold water vessel each contain about 2 gallons. A thermometer for indicating the temperature will also be required but is not included.

S33. **Scripture's Olfactometer** **$3 00**

Upon a base board is fastened a glass tube ⅜ inch internal diameter and 18 inches long. A tube of smaller diameter but of the same length and with a small nose piece connected to one end by a rubber tube is arranged to slide within the larger tube. At the side of the large tube is a scale graduated in inches. A thin strip of blotting paper is saturated with the test solution and laid in the bottom of the larger tube so that with the nose applied to the nose piece, the extent to which the smaller tube is drawn out, as read off on the scale, is a measure of the intensity of the odor since the length of paper exposed to incoming air is equal to the length of tube drawn out. As constructed, the base board forms the bottom of a thin box, in the lid of which may be kept blotting paper, rubber tubes, etc., the parts of the apparatus when not in use. Complete, with blotting paper, tubes, rubber tubes, nose piece, and 2 standard odor solutions in small glass bottles.

S34. **Solutions for Experiments on Smell and Taste** . . . . . .

See *Thinking, Feeling, Doing;* also, *A Laboratory Course in Physiological Psychology* by Edmund C. Sanford—*Am. Journal Psychology, December, '91.*

S36. **Giant Fork.** *Price on application.*

For showing least audible sounds. A large tuning fork 28 inches long is mounted upon a substantial hard wood base. On each prong is a sliding weight, by moving which the rate of vibration of the fork may be changed. A graduated scale upon the prongs shows the actual value of this rate for various portions of the weights. The limits of obtainable vibrations are 16 and 24 vibrations respectively, or from well below the limits of audible sound to well above.

S36A. **Appun's Reed** **$6 00**

This is a single strip or prong of steel, and capable of adjustment so as to give rates of vibration varying from 4 to 24. It will, hence, serve to take the place of S36.

S37. **Galton Whistle.** *Made by* **Koenig,** *Paris* **$8 00**

For showing highest audible pitch. This is of the same pattern as those which have now been sold for a number of years. It consists of a whistle of very small bore, with an adjustable plug for varying its length. It is sounded by means of a small rubber bag attached to the end of the tube. The number of complete vibrations per second may be varied from about 8000 to 90,000.

Schools and colleges, being able to import **duty free,** *will be given a special price on application.*

S38. **Forks for Least Noticeable Difference** **$20 00**

This consists of a pair of forks mounted upon resonators. One fork is adjusted to 320 complete vibrations per second. The other fork carries two sliding weights moving over a scale graduated in vibrations per second and allowing the rate of the fork to be varied from 305 to 335 complete vibrations per second. In use, the weights are adjusted so that both forks give the same note without beats. Then by sounding the fixed and adjustable forks alternately, and varying the weights upon the latter the least noticeable difference of pitch for different persons may readily be determined. (See T. F. D., p. 146.)

S39. **Gilbert's Tone Tester** **$6 00**

This consists of a small reed pitch pipe fixed to the center of a sector. A small slide may be carried along the reed so as to vary the pitch by moving a lever arm. The lever arm is prolonged into a pointer which plays over the edge of the sector which is graduated in terms of pitch. This piece of apparatus may, therefore, be used for the same purpose as the apparatus just described, S38, although, of course, with results less rigorously exact.

S40. **Apparatus for Finding the Middle Tone.** *Price on application.*

In this apparatus there are three forks mounted upon a base board. One of these has a frequency of 256, and a second of 512 complete vibrations per second. The third fork is provided with a pair of sliding weights by which its rate may be varied from about 370 to 405 vibrations. Each fork is mounted in front of a resonator from which three rubber tubes connect to a single tube, which last leads into

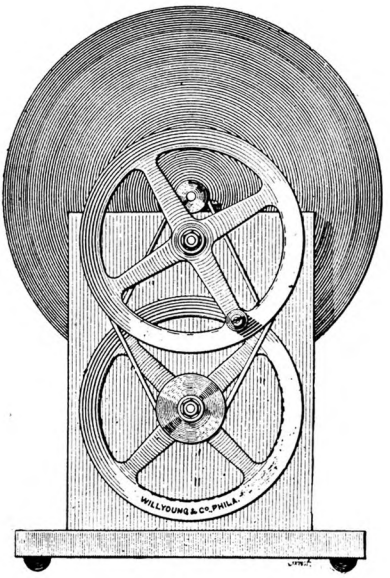
a distant room. A small shutter is normally held between each fork and its resonator by a little spring but may be drawn away, by a small cord leading from it, so as to allow the sound from the resonator to pass into the main tube. The two extreme forks are sounded in succession, and the intermediate fork then adjusted until the distant observer believes it to be, in pitch, half-way between these two.

S41. **Scripture's Audiometer** **$8 00**

Upon a base board are mounted two small and exactly similar coils, with their planes parallel and at a distance apart of about 4 feet. These coils are connected oppositely and are in series. In their circuit is to be connected an electro-magnetic fork and a battery so as to produce an intermittent current. A third coil, in series with a telephone, is movable between the coils upon a guide bar and its distance from the middle point readable upon a graduated scale. The magnetic induction in the middle coil varies with the distance which thus becomes a rough measure of the sense of hearing.

S42. **Bradley's Color Top** **$0 06**

This consists of a wooden spindle with sliding nut; eight thin paper disks 1½ inches in diameter, and in the six standard colors together with white and black; and eight other similarly colored disks, ¾ inch in diameter. These disks, when slotted, may be placed upon the top and compounded in any desired proportions. The top is spun by simple twirling between the thumb and forefinger. With this little device all of the more ordinary phenomena of color mixing may be shown.



S 43.

S43. **Color Wheel** **$8 00**
Our own design. This is mounted upon a substantial hard wood base. The metal work is of iron, finished in black japan, while the bearings are of brass. The wheel is driven by hand and speeds up to and exceeding 3000 revolutions per minute, for the disk arbor, may easily be obtained. Four sets of color disks of 10 inches, 7¾ inches, 5½ inches, and 3¼ inches in diameter are furnished, each set consisting of six disks giving the six standard colors, together with two disks giving white and black. There are also several graduated circles from which the relative amounts of color being mixed together may be read off. The wheel has been so designed that *all of the gear wheels, etc., are concealed from the observer*, so that *there is nothing to distract his attention* from the color disk itself. It is dead black in finish.

S44. **Color Cone** **$4 00**
12 inches from peak to peak, and 8 inches in diameter. This is made up of the diagram of fig. 87, T. F. D., made on an enlarged scale, and cemented into a double cone. The relation of standard colors, tints, hues, shades, etc., is very interestingly shown.

S45. **Package of Colored Papers** **$0 40**
This is made up of 200 squares, 4 x 4 inches, and contains each of the standard spectrum colors, together with the intermediate hues and a large number of shades and tints of each of these. A great many interesting experiments in color matching, etc., can be performed with these papers.

S46. **Circular Diffraction Grating** **$2 00**
Engine ruled and for hand use; 2000 lines to the inch. *With descriptive pamphlet.*

S46A. **Circular Diffraction Grating** **$4 00**
Same as S46, but 7000 lines to the inch.

NOTE.--Prices will be quoted on larger circular and straight line gratings for projection.

S48. **Perimeter.** Complete, with test pieces, ... **$9 00**
Our own design. For measuring the angular limits of the field of distinct vision and for measuring the variation in the angular limits for the perception of various colors. The arc has a radius of about 17 cms. The test object is held by a little wand. This is a well made, substantial, and simple instrument. It has not been designed as an instrument of precision for expert opticians, but for showing in a simple and practical way the leading phenomena of vision limits so far as they are interesting and of value to the psychologist.

S49. **Scripture's Book Stereoscope** **$1 00**
For combining book and other stereoscopic pictures. This consists of a special form of the usual stereoscope, having the extension support removable so that the eyepiece can be readily brought up to the printed page.

S50. **Millimeter Scale** **$0 15**
Of thin polished hard wood and 20 cms long. The divisions are clearly cut and are in millimeters.

S51. **Pneumatic Shoes** **$6 00**
A pair of leather soles may be bound upon the feet, either bare or over an ordinary pair of shoes, by tape fastenings. In the fore part of the sole is a recess covered with a small piece of sheet rubber and having passing from it and out at the tip of the sole a short metal tube of small diameter. A soft rubber tube may be carried from this to a tambour writing upon a recording drum. With a sufficiently long rubber tube the recording drum may stand upon a table; or, the small drum, S57, may be used and carried about in the hand. The interval between steps, as also the length of time the two feet remain upon the floor, is thus recorded.

S52. **Scripture's Electric Shoe** **$2 50**
This is for the same purpose as the Pneumatic Shoe just described, only accomplishing the result by the spark method. A little yoke piece is arranged to clamp to the heel, provision being made for heels of varying widths. Upon this yoke is mounted a little contact key, so that the circuit is broken whenever the foot strikes the ground and made again as the foot is raised. Flexible conductors are supplied with the shoe to connect it to the recording circuit.

S53. **Scripture's Electric Baton** **$3 00**
For experiments in rhythmic action. A rod, similar to an orchestra leader's baton, is provided with a spherical tip of metal mounted upon a flexible rod. Surrounding this rod closely is a metallic ring. The tip and ring are respectively joined to the ends of a pair of flexible conductors, leading off to a recording circuit. Every change of direction of the baton makes a spark record upon the drum.

S54. **Scripture's Electric Dumb Bells** **$2 00**
For experiments in rhythmic action. A pair of light iron dumb bells is joined to a pair of flexible conductors, leading to the recording drum. Every time they are brought together the circuit is closed and a record made upon the drum.

S55. **Scripture's Hallucination Apparatus** **$2 50**
Upon a wooden base board are mounted two metal posts at a distance apart of about six inches. A piece of German silver wire is stretched between these two parts and may be made part of an electric circuit by means of binding post screws forming part of the posts. A special form of key, so small and of such a shape as to allow of its being completely concealed in the hand, accompanies the apparatus and is also to be inserted in the circuit. The current is so adjusted as to just perceptibly warm the wire when it is flowing; the subject then holds it between his thumb and forefinger. The experimenter then opens and closes the circuit at irregular intervals and unknown to the subject, who will often imagine the circuit to be closed when it is not, and *vice versa*.

*S56. **Scripture's Suggestion Blocks** **$4 00**
For showing effect of size upon perception of weight. A set of apparently solid discs, 6 cms. in diameter by 3 cms. thick, and have weights

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* See also **Seashore's Suggestion Blocks** in Section II.

of 15, 20, 25, 30, etc., grams, up to and including 80 grams, respectively, thus making 14 in all. A large disc, 9 cms. in diameter, and a small one of 3 cms. in diameter (both 3 cms. thick), and both weighing 55 grams, are also furnished. The subject, not knowing the large and small disc to have the same weights, selects a medium weight to match the one and then again selects to match the other. A *heavier* disc is invariably selected ts match the *larger* comparison disc. (See also *Thinking*, *Feeling*, *Doing*, p. 266.) Each disc has its weight stamped upon it in very small figures. The entire set of 16 discs is supplied in a suitable containing box.

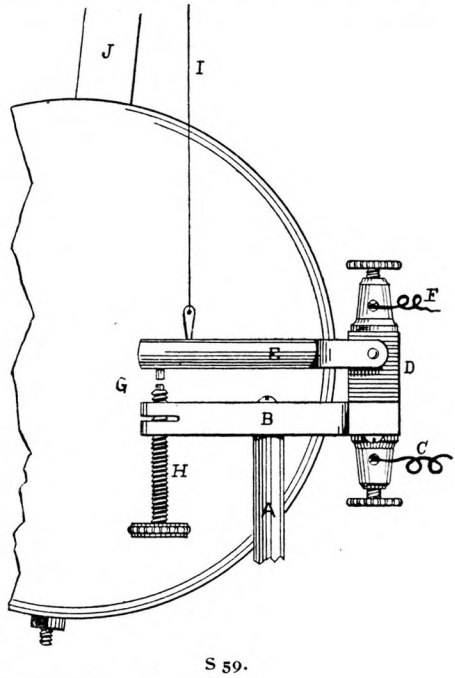
S57. **Portable Recording Drum** **$155 00**
Suitable for carrying about in the hand and securing records of the subject's movements.

NOTE.—The drum S57 is made by Mariaud, Paris, and can be imported free of duty (according to Act of Congress) by educational institutions. A special **Duty free** *price will be quoted on application. We are now working upon a simpler and more inexpensive equivalent of this, to be made by ourselves, and hope to be able to announce the same very shortly.*

S58. **Scripture's Blind Spot Cards.** Per set of four **$0 15**
There are four of these cards in all, three of the same design as those in figs. 103, 105, and 107 of the book, and one of a new design. The cards are, however, much larger than the designs in the book, being 4 x 6 inches and are printed in blue and red colors. They show the phenomena of the blind spot in a very effective manner.

S59. **Scripture's Pendulum Contact** **$8 00**
(See *Studies from the Yale Psychological Laboratory*, vol. I, p. 99.) In attempting to get records of seconds from the pendulum of a clock it has been usual to employ a mercury globule placed in a little support under the centre of the pendulum's swing, to be cut by a point from the pendulum bob. This globule soon becomes oxidized and requires readjustment; it, also, occasionally becomes jarred off so as to require a raising of the mercury level. To avoid these constant annoyances, Dr. Scripture has devised the form of contact shown in the figures. This is a strictly mechanical contact of platinum against platinum and is, hence, as thoroughly reliable as the contacts in any vibrating bell or telegraph key. The light silk cord or wire, I, is attached to the pendulum rod at a point somewhat below its axis of suspension, and to a bar, E, immediately below this axis. When the bob passes through the vertical, therefore, the bar, E, will reach its limiting point, so that if the contact screw, H, be properly adjusted, the circuit will be momentarily closed. This form of contact will operate successfully for weeks at a time without requiring the slightest attention. When the contacts do finally become sufficiently oxidized to require cleaning off, this may be accomplished without having to stop the pendulum, as in the case of mercury contacts, since E needs only be lifted up to take all strain from I. The weight of bar, E, is very small and the angle of movement very slight, so that the friction is exceedingly minute. An adjustment is provided by means of which the contact may be moved to the right or left, so as to correspond with the exact centre of swing. The whole is accurately

made of metal and hard rubber. It is mounted upon a little metal frame which may itself be screwed fast to wood. In mounting up this device, any cabinet maker or good carpenter may be employed to insert a little wooden bracket inside the clock case, upon which the contact may be fastened. Detailed directions as to this mounting accompany each contact.



S 59.

S60. **Scripture's Multiple Key** **$16 00**

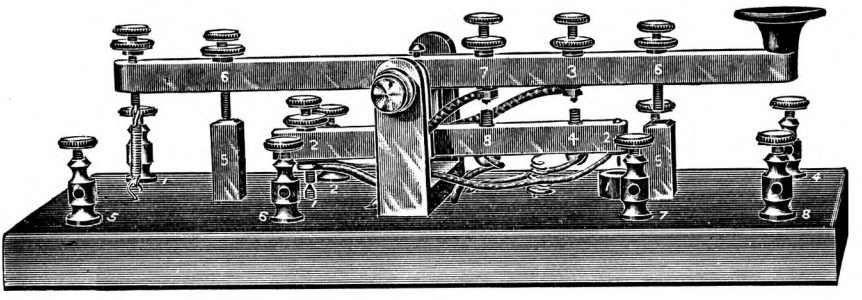
For simple qualitative measurements of reaction time any ordinary make or break key is sufficiently effective. When, however, great accuracy is desired, and when, also, the experiments become at all elaborate, something specially designed to meet the special requirements of the case must be employed. Dr. Scripture's Multiple Key is, it is believed, the best appliance which has yet been devised for exact and complex reaction time experiments. A few of the functions for which this key may be employed, by slightly altering certain adjusting screws, are as follows :

1. Of an ordinary key where contact is *made* by depressing the key.
2. Of an ordinary key where contact is *broken* by depressing the key.
3. To *close* two circuits *simultaneously*.
4. To *close* two circuits *simultaneously* and a *third* an instant *later*.
5. To *close* one circuit and *break* another simultaneously.
6. To *close two* circuits and *break* a third simultaneously.
7. To *break* one circuit just before *closing* a second.
8. To *break* a circuit and instantly *close* it again.

A large number of other combinations can easily be made. The key is substantially made of metal and mounted upon a polished hard wood base 10 inches by 4 inches in size. The workmanship is of the highest accuracy, so that the key may be used in the most exact investigations.

For detailed description of the *Multiple Key*, see *Studies from the Yale Psychological Laboratory*, vol. I, p. 11 and 12, "*Investigations in Reaction-time and Attention;*" also p. 98, "*Some New Psychological Apparatus.*"

NOTE.—*Since the above cut was made, changes in detail have been effected greatly improving this key.*



S 60.

S61. **Scripture's Five Finger Key** (either hand) **$9 00**

Five levers, arranged so that the knobs fit the fingers of the right hand, carry front and back contacts similar to to those in S8. The separate levers can be connected to make one record or five records. A similar key is made for the left hand.

S62. **Scripture's Automatic Contact for Determining the Latent Time of Spark Coils, Markers, Etc.** **$4 00**

For all accurate work and for training in laboratory practice it is necessary to measure the latent time at the make and break of the circuit in time markers and at the break in spark coils. The automatic contact is attached directly to the drum. The contact is attached to the drum support. A pin on the head of the drum makes or breaks the circuit at a definite position, which is recorded by moving the drum slowly. The time-line and the marker, or the spark, are then arranged. By revolving the drum at a high speed, the latent time can be determined with great accuracy. *This can be attached (if so ordered) to any of the drums S1 to S1C.*

S64. **Scripture's Models for Demonstrating the Treatment of Measurements** **$15 00**

A large block carries a number of vertical steel rods. Colored beads and sticks are slipped on these rods to illustrate the relative frequencies of variations in measurements. Symmetrical or assymmetrical curves are formed. The apparent relation between the arithmetic mean and the median is clearly illustrated (see *Studies from the Yale Psychological Laboratory*, Vol. II). To save time in transforming the simple curve

into the integral curve, additional models are provided. Complete with one frame, 500 square wooden beads, 200 sticks of different lengths and two models of integral curves.

S66. **Scripture's Contrast Banners,** *per set of four* **$5 00**

Set of 4 banners of red, yellow, orange, and blue cloth respectively, each 2 feet 1 inch wide by 4 feet 8 inches long, and arranged to hang upon the wall like a map. In the centre of each banner is a rectangle of drab-colored cambric 6 inches wide by 2 feet 1 inch long, and over this, also centered upon the banner, a rectangle of thin white muslin 1 foot 6 inches wide by 3 feet 5 inches long. When hung up in fair daylight each piece of drab shows through its muslin with the color complimentary to its background.

These banners show the phenomena of contrast colors very effectively for lecture-room purposes.

If furnished singly, each $1.50.

S68. **Scripture's Wool Test for Color-Blindness** **$5 00**

The worsteds are arranged in 7 rows on a large black banner, 3 feet wide by 5 feet 8 inches long. The bottom row is first pointed out, and the experimenter explains what is meant by worsteds being all of the same general color. The person or persons experimented upon are asked to notice which of the other rows are all of any one general color. The experiment can be performed simultaneously on as many persons as can see the banner. It is especially adapted for testing large audiences or classes.

The diagnosis is as follows:

Row 1, all of the same color . . . . . color blind.
" 2, " " . . . . . normal.
" 3, " " . . . . . red blind.
" 4, " " . . . . . green blind.
" 5, " " . . . . . red blind.
" 6, " " . . . . . green blind.

S69. **Scripture's Color Sight Tester** **$12 00**

Some persons are not color-blind for bright or near objects, but are color-blind for distant or weak ones. These persons are perfect at the wool tests, but cannot tell a red lantern from a green one at a distance. In Dr. Scripture's apparatus colored glasses are manipulated in such a way that both color-blindness and color-weakness are exposed. The instrument resembles a rather large ophthalmoscope. Its manipulation is very simple. Full directions accompany it. *A special pamphlet will soon issue regarding this instrument.*

S70. **Scripture's Color Blind Flags** **$6 00**

(See frontispiece, T. F. D.) To aid in the demonstration of color-blindness, four flags are prepared to represent the American flag as it appears to color-blind persons of different kinds. Size about 20 x 14 inches. Very effective for class demonstration.

S71. **Scripture's Stereoscopic Lantern Slides** . . . . . .

Figures and pictures to illustrate the principles of binocular vision are thrown in pairs on the screen. Each person of the class or the audience observes these figures through small pieces of colored glass, whereby the pictures combine and are seen in actual relief. A whole audience can thus see stereoscopic views just as one person sees them in a stereoscope. A bi-unial lantern is required.

Slides, per pair	$ 2 50
Set No. 1, 10 pairs of different figures and views .	23 00
Set No. 2, 10 pairs, different from Set No. 1 . . .	23 00

Each set is accompanied by enough pieces of red and green glass to supply 100 persons.

S72. **Scripture's Psychological Pendulum** **$15 00**

For obtaining seconds, half-seconds, two-second intervals, etc. Invaluable for general work in a psychological laboratory.

The pendulum proper is of ash. Two flat lead bobs are adjustable upon this rod so as to secure wide variations in rate of swing. The pendulum swings upon hardened steel knife edges in hardened steel bearings, themselves attached to a pillar erected from a substantial base. A contact point is fixed to the lower extremity of the pendulum so that an electrical circuit may be closed at each swing. A special device allows of this contact being made *only at alternate swings* if desired.

The whole is substantially made and neatly finished.

NORMAL SET, No. 1.

S17.	Graphic Recorder . . .	$5 00
S22.	Spring Dynamometer .	4 25
S24.	Touch Weights	3 00
S27.	Simple Aethesiometer .	2 00
S29.	Test Weights	6 00
S30.	Pencil for Hot and Cold Spots	2 00
S33.	Olfactometer	3 00
S37.	Galton's Whistle	8 00
S39.	Tone Tester	6 00
S42.	1 doz. Color Tops	60
S44A.	Color Cone Diagram . .	1 00
S45.	3 pkgs. Colored Papers .	1 20
S49.	Book Stereoscope . . .	1 00
S50.	Millimeter Scale	15
S56.	Suggestion Blocks . . .	4 00
S58.	Blind Spot Cards	15
	Total,	$47 35
	Net price in special containing case	$43 00

NORMAL SET, No. 2

Contains the following pieces in addition to those of Set No. 1:

S1B.	Student's Drum	$20 00
S2.	Glazed Paper	1 00
S5A.	Electric Fork	16 00
S6.	Time Marker	6 00
S7.	Spark Coil	12 00
S11.	Bell Signal	4 00
S12.	Runner's Key	2 50
S13.	Touch Key	5 50
S322.	2 Cells Battery	3 70
	½ lb. Wire	18
	Total,	$70 88
	Total of Set No. 1	$47 35
	Net price of Set No. 2 in special containing case . . .	$106 00

NORMAL SET, No. 3

Contains the following pieces in addition to those of Sets Nos. 1 and 2:

S16.	Thought and Action Apparatus	$15 00
S52.	Electric Shoe	2 50
S53.	Electric Baton	3 00
S54.	Electric Dumb Bells . .	2 00
S20B.	Graphic Chronometer .	40 00
S210.	Giant Telegraph Sounder	4 00
	Total,	$66 50
	Total of Set No. 2	$118 23
	Net price of Set No. 3, in special containing set . . .	$165 00

NOTE.—With each set are furnished diagrams, showing how the apparatus must be arranged for the various experiments and directions as to manipulation.

Set No. 4. (**Standard Set for Accurate Measurements.** Suitable for small laboratories, tests on school children, systematic instruction in psychology, etc.)

S1.	Recording Drum	$35 00
S2.	Paper for Drums	1 00
S320.	Motor	22 00
S5A.	Electric Fork	16 00
S6A.	Time Marker	13 00
S7.	Two Spark Coils	24 00
S8.	Two Telegraph Keys	8 00
S9.	Reaction Key	8 00
S11.	Bell Signal	4 00
S13.	Touch Key	5 50
S16.	Thought and Action Apparatus	15 00
S17.	Graphic Recorder	5 00
S22.	Spring Dynamometer	4 25
S24.	Touch Weights	3 00
S27.	Simple Aethesiometer	2 00
S29.	Test Weights	6 00
S33.	Olfactometer	3 00
S37.	Galton's Whistle	8 00
S39.	Tone Tester	6 00
S43.	Color Wheel	8 00
S50.	Millimeter Scale	15
S56.	Suggestion Blocks	4 00
S322.	Two Batteries	3 70
	½ lb. Wire	18
	12 Connectors	1 00
	Total,	$205 78
	Net price in special containing case	$175 00

Special Apparatus.

We have made a number of pieces of Psychological Apparatus for some of the most eminent authorities in the country. We submit designs whenever desired, before beginning construction.

Section 2.

In this section will be found several exceedingly interesting and valuable instruments due to Dr. G. W. Fitz, of Harvard University. There are also a number of pieces of our own design, some of Continental manufacture, and a line of chronographs from the shops of NALDER BROTHERS & Co., of London, whose American representatives we are. The apparatus in this section is, in general, intended for exact quantitative and research work.

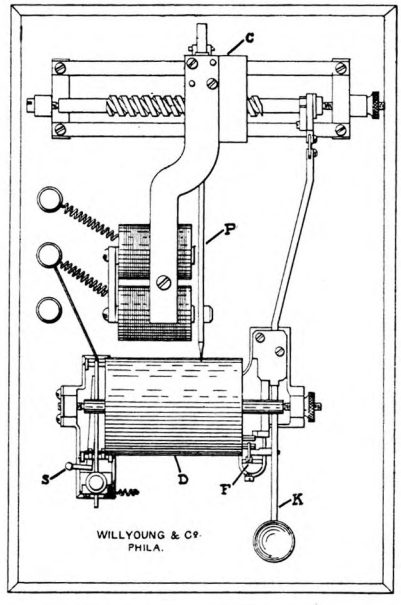
[LETTER OF AUTHORIZATION.]

July 15, 1895.

To whom it may concern:

This is to certify that I have constituted the firm of Elmer G. Willyoung & Co., the sole authorized makers of the several pieces of apparatus of my invention, known respectively as the Pendulum Chronoscope, the Location Reaction Apparatus, the Spring Cylinder Chronograph, and the Sparring Re-action Apparatus. Also that the designs of these pieces, as made by the above firm, have been made according to my suggestion and advice, and that they have been examined by me, and have my full approval.

Signed, G. W. FITZ, M. D.,
Asst. Prof. Physiology, Harvard University.



S200. **Dr. Fitz's Spring Cylinder Chronograph** **$35 00**

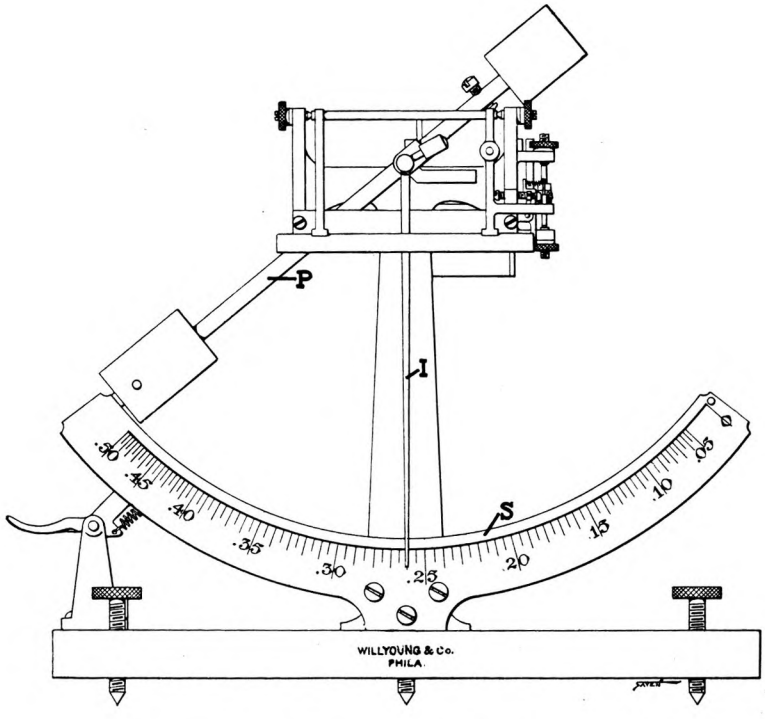
A small drum, D, 2 inches in diameter by 2½ inches long is mounted upon coned bearings. When key K is depressed this drum is carried around through a small angle against the resistance of a compression spring which, when the key is at the bottom of its stroke, is suddenly released, so that the drum, D, is given a rotatory push which sends it at a uniform speed of about 8 inches per second (peripheral) through a complete revolution. As K depresses, its extension revolves a screw upon which rides the carriage, C, which carries the time-marker, P; the marker is thus advanced about 3-32 inches for each revolution of the drum, so that there is always a fresh part of the drum for each successive re-action measurement. Further than this, the drum itself is made to give the stimulus by having a projecting stud open an electric contact when the drum has revolved through about 10 degrees of arc. A device allows this contact to instantly close again or to remain open at will. The time-marker, P, is a flat steel strip having a period of 100 vibrations per second. The stimulus and reaction circuits are arranged to be closed, normally, so as to hold the marker against the electro-magnet. Hence, when released (during the interval *between* stimulus and re-action), the marker vibrates and the number of waves traced is a measure of the time. After each revolution, drum and key automatically take the proper position for another experiment, and so on. The time-marker carriage can be instantly reset to any desired position upon the screw.

The instrument will be found very convenient for re-action time experiments, as it allows a large number of records to be obtained upon one drum and experiments to be made in rapid succession and without adjustment of several pieces of apparatus. It is accurately and substantially made of metal, nicely finished, and mounted upon substantial base.

Dr. Fitz's Pendulum Chronoscope . . . . . .

This instrument, devised by Dr. G. W. Fitz, of Harvard University, was first described by him in a paper entitled, "A New Location Re-action Apparatus," in *The Psychological Review*, January, 1895, and pictured in the same article. A number of improvements in the instrument have been made by Dr. Fitz since that time, and the latest models here listed are offered as perfected and thoroughly practical working instruments which can be depended upon for continuous and satisfactory working.

The following general description applies to the several styles here listed, whether covered or open:—Upon a light but rigid supporting casting swings a pendulum, P. Moving with the pendulum is a light flat index, I, which swings over a scale, S, graduated in fractions of a second so as to show the time taken by the pendulum to swing from the zero position upon the right to the particular point on the scale. In using the chronoscope the pendulum (and index) is carried to the extreme right, where it is caught back by a detent energized by an electro-magnet in circuit with the stimulus key. When the signal is given by the key (making a sound, exposing a light, or by any other orthodox method) the broken circuit frees the pendulum, which instantly, with its index,



swings down over its scale. When the re-action key is operated, it is made to close once more the chronoscope circuit; this releases a light clamp between which and the main frame the index swings. This clamp, being normally free of the index against the tension of a powerful spring, instantly catches the index and binds it against the scale, thus giving the time of re-action directly in known fractions of a second. The pendulum itself swings on and is caught fast at the left of its arc by a special device. By then operating a mechanical key attached to the instrument the pendulum is automatically carried a trifle further upon the left and then freed, when it swings back to the right, catching up the index as it passes, to be caught fast by the detent, when the instrument is then ready for a second experiment.

The pendulum is so made as to be almost frictionless, and careful tests have shown the error in the use of this instrument to be almost inappreciable. *The instruments are all empirically graduated by comparison with the times of falling bodies, and their accuracy is guaranteed.*

For many of the usual re-action experiments the Fitz chronoscope will be found superior to any form of chronograph method, being much simpler, more convenient, and quicker.

These instruments have been supplied to the laboratories of the World's Museum, Chicago, and of the Women's College, Lynchburg,

Va.; also to the gymnasium of the Y. M. C. A., Chicago, Ill., and to the University of Colorado, Boulder, Col.

Dr. Fitz's Pendulum Chronoscope—Style A . . . . . .

This is the original open form as first made by Dr. Fitz. The base and supporting frame are of neatly japanned metal, while the working parts are of lacquered brass. It is made with several different ranges, as below. Each instrument is supplied in wooden carrying-case.

Dr. Fitz's Pendulum Chronoscope—Style B . . . . . .

Same as above, but enclosed. A mahogany dust-proof cover, with glass front, fits down over the working parts. It may be removed by means of two fastenings.

Single Scale Instruments.

	Time of full swing	First graduation is	*After first division the remainder occur every	Style A, open	Style B, closed
No. 1	½ second	1-20 second	5-1000 second.	$50 00	$60 00
" 2	1 "	1-10 "	1-100 "	50 00	60 00
" 3	2 "	1-5 "	2-100 "	50 00	60 00

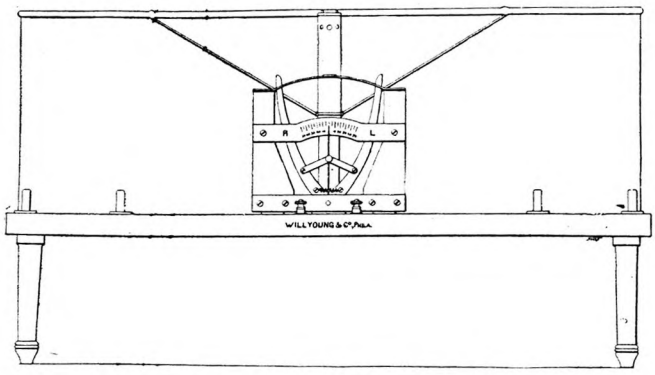
Multiple Scale Instruments.

No. 4; has two interchangeable pendulums as in No. 1 and No. 2	60 00	70 00
" 5; has two interchangeable pendulums as in No. 3 and No. 4	60 00	70 00
" 6; has three interchangeable pendulums as in No. 1, No. 2, and No. 3	70 00	80 00

S201. **Dr. Fitz's Location Re-action Apparatus** **$25 00**

(As devised by Dr. G. W. Fitz and first described in *Psychological Review, January, 1895.*) For testing the power of an individual to quickly and accurately touch an object suddenly disclosed to him in an unexpected position. The subject is required to make a movement of the finger from the end of the nose to one of three positions of the arc of a circle of which he is the centre, and whose plane is at the level of his elbow. The object to be touched is a white spot, ½ inch in diameter, which may be placed at any one of these three points without the knowledge of the subject, a screen being in front, arranged to fall at the proper time and disclose the spot. Just as the spot is exposed, an electric contact is made by the falling screen and a record made upon the recording instrument. The subject at once strikes out and, touching the white spot, effects another contact, which makes a second time record.

**Each of these intervals can be sub-divided by the eye to tenths, as the tip of the pointer is made very thin and sharp for this purpose.*



S 201.

The screen is quite light and about 12 inches high by 36 inches long. It is mounted upon a solid base and has a fall of about 10 inches. Depressing a key upon the base releases the screen. Behind the screen are three fittings, at the centre and two ends respectively, into which will engage the device (shown in the centre of the figure) which carries the disc to be struck. This disc is mounted upon and at the centre of a flexible strip of metal; pressure upon any point of this metal strip causes the second time record to be made. Simultaneously with the making of this second contact there is released a pair of light "scissor" arms which fly up and lightly embrace the striking finger; attached to these arms is an index moving over a graduated scale so as to always lie in the centre line of the scissor arms. The scale is graduated in both directions, from zero at its centre, so that the index reading becomes a measure of the accuracy with which the disc is struck.

With this instrument the effect of training in the base-ball and tennis field is very easily and beautifully shown. It has been used in the gymnasium at Harvard with considerable success, and is also being used by the gymnasium of the Chicago Young Men's Christian Association, and is recommended to all instructors in physical training as an effective aid in their work. It is simply and substantially made and will stand very hard usage without derangement.

NOTE.—We recommend the use of Dr. Fitz's Pendulum Chronoscope with this instrument as furnishing all the requisite accuracy, combined with the greatest convenience in working.

S208. **Exposing Screen** **$35 00**

(W. S. pattern.) For producing exposures of letters, words, diagrams, etc., in lecture-room experiments upon time necessary for recognition. (As made for Dr. Lightner Witmer, University of Penna.)

This apparatus consists of a solid oak frame 36 in. high, upon which is mounted an endless curtain 32 in. wide. In this curtain are two rectangular apertures, or windows, 12 in. high by 24 in. wide. This curtain moves upon light rollers, so placed as to bring the plane of the upward and downward moving portions of the curtain within about ¼ inch of one another. The two windows are so cut as to be in the centre of the apparatus when superposed. Behind them is a flat show-board hinged to the frame, upon which may be placed the chart or diagram to be exposed. The curtain and rollers are wound up against the tension of a strong spring by means of a cord and held fast by a spring click. When this click is released by a trigger attached to the lower part of the framework, the curtain is instantly set into rapid motion and the two windows approach, superpose, and recede from one another so as to permit the chart or diagram to be exposed. The time of exposure can be shortened or lengthened by means of an adjustable pneumatic brake.

This apparatus *is unique in that the exposure is made symmetrically above and below a central horizontal line*, just as that of the iris diaphragm is made symmetrically about a point. The eye fixes itself naturally at this centre line and remains there, not being caught by any traveling portions so as to distract the attention.

This apparatus is substantially made and cannot readily get out of order. It is perfectly portable, weighing but 10 lbs., and is compact. For lecture purposes it is recommended as far superior to any other form of exposure apparatus in the market.

S209. **Exposing Screen** **$50 00**

(W. S. pattern.) Same as S208, but arranged to vary the time of exposure between wide limits, and to give it any desired and predetermined values. The exposing time is given by an index attached to the adjustment, and moving over a graduated scale.

S210. ***Runne's Graphic Chronometer** **$40 00**

This is a chronometer stop-watch mounted in a rectangular metal case. It can be used as a very accurate stop-watch (see T. F. D., p. 256). It can also be used to write seconds or fifths of a second directly on the (see T. F. D., p. 256) by means of a fine pointer actuated from the escapement. It is also arranged to break a circuit for running a sounder, bell, Geissler tube, etc. (see T. F. D., p. 256), or for making sparks. Size, 46 mms. high and wide by 16 mms. deep. Weight, 200 grams.

S211. **Recording Apparatus** **$35 00**

(As suggested by and made for Dr. Lightner Witmer, University of Penna.) This apparatus will be found useful in obtaining records of the maxima and minima of muscular action, as e. g., the knee jerk, etc.

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* *This can be imported* **duty free** *for schools and colleges at a somewhat less price.*

A strip of paper, 15 inches wide and of any desired length, is unrolled from one drum upon another about 12 inches distant by means of a spring placed within the second roller. Between the two rollers the paper passes over a flat metal bar, above which a pen moves upon guides in a line perpendicular to the direction of the paper's motion. The rate at which the paper moves over this bar is regulated by an electro-magnetic escapement which may be controlled from a second's or any other pendulum or by any other device for closing an electric circuit. At each make of the circuit the paper advances by about ⅛ inch. The pen, which is capable of holding a considerable supply of ink, is to be attached to the particular thing whose movement is to be recorded, and moves against the tendency of a weight tending to always carry it in the same direction. An electric contact is attached to the pen in such a way that when the initial jerk comes upon the pen a circuit is broken so as to make a time record of the re-action of the particular muscle being observed. The apparatus is substantially made of metal upon a hard wood frame work.

S212. **Interrupted Extent Apparatus** **$20 00**

As suggested by Dr. E. B. Titchener and made by us for Cornell University.

A car is arranged to be drawn over nearly frictionless guiding ways by means of a weight. A pair of vanes of adjustable angle gear to a drum controlling the motion of the car and give it practically uniform speed of variable (at will) rates. Upon this car are adjustable clamps by which two or all three of the following strips of hard rubber may be held "end on" in any order so that the finger may be passed over. The strips are of same width and length.

1. Open space strip, 5 cms. long, with one side planed down, except at the two ends, which are *beveled* up (on sides toward center) so as to have a sharp edge.

2. Interrupted space strip, 5 cms. long, but with one side notched with V shaped teeth at intervals of 1 mm.

3. Smooth space strip, 5 cms. long and smooth.

S213. **Combination Tilt and Rotation Table** **$50 00**

As designed and built for Dr. E. B. Titchener, of Cornell University.

A skeleton wood pedestal has a stout metal shaft passing through its centre, and down through a bearing in the centre of a substantial wood base which may be bolted to the floor. A nut retains this shaft in position so as to allow of rotation of the pedestal. Three metal wheels attached to the pedestal and rolling upon metal ways placed upon the base, support the weight of the pedestal and provide easy and smooth rotation. Upon the top of the pedestal is the "chair-table," which is made in three sections

joined together with lever arms so that either a flat table or a chair may be made at will. The two end sections make up back and leg support of the chair and are always parallel as in the various forms of reclining chairs upon the market. They may be set at any desired angle with the seat.

When used as a flat table all angles with the vertical are possible, so that the subject may be placed with head or feet downward or rotated through a full 360° if desired.

Angles of rotation about the vertical are read from 0 to 360° upon a large circle fixed upon the periphery of the base; two sets of numbers are provided, starting from 0 in opposite directions.

Angles about the horizontal are read from 0 (for the horizontal position) to 90° (head up) or 90° (head down).

Straps are provided for holding the subject in place when at considerable angles with the horizontal. An adjustable foot board accommodates experimenters of different heights.

This table has been carefully worked out and is solidly made and nicely finished.

S230. **Registering Metronome** . . . . . .

This will be found a good substitute for a clock in many laboratory experiments; it is arranged to record at a distance, both by an electric circuit and air transmission (using a manometric capsule.)

A. Price: As described, $12.00.

B. " " but with addition of bell, $13.50.

S231. **Simple Metronome** **$3 75**

S232. **Compression and Extension Dynamometer** **$12 00**

Consists of an oval steel spring having a graduated scale mounted within it. A pointer attached, through a lever system, to the oval moves over the scale and indicates the amount of pressure exerted in the line of the minor axis, or traction in the line of the major axis. The index remains at the maximum until reset; reads up to 180 Kg. (360 lbs.)

S233. **Jastrow's Automatograph** **$12 00**

(See Am. Jour. Psych., Vol. IV, p. 398–407; also Vol. V, p. 224, etc.) For studying the direction and extent of involuntary movements as related to attention.

A square of plate glass, 15 inches on a side, is mounted in a wooden frame which is itself adjustable for level by means of leveling screws. Three polished brass balls, ¾ inch in diameter, are laid upon this plate so as to become the peaks of an equilateral triangle; upon them is placed a thin plate of frosted crystal glass, 14 inches square. From one edge of this crystal glass projects forward an arm, about 10 inches long, carrying at its end a glass stylus or lead pencil, as preferred. This stylus is free to move vertically so as to readily adjust itself to any inequalities of the surface upon which it marks. This surface is a piece of smoked paper, stretched over a glass plate by means of a suitable frame in which this plate is mounted. A screen is placed vertically between the Automatograph and the recording plate, in order to conceal the record from the sight

of the subject. When the subject rests the finger tips upon the instrument, the recording point will trace a record dependent for its direction, character and extent upon the direction and quality of the attention.

Complete, with balls, one extra stylus, screen and recording plate.

S234. *__Helmholtz's Spherical Resonators__ . . . . . .

(Made by Koenig, Paris.) Set of 19, being fundamental (ut_1=64 dbl. vibs) and 18 harmonics. *Price on application.*

S235. *__Helmholtz's Spherical Resonators__ . . . . . .

(Made by Koenig, Paris.) Set of 10, being fundamental (ut_2=126 dbl. vibs) and 9 harmonics. *Price on application.*

S236. __Gelatine Films__ . . . . . __$3 50__

In 24 different colors. Size, about 10 x 17 cms. In case. *The colors of these films are exceedingly pure.*

S240. __Bradley's Pseudoptics__ . . . . . .

A series of experiments in producing optical illusions. The experiments are performed by the aid of a series of cards prepared with the assistance of Dr. Münsterburg, of Harvard University. These cards are arranged in three groups, each group being put up by itself in a containing box. The first contains illusions of lines and figures, with an appendix of illusions of movement; the second, illusions of color and light; the third, illusions of double vision and third dimension. Each group is divided into sub-groups, put up in envelope portfolios. Every piece bears a letter and number indicating its classification.

Box No. 1 contains four sections—A, Illusions of Length; B, Illusions of Direction; C, Illusions of Form and Size of Figures; D, Illusions of Movement.

Box No. 2 contains four sections—E, Illusions of Optical After-Effects; F, Illusions of Color Mixtures; G, Illusions of Light and Color through Influence of Surroundings; H, Illusions of Indirect Vision.

Box No. 3 contains three sections—I, Illusions of Multiple Vision; J, Illusions of Perspective; K, Illusions of Stereoptic Vision.

This set of experiments will be found very instructive, as well as entertaining, and equally appropriate for home, school or college use. Full directions and explanations accompany each set.

The entire set, three boxes	$5 00
Part No. 1	2 00
Part No. 2	1 75
Part No. 3	1 25

A 32 page pamphlet, describing the above, will be mailed to any one sending a two cent stamp.

S241. __Seashore's Suggestion Blocks__ . . . . . __$14 00__

Two sets of cylindrical blocks colored dull black and loaded. Length of cylinder, 31 mms. Each set consists of 17 blocks. Those of Set A are uniform in weight, but vary in diameter according to a geometric

*__DUTY FREE PRICES__ *will be quoted on application.*

series in which the regular increment is one-tenth. Those of Set B are uniform in size, but vary in weight with a successive difference of 5 g. With these blocks it is possible to determine the exact mathematical law according to which variations in size effect judgments of weight. (See Studies from the Yale Psychological Laboratory, Vol. III.) These blocks can be used as an excellent exercise or demonstration in careful psychological methods of measurement.

S242. **Cattell's Algometer** **$10 00**

For measuring the intensity of pressure causing pain. (See "On Sensations from Pressure and Impact," by Harold Griffing, Ph. D., Monograph Supplement No. 1, February, 1895, of Psychological Review.) Consists of a spring dynamometer reading up to 15 kilograms and having its spring ending below in a sliding cylinder of brass, capped with a hemispherical piece of hard rubber about 8 mms. in diameter. The pressure is exerted by the hand of the operator, the instrument ending above in a proper "grip."

S243. **Mosso's Ergograph** **$40 00**

(See Vol. II of Landois & Stirling's "Text Book of Human Physiology," 4th ed.) Finely finished.

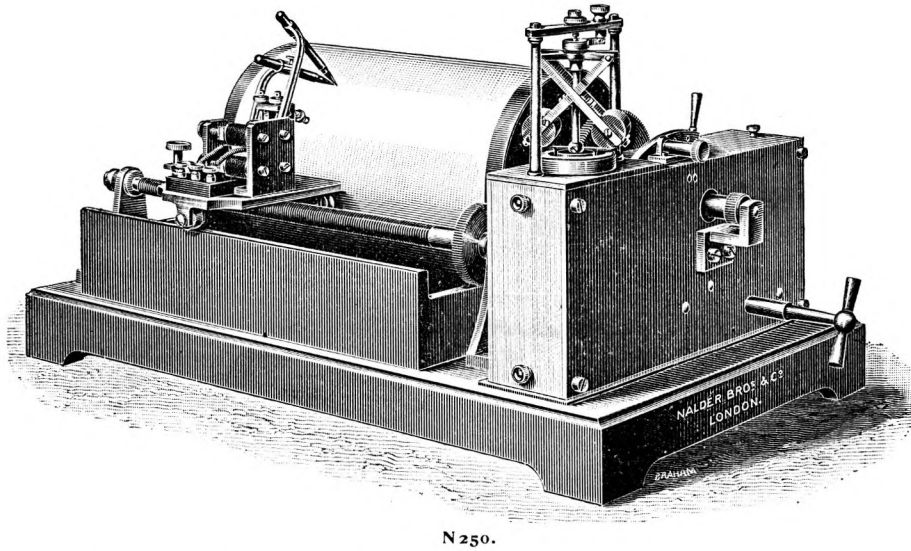
Final design of this is not yet completed, so that we are unable to give a detailed description, but we shall be pleased to furnish such to inquirers.

Chronographs for Psychological and Physiological Work.

The following S250 to S255, inclusive, are made by Messrs. Nalder Bros & Co., of London, England, whose American representatives we are. All of the gear wheels are cut by high class machinery and the workmanship throughout is of the highest possible character. The control is effected by Nalder's Improved Isochronous Governor in which the retardation is accomplished by the arms attached to the pendulum weights rubbing against a heavy ring capable of free rotation. In the case of a slight acceleration, the friction of the arms against the ring suffices for proper regulation, while if the tendency to higher speed is greater, the ring is rotated by the arms, its friction thus accomplishing the necessary correction, and in both cases without shock or jar. With this type of governor we always slightly overdrive; further regulation adjustments can be obtained by removing or adding, as may be required, one or more of the driving weights, which are easily removable, as in an ordinary weighing machine. The maintaining motion is Hooke's, with endless pitch chain and two weights.

S250. **Nalder's High Speed Tuning Fork Chronograph.**

Provided with two peripheral speeds of 80 and 160 feet per minute. Has two special electro-magnetic pens of extremely small inertia. The magnets have a very small time constant. *Price and further details on application.*



N250.

S251. **Nalder's Recording Chronograph.**

Driven by clock-work and controlled by an isochronous governor. May be given any of five different speeds, viz.: Peripheral speeds equivalent to 3.2, 8, 16, 32 and 80 feet per minute by means of changeable gears supplied with the instrument. The weights are cast iron. Drum measures 5 inches in diameter by 9 inches long and is vertical. The whole very substantially made and finely finished. *Price on application.*

S252. **Nalder's Recording Chronograph, etc.**

Exactly the same as preceding, but with horizontal instead of vertical drum. *Price on application.*

S253. **Nalder's Reading Chronograph, etc.**

Same as N501, but with drum either horizontal or vertical, at will. *Price on application.*

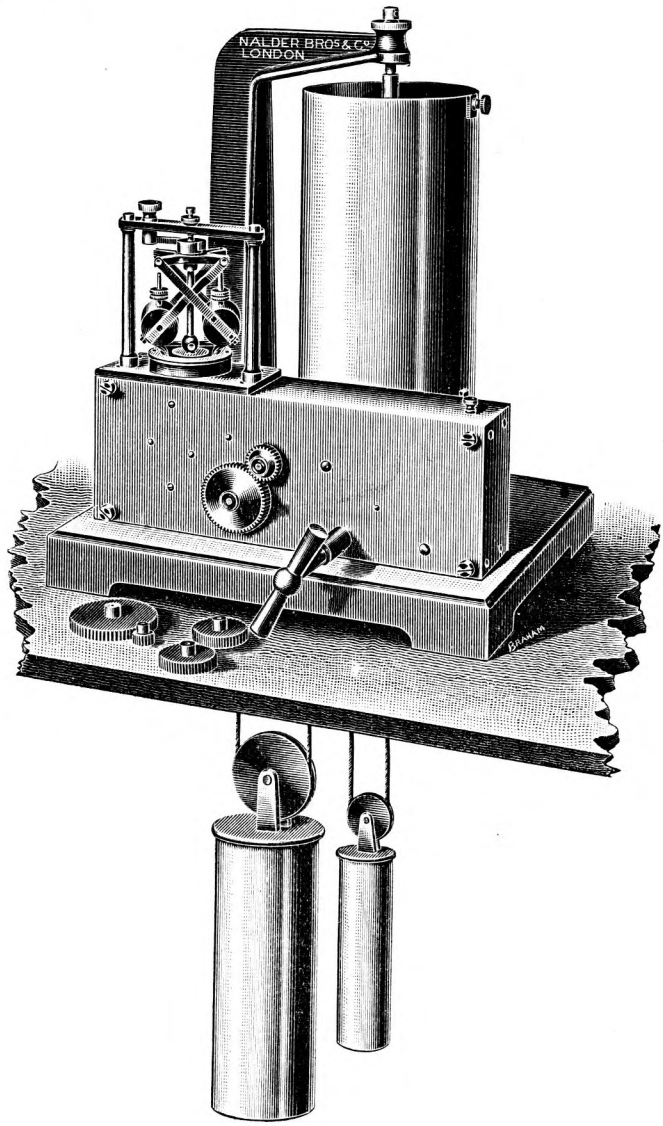
S254. **Pendulum Myograph.**

For physiological and chronographic purposes, The pendulum is strongly made and carries an adjustable glass plate which swings past the recording points; a catch releases it on the one side, while a similar catch stops and holds it upon the other. As the pendulum passes through its lowest point, it actuates the break circuit device. Complete with two plates and one contact breaker. *Price on application.*

S255. **Spring Myograph** (Dubois Reymond's Improved Form).

In this instrument the glass plate is actuated by a compressed spring instead of a pendulum. The velocity of the plate during its motion is nearly constant, owing to the ways being practically frictionless. Two

contact breakers, relatively adjustable, are knocked over during the plate's motion. The time is noted by a tuning fork record, the fork being set in motion by the same act which releases the plate. *Price on application.*



N251.

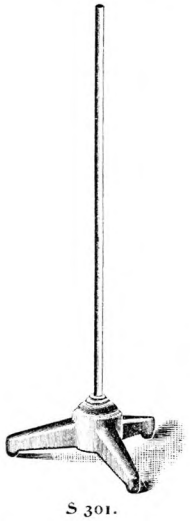
Section 3.

In this section will be found Stands, Supports, Tables, Clamps and other similar devices. Also Motor Apparatus of various kinds, Batteries, etc.

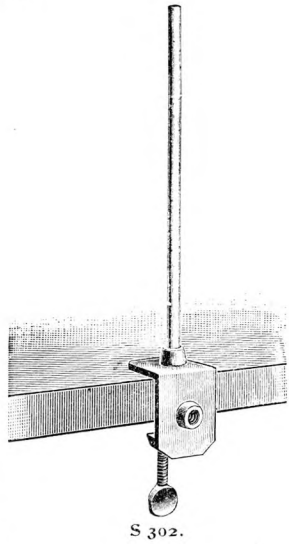
Iron Stands, Clamps, Etc.

The several Stands, Clamps, Joints, etc., S301 to S310, inclusive, below listed, are made to form parts of an interchangeable system. Thus either S305 or S306 may be screwed upon the top of any of the rods of either S301 or S302. Or they may be screwed upon the ends of rods sliding in S303, etc., for a number of different combinations.

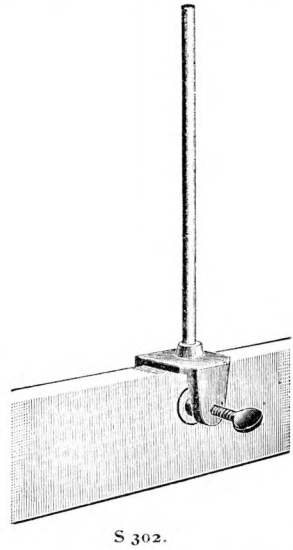
S301. **Tripod Stand** **$1 00**
Of iron, neatly japanned. Rod is 15 inches long, nickel plated, and 7-16 inch in diameter.



S 301.

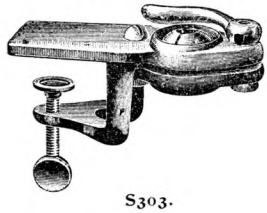


S 302.



S 302.

S302. **Plain Clamp** **$0 75**
For horizontal or vertical positions. Of japanned iron, with nickel plated rod 7-16 inch in diameter and 15 inches long.



S303.

S303. **Table Clamp, with Sectional Ball and Socket Joint** **$1 50**
In this clamp a 7-16 inch rod may be held at any point along its length and inclined at any desired angle with the table.

S304.

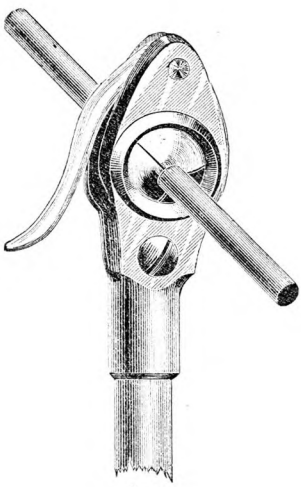
S304. **Double Swivel and Clamping Cone Joint.**

A. For 7-16 and 7-16 rods, $1 50 each.
B. " 7-16 " 5-16 " 1 50 "

This Joint clamps two rods at any angle with one another. The B style is slightly more delicate than the A, and its 5-16 rod is recommended for use in connection with the Flat End Joint S306 or the Ball and Socket End Joint. It may, therefore, be used with S300 or S301, to attach a rod to same at any desired angle.

S305. **End Sectional Ball Joint** **$2 25**

This is nickel plated and screws upon the end of a 7-16 rod. The slide rod belonging to it is 13 inches long by 5-16 inch in diameter. Complete, with slide rod.



S 305.

S 306.

S306. **Flat End Joint** **$0 50**

Attaches to end of 7-16 rod and takes a 5-16 rod. Without rods.

S 307.

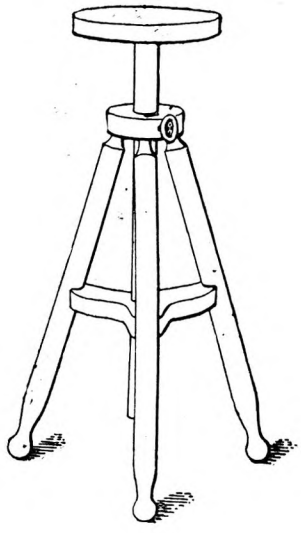
S307. **Ball and Socket End Joint** **$0 75**

Extra Rods.

S308. Steel, nickel plated, 20 x 7-16 inches, each $0 30
S309. " " 15 x 7-16 " " 25
S310. " " 13 x 5-16 " " 22

The 7-16 inch rods are threaded full at one end, the other end rounded, except when specially ordered, then with reduced 5-16 thread to fit Flat End Joint or Ball and Socket End Joint.

Wooden Stands, Tables, Supports, Etc.



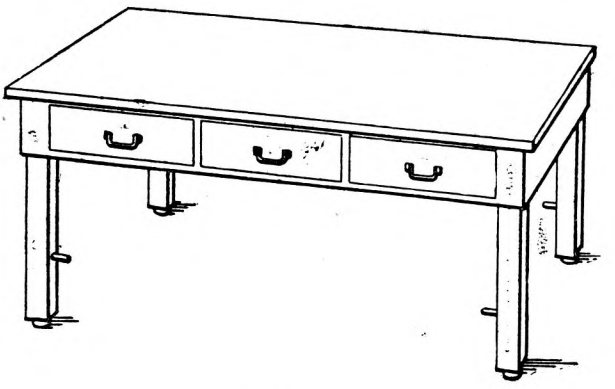
S 311.

S311. **J. H. U. Laboratory Stand** **$6 00**

This stand, which originated in the Physical Laboratory of Johns Hopkins University several years ago, is now widely used and well known. It is substantially made of hard wood and as shown in the sketch. All parts are solidly screwed together. The table is adjustable as to height from a minimum of 38 inches to a maximum of 55 inches from the floor; it is clamped at the desired height by a strong set screw bearing against a metal faced semi-circular friction block, so that the solidity of the stand at all heights is assured. This stand will be found very useful in the laboratory, as it can readily be moved about.

S312. **Table Stand** **$4 00**

As suggested by Dr. E. C. Sanford, Am. Jour. Psych., Vol. V, No. 4. This is a small hard wood stand, with top 14 inches in diameter and adjustable in height from 12 to 20 inches. It is intended to stand upon other large tables, and will be found convenient for many experiments. Neatly finished in shellac.



S 313.

*S313. **Willyoung's Laboratory Table** **$22 00**

This is a special table, designed by ourselves, to carry out the suggestions of Dr. E. C. Sanford in *Am. Jour. Psych., Vol IV, No. 4.* The top is rectangular, 3 x 8 feet, and the legs are square, 3 inches on a side, and uniform from top to bottom, so that apparatus may be clamped to them. Three drawers are provided. The legs are fitted below with an extension movement, by which the table can be set with top either 30 inches from floor (for observer seated) or 36 inches from floor (for observer standing).

*S314. **Willyoung's Laboratory Table** **$16 00**

Same as S313, but without drawers.

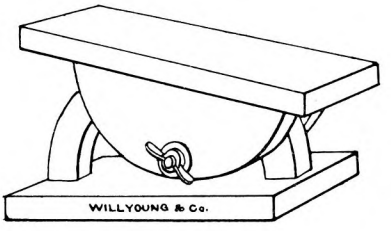
*S315. **Willyoung's Laboratory Table** **$15 00**

Same as S313, but with top 2 x 4 feet. Either one or two drawers.

*S316. **Willyoung's Laboratory Table** **$10 00**

Same as S315, but without drawers.

NOTE—Special sizes of any of the above styles of tables will be made to order and price quoted on application.



S 317.

*Parts screw together and are arranged to pack in small compass for shipping by freight. Each piece is numbered and marked so that assembling is easy.

S317. **Sanford's Arm and Hand Rest** **$2 25**

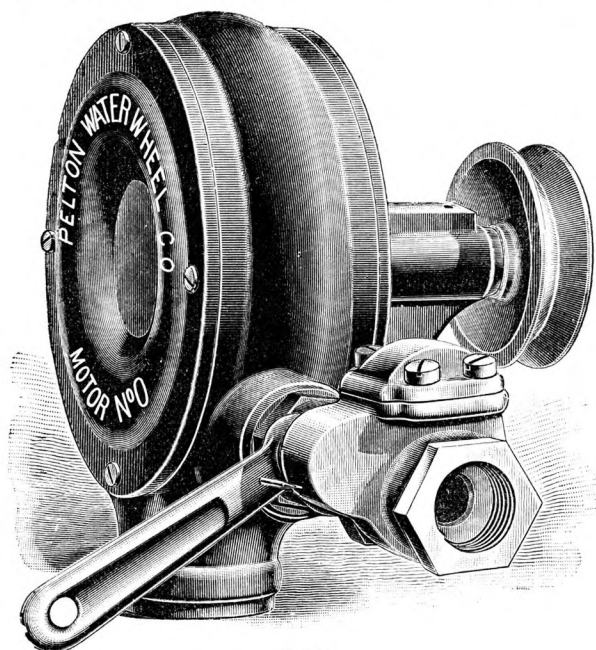
(As suggested by Dr. E. C. Sanford.) To a flat board about 9 x 6 inches are fastened two semi-circular arcs, at about ⅜ inch apart. A single similar semicircle is fastened to a similar rectangular board. The bottom board being screwed fast to the table may be inclined at any desired angle by merely shifting a clamp. This makes a very convenient rest for the hand or wrist in many experiments.

*S318. **Chart Cases** **$20 00**

As suggested by Dr. E. C. Sanford, *Am. Jour. Psych., Vol. IV, No. 4.* Of neatly finished wood and substantially made. Dimensions (kindly furnished by Dr. Sanford) are: Length, 39 inches; depth, 25 inches; height, 31½ inches. It contains seven drawers, each measuring (inside) 36 x 24¼.

Motor Apparatus, Etc.

(For driving Physical and Psychological Apparatus, etc.)



S 319.

S319. **Pelton Water Motor** **$20 00**

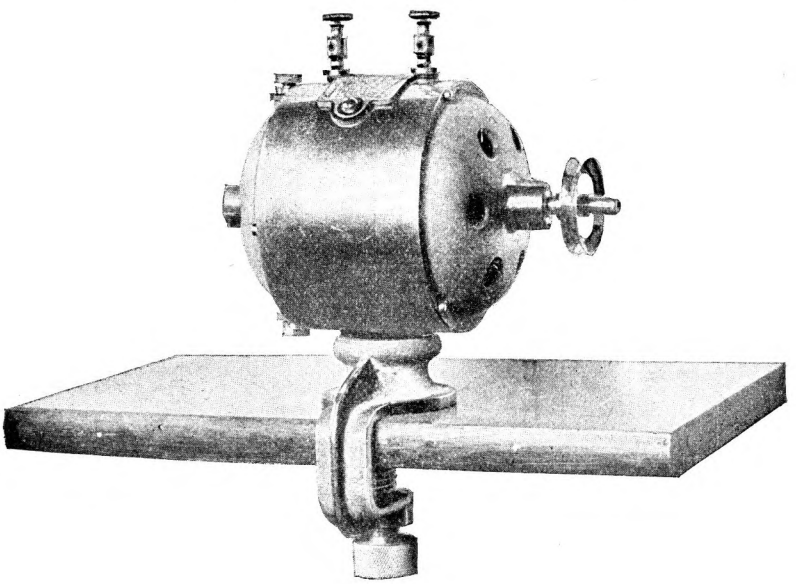
Weight, 20 lbs. Pulley 2 inches in diameter with ¼ inch V groove. Water wheel 4 inches diameter. Speed, 1000 revolutions per minute with 20 feet head. This is a thoroughly practical motor, made after

the same model and in the same manner as the larger Pelton motors, now so well known. It will run with heads of water varying from 20 feet upward and give ample power to run recording drums or other apparatus ordinarily used in the psychological or physiological laboratory. It can be attached to any ordinary faucet by a simple hose connection and the water carried away by a one-inch pipe. This may also be an ordinary rubber tube or hose if desired.

S320. **Electric Motor** . . . . . .

For driving sirens, static machines, and other apparatus ordinarily used in physical and scientific laboratories. Will do about ⅛-horse power work. Either table form, as shown in the cut, or upon solid base casting, as preferred.

For battery circuits of 2 to 10 volts . . .	$20 00
For 50 and 110 volt circuits	22 00



S 320.

S321. **Storage Batteries** . . . . . .

For all laboratory purposes experience has shown that no source of current can compare as regards convenience, reliability and ease of control with a well-made storage battery. The E. M. F. is high (over two volts), the internal resistance low (1-500 to 1-1000 ohm or less), and the current almost absolutely steady during its flow. After once being set up, the storage battery requires almost no attention whatever, but is always ready for instant use.

The "chloride accumulator," which we handle, is without doubt the best type of storage cell now upon the market, and it has succeeded, in

a comparatively short time, in displacing almost all other forms. Its construction is such as to make short circuiting almost an impossibility and disintegration equally difficult. We recommend it unhesitatingly.

Type	Charging current in amperes.	Capacity in ampere h'rs at normal distance.	Normal discharge rate.	Outside dimensions not including height of lugs. W. L. H.	Price in glass cell above jar.
5B	1¼	12½	1¼	3 x 3⅝ x 4¾	$ 2 90
7C	3¾	37½	3¾	4 x 5 x 6	5 30
7D	7½	75	7½	4¾ x 7¾ x 8½	7 50
6E	20	200	20	5¾ x 9 x 10½	16 20

We will be glad to quote on large storage battery installations. Interested parties are requested to correspond with us.

S322. **Edison-Lelande Batteries** . . . . . .

For operating spark coils and electrical circuits generally. These cells have a very low internal resistance and give a very constant current. For all purposes where primary batteries are required to develop currents of any magnitude, and for more than very short intervals of time we advise this form. There is practically no local action when the cell is not in use, and hence the battery needs no attention after it is first set up until it is exhausted. When finally necessary to recharge the battery, all that must be done is to place two sticks of caustic potash in the jar and fill up with water.

Per cell, Type G, capacity 150 ampere hours . . $1 85
" " " K, " 300 " " . . 2 50
" " " M, " 600 " " . . 6 75

S323. **Insulated Copper Office Wire, No. 16, B. & S.** **$0 35**

For making connections, etc. Per lb. (about 100 ft.)

S324. **Connectors** . . . . . .

Of brass, with two milled thumb screws, for making temporary connections between two pieces of wire.

Apparatus
For Use with Dr. E. C. Sanford's Book, "Experimental Psychology."

CHAPTER I.

1. [Par. 2.] **Pair of Short Wooden Rods,** with hard rubber tip . . **$0 40**

2. [Par. 4.] **Long Wooden Rod,** of hard wood. Turned and finished. One end has hook for use in experiments in [Par. 43] **$0 50**

S50. [Par. 5b.] **Millimeter Scale** **$0 15**

S27. [Par. 7.] **Simple Aethesiometer** **$2 00**

5. [Par. 7d.] **Ether Spray** **$1 00**

6. [Par. 8.] **Two Metal Rods** of equal length and diameter. One has a row of five blunt pointed metal pins at intervals of one-half inch. The other has two similar pins two inches apart **$1 00**

7. [Par. 10.] **Tuning Fork,** Ut3, giving 512 complete vibrations per second. Mounted upon resonating case **$9 00**

8. [Par. 11.] **Teasing Needle.** *i. e.* needle mounted in light wooden rod **$0 10**

S30. [Par. 13.] **Scripture's Pencil for Hot or Cold Spots** **$2 00**

10. [Par. 13b.] NOTE.—Refer to S31 for a complete and practically automatic apparatus for mapping hot and cold spots.

11. [Par. 14b.] **Menthol Pencil** **$0 25**

12. [Par. 19 and 19b.] **Two Metal Discs.** Polished, on handles. Each is about the size of a half dollar piece **$0 50**

[Par. 20.] NOTE.—Use thermometer 59 or 60.

13. [Par. 21.] **An Adjustable Holder** and one dozen small, fine corks. Each student is expected to point his own cork before using . . **$0 40**

S24. [Par. 22.] **Scripture's Touch Weights** **$3 00**

15. [Par. 23.] **Two Cylindrical Brass Weights.** One solid, ¾ inch in diameter and ¾ inch long, the other of thin walled brass tubing with solid ends, same diameter, and of length sufficient to give same weight as the first **$0 60**

S25. [Par. 24.] **Scripture's Apparatus for Least Noticeable Change in Pressure** **$6 00**

S29. [Par. 24.] **Scripture's Test Weights** **$6 00**

18. [Par. 25.] **Two Wooden Cylinders.** ¾ inch in diameter and ¾ inch in height. Are of hard wood, polished and thoroughly seasoned. *For heat.* **For cold use the discs of** 12 . . . . . **$0 50**

[Par. 31.] NOTE.—The tuning fork of 7 may be used for tickling experiments.

CHAPTER II.

19. [Par. 33a and 33b.] **Single Weight.** 1 kg., (with ring, for use in experiments of par. 43) **$0 50**

20. ["] **Single Weight.** 100 grams **$0 20**

S29. [Par. 34.] **Scripture's Test Weights** **$6 00**

22. [Par. 35.] NOTE.—Use the weight of 19.

23. [Par. 39.] **Passive Motion Apparatus.** Much as figured (p. 31, E. P.) Is arranged to read to ⅓ degree. Neatly finished **$8 00**

24. [Par. 42.] **Simple Interrupted Extent Apparatus.** Three pieces of hard rubber, of same width and length, are cut as below:

1. Open space. 5 cms. long, with one side planed down, except at the two ends, which are *beveled* up (on sides toward centre) so as to have a sharp edge.

2. Interrupted space. 5 cms. long, but with one side notched with V shaped teeth at intervals of 1 mm.

3. Smooth space. 5 cms. long and smooth.

A little stand has adjustable clamps by which two or all of the above strips may be held horizontally and " end on " (in any order) so that the finger may be passed over **$6 00**

NOTE.—See, also, S212 for a more elaborate apparatus for the same purpose.

25. [Par. 43.] **Pad.** For weight **$0 25**

NOTE.—Use rod and weight of 19.

26. [Par. 44-] **Simple Meter Stick.** Graduated in mms. upon both sides **$0 25**

27. [Par. 46.] **Simple Tilt Board.** Of wood and thoroughly substantial. A vertical position may be attained. An arc is graduated single degrees. Has adjustable foot board and straps and may be clamped at any angle **$25 00**

28. [Par. 47.] **Simple Rotation Table.** Substantially made of wood, and with arc for reading angle, graduated single degrees. Top can be clamped at any desired rotation angle. The subject may lie down or sit up, a removable chair seat being provided for the latter purpose . **$20 00**

NOTE.—See S213 for a combined rotation and tilt table.

CHAPTER III.

29. [Par. 53.] **Set for Taste Experiments.** A box contains 6 1-oz. bottles and 6 8-oz. bottles. Also 6 camels' hair brushes, mounted upon wooden handles 9 inches long, and 6 watch glasses **$1 00**

30. [Par. 56.] **Pair of Small Zinc Electrodes.** With points of connection for wires from battery **$0 35**

31. [Par. 58.] **Zwaardemaker's Double Olfactometer.** With two rubber tubes, one wax tube and glass bottles for odor solutions. Nicely finished. In box **$3 50**

CHAPTER IV.

S41. [Par. 61.] **Scripture's Audiometer** **$8 00**

33. [Par. 62.] **Sound Pendulum.** Simple form, mounted on substantial wooden stand **$12 00**

34. [Par. 64b.] **Fork Pendulum.** With sliding upper weight, so as to vary the period. Has small tuning fork fastened as required by the experiment. Is mounted upon plain stand. Is simply but strongly made. **$6 00**

S37. [Par. 67.] **Galton's Whistle** **$8 00**

S36A. [Par. 68.] **Appun's Reed** **$6 00**

S38. [Par. 71.] **Forks for Least Noticeable Difference** **$20 00**

38. [Par. 73.] **Simple Hydrogen Generator**, basin, tubes and bubble pipe. Is complete for the generation of hydrogen and air bubbles . **$12 00**

[Par. 79 and 80.] NOTE.—S38 may be advantageously used for this, as for par. 71.

CHAPTER V.

40. [Par. 109.] **Astigmatic Charts.** *Prices on application.*

S58. [Par. 113.] **Scripture's Blind Spot Cards** **$0 15**

42. [Par. 115.] **Violet or Purple Sheets** of Gelatine. Size, about 4 x 1½ inches **$0 25**

43. [Par. 124d.] **Red-Starred Disc** for wheel S43 . . . . . **$0 25**

44. [Par. 128b.] **Spiral Card** for Color Wheel S43 . . . . . **$0 25**

CHAPTER VI.

45. [Par. 135.] **Set of Holmgren Worsteds,** 60 skeins **$2 50**

46. [Par. 146.] **Dark Box.** Now being designed. *Price on application.*

S48. [Par. 137.] **Perimeter** **$9 00**

S43. [Par. 139.] **Color Wheel** **$8 00**

48. [Par. 150.] **Reflection Mixer and Contrast Mirror.** We are now designing a simple form of instrument which shall combine the functions of the mixer of this paragraph and the contrast mirror of [Par. 152b.] *Write for details* . . . . . .

Miscellaneous Apparatus.

49. **Sonometer.** With two wires. Simply, but strongly made and complete with weights and extra wires **$10 00**

50. **Telegraph Snapper.** Usual form **$0 25**

51. **Bunsen Burner.** With regulator for air **$0 50**

52. **Bunsen Burner.** Same as 51, but with tripod on top for holding dishes **$0 75**

53. **Induction Coil.** With condenser, adjustable vibrator and reversing switch. Gives ¼ inch sparks **$5 00**

54. **Induction Coil.** Same as 53, but for ½ inch sparks **$10 00**

55. **Small Geissler Tubes.** Each **$1 00**

56. **Student's Spectroscope.** (*Made for us abroad.*) Has prism of very dense glass. The circle is divided and reads with a vernier. Slit is adjustable and has a reflecting prism, so that two spectra may be shown at the same time. Is furnished in containing case. *Details and duty free price on application.*

57. **Graduate.** 1000 c c's, of glass **$2 00**

58. **Graduate.** 100 c c's, of glass **$0 60**

59. **Centigrade Thermometer.** Reading from 55 degrees to +105 degrees and graduated in single degrees **$3 00**

60. **Centigrade Thermometer.** Same as 59, but graduated in $\frac{1}{10}$ degree divisions **$4 50**

61. **Reading Glass.** 3 inches in diameter **$1 50**

62. **Beakers.** With lip, Bohemian glass.

A.	In nests of 4, ½ to 5 oz.	$0 25
B.	" " 3, 2½ " 8 "	35
C.	" " 4, 2½ " 12 "	55
D.	" " 4, 5 " 20 "	80