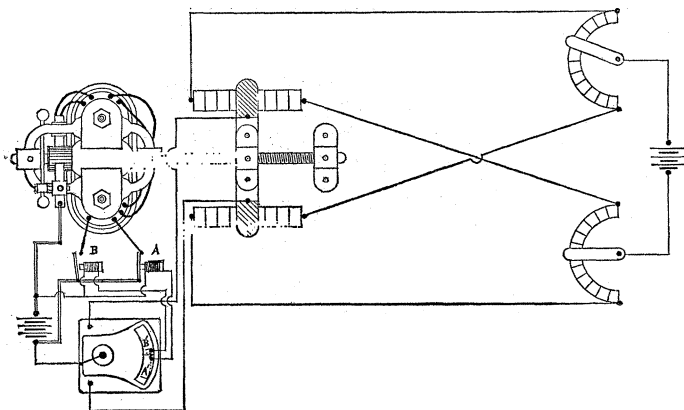


practical; yet I think I will speak of it, as I see no reason why it could not be applied with success, and still further increase the effectiveness of the range-finder. The object is to make the range-finder self-recording, to automatically adjust the balance, and to avoid the need of a third operator. The method is extremely simple. First, the "slider" is provided with a nut through which a spindle revolves, the spindle being the continuation of a small motor-shaft. The fields are wound with two coils in such a manner, that, when the circuit is closed through one, the motor revolves in a particular direction, and, when closed through the other, in the opposite direction; moving the slider backward or forward, as the conditions might require, to establish the balance. The motor is fed from one cell of storage or other battery, at about two volts potential.

The operating mechanism is equally simple. Two small magnets, *A* and *B*, are connected to the same cell that supplies the motor, and the return wire of each terminates in a drop of mercury, *A'* and *B'*, located each side of the galvanometer-needle, so that the least movement to one side or the other will cause contact with the globule of mercury. The circuit thus being closed through the needle to the other pole of the battery, the



corresponding magnet becomes energized, attracting the armature, which closes the corresponding circuit of the motor. The object of the magnets *A* and *B* is to reduce the sparking at *A'* and *B'*, and they might possibly be dispensed with. They were to be wound with considerable resistance, that the current might be so small as to prevent any trouble at *A'* and *B'* by burning or sticking of the contacts.

There are other arrangements whereby the above result might be accomplished, but I send this, as it may be of some interest should this plan of automatically adjusting the balance not have been previously thought of.

J. F. DENISON.

New Haven, Conn., Feb. 15.

Soils and Alkali.

PLEASE grant me the use of your paper to reply to the article by Dr. Stockbridge in your issue of Jan. 17, on soils and alkali. When the bulletin was written, it was thought best to preface it with some general statements about soils. With this end in view, I collected, condensed, and arranged, from the sources at my command, the facts of the first eight pages of the bulletin. There never has been any claim made to originality in these eight pages. The facts were collected simply to make the bulletin more intelligible to the farmers. As far as I knew, I tried to give credit to every one for his work. The domain of science is too large, and human life is too short, to have any one mind even comprehend it. It was explained to Dr. Stockbridge that I did not collect all the material myself, and, if any of the matter was his, due credit would be given him. This should convince any man that I acted in good faith in the matter. He makes some very broad assumptions, that are not warranted in this day, age, and generation: 1st, That he has a patent right on German and other foreign publications, and that no one else has access to them; 2d, That no one else can translate them; 3d, If he translated them, and any one afterwards uses the facts, credit must be

given to Dr. Stockbridge, and not to the author. When I use the facts of Dietrich, Hoffman, Liebenberg, or any other man, and I give him credit, my duty ends then: Dr. Stockbridge has no claim to them, even though he may have translated them.

The statements in the eight pages referred to are commonplace, and are found in any good modern text-book that treats of the subject.

Nitrification is described in great detail in Part II. of the third supplement to Watt's "Dictionary of Chemistry" (p. 1397); also in Bloxam's "Chemistry" (p. 173) and Storer's "Agriculture" (vol. i. p. 298). The word "microbe" ("little life") was first used by Sédillot. The latest investigators are Warrington, Schlösing, and Müntz. The per cent of ash in plants is given in "How Crops Grow," by Johnson (p. 30); "How Crops Feed," by the same author (p. 364); "Chemistry of the Farm," by Warrington (p. 2). "Aschen Analysen Von Landwirtschaftliche Producten," by Wolff, gives 5 per cent of ash. "The Geological Survey of Ohio, 1870," p. 368, the average of 151 analyses, gives 4.84 per cent of ash. It has been thought that the transpiration of plants has been worked out in greater detail than any other subject. Nearly every possible condition has been investigated by some one. The law of transpiration from the upper and lower portions of the leaves has been worked out by Guettard, Unger, and Bonnet. The relation between the number of stomata and the rapidity of transpiration has been experimented upon by Von Höhnell and Garreau; the amount in wet and dry weather, by Moldenhawar; the effects of light and darkness, by Wiesnar and Van Tieghem; how transpiration is influenced by the liquid absorbed, by Sénébiér, Sachs, and Burgenstein; the pressure in the growing plant during transpiration, by Meyen, Sachs, and Von Höhnell; even the effect of the different rays of the sun, by Wiesner; and the age of the leaves, by Höhnell and Dehérain. The amount of water transpired for wheat, barley, oats, beans, red clover, rye, peas, etc., has been determined by Hellriegel, while Sachs, Hofmeister, and Hales have determined the amount transpired from the grape-vine, sunflower, cabbage, etc.

The facts about the fineness or division of soil are stated in Williams's "Applied Geology" (p. 111). In "Chemical Bulletin, No. 10, Department of Agriculture," under the head (p. 10) "The General Fertility of Soils depends Principally on Their Texture," is the following language: "These qualities depend altogether on the state of division of the soil and of its geological origin" (see "Soils of the Farm," by Scott and Morton). When the same statement has been made by so many authors, it is difficult to state positively the source of information; but in two instances I had the references marked.

He quotes me:—

O'BRIEN (p. 9).

The heat comes from three sources: Solar heat, as the sun's rays; heat of chemical decomposition within the soil, and the original heat of the earth's interior. The latter cannot be of any value to plants; the heat of chemical decomposition is not of any value, except in a few special cases. The sun, therefore, remains the only source of heat of practical importance in relation to the production of crops from the soil.

In Dana's "Manual of Geology," 1879, p. 714, this language is found:—

The earth has three prominent sources of heat: (1) The sun; (2) The heat of the earth's interior; (3) Chemical and mechanical action.

In making the application of these facts to plants, what other conclusion could be arrived at?

He quotes me:—

O'BRIEN (p. 4).

Oats, rye and buckwheat thrive with the lowest amount of organic matter, requiring from one to two per cent. Wheat and tobacco seem to require most among the common agricultural products, and do their best upon soils containing from five to eight per cent of organic matter.

The text-book of geology by Geikie, 1885, p. 326, in speaking about the organic matter in soils, says,—

It is the experience of practical agriculturists in Britain that oats, rye, will grow upon a soil with one and one-half per cent of organic matter, but that wheat requires from four to eight per cent.

I added to the statement in the geology, "buckwheat and tobacco;" the one being proverbial for growing on poor soil, and the other for requiring a rich soil. The order of arrangement that I used is found in Loudon's "Encyclopædia of Agriculture," eighth edition.

He claims, in his article, that the facts I used are his, while in the preface to his book he lays no claim to the facts. Here is what he says: "The nature of the work is such that I have no claim for the presentation of new material." In regard to "Rocks and Soils," published by Dr. Stockbridge, I have lately examined it, and I can confirm what he has said, that it does not contain a single fact new to science. I believe *one* such claim is made, but the *facts* have been in print for *forty years*. We have the same publisher, and for that reason I do not care to make any comments upon it. Any of your readers that are interested will find a review of it in *Nature*, Jan. 24, 1889, p. 292.

D. O'BRINE.

Fort Collins, Col., Feb. 15.

INDUSTRIAL NOTES.

The Electric Light in Japan.

AN American electric-light system has again come out victoriously while competing with the older European systems. This time the battle-ground was Tokio, Japan, where a corporation of capitalists, The Takata Company, awarded a large contract for electric lighting to the Westinghouse Electric Company of Pittsburgh, Penn. The Westinghouse alternating-current system has gained great favor in eastern Asia, as an immense central station for electric lighting is now being installed with Westinghouse alternating-current apparatus in Canton, China. The Japanese plant will be put up at Shidznoka, near Tokio, and it will have a total capacity of 500 lights. This is the first alternating-current central-station plant in the land of the Mikado.

A Big Road goes in for Electricity.

DURING the last week Mr. Thomas Lowry, president of one of the largest street-railway combinations in the world, showed his confidence in the electric system of street-railway propulsion by deciding to equip all the lines of St. Paul and Minneapolis by electricity. The electric company to whom this contract was awarded is the Sprague Electric Railway and Motor Company, and the investment called for from the street-railway company is said to be in the neighborhood of two million dollars.

Before deciding upon any system to be used upon these roads, the president of the company, together with the directors, made a careful inspection of all the different methods of operating street-cars in large cities, and investigated the merits of each. As a result of this investigation, the contracts for

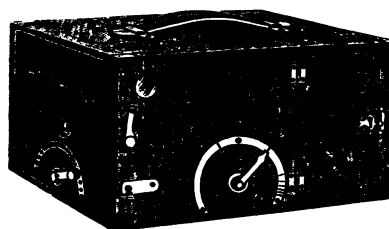
the partial equipments of the road by cable were cancelled, and negotiations were entered into with the Sprague Company for the entire electrical equipment.

By the terms of the contract, the Sprague Company is to fully equip and put into working order the entire mileage owned by the railway company, the work to be completed by June 1; and the first delivery of electric-railway apparatus, which will include 360 Sprague improved motors for the equipment of the rolling-stock, will be made shortly.

This is probably the largest order which has ever been given for electric-railway motors, and evinces the confidence which prominent street-railway managers feel in the electric system.

Photography done Quickly.

THE initial letters of the above three words have been adopted as the name of the "P. D. Q." camera, a new detective camera of small size, manufactured by E. & H. T. Anthony of this city. This camera, which is shown in the cut, is adapted to the making of four-by-five inch pictures, either time or



THE P. D. Q. CAMERA.

instantaneous, and which may be taken either vertically or horizontally. It is provided with a finder which may be used for either position. Three patent double holders are supplied with each camera, — one for dry plates and two for films. The double-film holders are very durable and compact, being only three-eighths of an inch thick.

This camera is fitted with a combination instantaneous achromatic landscape lens and a shutter of a new design, which by its peculiar mechanism is always closed except at the moment of exposure, the resetting being accomplished by an ingenious device, which requires only the movement of a lever to the right or left. The manipulation of the shutter is wholly from the outside of the box, and it may be made to work with greater or less rapidity, as desired.

TEN POUNDS
IN
TWO WEEKS
THINK OF IT!

As a Flesh Producer there can be no question but that

SCOTT'S EMULSION

Of Pure Cod Liver Oil and Hypophosphites Of Lime and Soda is without a rival. Many have gained a pound a day by the use of it. It cures

CONSUMPTION,
SCROFULA, BRONCHITIS, COUGHS AND COLDS, AND ALL FORMS OF WASTING DISEASES. AS PALATABLE AS MILK. Be sure you get the genuine as there are poor imitations.

A New Method of Treating Disease.

HOSPITAL REMEDIES.

What are they? There is a new departure in the treatment of disease. It consists in the collection of the specifics used by noted specialists of Europe and America, and bringing them within the reach of all. For instance, the treatment pursued by special physicians who treat indigestion, stomach and liver troubles only, was obtained and prepared. The treatment of other physicians celebrated for curing catarrh was procured, and so on till these incomparable cures now include disease of the lungs, kidneys, female weakness, rheumatism and nervous debility.

This new method of "one remedy for one disease" must appeal to the common sense of all sufferers, many of whom have experienced the ill effects, and thoroughly realize the absurdity of the claims of Patent Medicines which are guaranteed to cure every ill out of a single bottle, and the use of which, as statistics prove, has ruined more stomachs than alcohol. A circular describing these new remedies is sent free on receipt of stamp to pay postage by Hospital Remedy Company, Toronto, Canada, sole proprietors.

ANY OF
Prof. A. MELVILLE BELL'S WORKS

—ON—

Elocution — Visible Speech —
Principles of Speech—Faults
of Speech—Phonetics—Line
Writing — World - English,
etc.,

SUPPLIED BY

N. D. C. HODGES,
47 Lafayette Place, N.Y.

FOR SALE.

A first-class water motor, for hydrant pressure of 20 pounds or over.

No experiment; 5,000 in use.
Clean, simple, safe, reliable, economical, and very desirable. No dirt, delay, or danger. Always ready; no repairs. Any one can erect and operate it in parlor, workshop, or office. For price, particulars, etc., address "HYDRAULIC," care of SCIENCE, 47 Lafayette Place, New York.