NEW BOOKS AND PUBLICATIONS.

LABORATORY MANUAL OF PHYSICS Α AND APPLIED ELECTRICITY. Ar-ranged and edited by Edward L. Nichols. In two volumes. Vol II. Senior Courses and Outlines of Ad-vanced Work. By George S. Moler, Frederick Bedell, Homer J. Hotch-kiss, Charles P. Matthews and the Editor. New York: Macmillan & Co. 1894. Pp. 444. Price \$3.25. AND APPLIED ELECTRICITY.

We have before now reviewed the author's course of physics for the lower classes. In the present book one finds more advanced researches, with the use of satisfac- Address W. W. Carder, Oldtown, Md. tory apparatus given in full detail, with especial reference to electrical work. As arranged, it makes excellent reading, being far more than a mere laboratory guide, and in it the author no longer appears to avoid proper apparatus, something which, to our minds, has been a defect in some manuals used for the lower classes in practical physics; so it may be recommended to readers not only as an exponent of college teaching and methods, but also as an actual manual of physics. Its make-up is of the most advanced description, as indicated by the capitalization of as few words as possible, although italics are used in considerable number.

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SCIENTIFIC AMERICAN BUILDING EDITION

NOVEMBER, 1894.-(No. 109.)

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- 2. Plate in colors showing the residence of John Cottier, Esq., at Bensonhurst, L. I. Three per pective elevations and floor plans. Cost \$6,750 complete. A good example of Colonial architecture. Messrs. Parfitt Bros., architects, Brooklyn, N. Y.
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- 7. A church at Short Hills, N. J., built entirely of rubble stone. Estimated cost \$6,000. Perspective elevation and floor plan. Messrs. Lamb & Rich, architects, New York City.
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- 11. A cottage at Edgewater, Ill., erected for Edgar Smith. Esq. A unique design in the Colonial style. Cost \$7,800 complete. Two perspective elevations and floor plans. Mr. G. W. Maher, architect, Chicago,
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to may be had at the office. I 'ncc 10 cents each. **Books** referred to promptly supplied on receipt of price.

Minerals sent for examination should be distinctly marked or labeled.

(6285) W. A. S. E. asks how or in what way the canvas is prepared which is sold at art store and whether the pores are filled with some composition or sized. A. 1 part white lead, 2 parts whiting ; a small portion of litharge and sulphate of zinc for driers; mix with equal parts of boiled linseed oil and raw linseed, tinted with either brown umber or lampblack, for a neutralground. The canvas is tacked upon a stretching frame, and sized with weak glue size, to which a small portion of ziuc sulphate is added. When dry it is stippled over with some driers and linseed oil, as thin as possible, not saturated. When very nearly dry the white lead, whiting, etc., is mixed up very smooth, and put upon it very thin and smooth with a large palette knife, and hatched over with a large sash tool, drawing it across one way and then at right angles, until the face presents a face like a piece of fine linen or cartridge paper, when it is

(6286) W. H. S. and A. K. W. ask for a cement for lining acid tanks. A. An oaken trough will and add lampblack enough to bring the preparation to a last from twelve to fifteen years if coated with Burgundy suitable consistence. When it is to be used with a stenpitch 1,500 grammes, old gutta percha in shreds 250 grammes, pounded pumice 750 grammes. Melt the gutta plied with a marking brush. The above gives a black percha, mix with the pumice, and add the pitch. A hot ink; for red, substitute Venetian red for lampblack;

left to dry.

of size named, working under 7 feet of fall, having all the water it could use? A. A 30 inch turbine using 750 cubic feet of water per minute under 7 feet head will equal 9 horse power and will need a race 3 feet de p 4 feet wide to maintain an approximate full head at the fume. There should be at least 216 feet clearance under the bottom of the wheel. Wheels are made of various sizes up to 114 inches, with proportional increase in quantity of water used and size of raceway. The 114 inch wheel under ? feet head will use 10,000 cubic feet of

(6289) W. L. B. says: In a double cyl-Metallic bag and sack tie patent for sale, or on royalty. inder gasoline engine with cylinder 4 1/2×6 inches, making 250 revolutions per minute, giving 6 horse power, what is the pressure per inch at time of explosion and at what point of stroke should exhaust be located to give best results? A. There is considerable difference shown in pressure and expansion lines in gasoline engines, owing to the various mixtures of gasoline vapor and air, its most powerful effect being for a mixture 1 part vapor to 10 parts air. Under the various conditions in ordinary use, the explosive pressure may vary from 50 to 100 Centrifugal Pumps. Capacity, 100 to 40,000 gals. per use, the explosive pressure may vary from 50 to 100 minute. All sizes in stock. Irvin Van Wie, Syracuse, N.Y. pounds per square inch. The exhaust should take place at the end of the stroke. See a valuable work on "Gas, Gasoline and Petroleum Engines."

> (6290) J. B. D. asks: Does it make any difference in the working of a bicycle if the large sprocket wheel is set higher than the small sprocket wheel? A. There is a little difference. The chain grips best when nearly horizontal. A slight departure from horizontal will do no harm.

> (6291) F. M. M. writes: 1. I wish to know how large an air pump running at say 200 feet piston speed should hold a pressure of 30 pounds per equare inch, with 1/4 inch nozzle outlet, open wide. Roper says steam has a velocity of 1.601 feet per second at 30 pounds pressure. Now, figured on this basis, how much air will be delivered from 1/4 inch orifice, or does the velocity of air differ from that of steam? sure is the cubical contents of discharge represented, I mean, at free air pressnre, tank pressure or an intermediate? By answering the above you will confer a great favor. Can you furnish me a book with data by which air capacities can be figured ? A. The velocity of air from a nozzle of good form at 30 pounds pressure is 640 feet per second. Hence the flow from a quarter inch

> > 640ו049×3 vol ×60 sec. = 39+

144

or say 40 cubic feet of free air perminute, and

$$\frac{40^{\text{c}}}{200}$$
 $\frac{--}{\text{ft. pr. m.}} = 0.2^{\text{c'}}$ area

or 298 square inches, but owing to the loss in the pump by clearance, leakage and imperfect piston packing, not less than a cylinder 8 inches in diameter will do the work at the feet per minute speed as stated. The stated flow of steam as above is the theoretical velocity of steam flow ing into a vacuum, but practically it is but 900 feetfrom 100 pounds pressure into the atmosphere. The flow of air, which is much heavier than steam, is but 952 feet per second into a vacuum, and varying in nozzle velocity from 632 to 658 feet per second, between 15 pounds and 75 pounds pressure and flowing into free air. Computations are made on the basis of free air volume plus pressure We have no complete works on air compression, but much can be gained from back numbers of SCIENTIFIC AMERICAN SUPPLEMENT, on air compression and its uses. A few useful formulas and tables are published in Haswell's "Engineer's Pocket Book," \$4 by mail.

(6292) D. P. B. savs: Please answer through the columns of your valuable paper, when and where the first electric car in the world was operated, also when and where the first cable car? A. The electric railway system was invented and model railways exhibited with cars driven by electricity in 1839, in New York. A practical trial was made on the Edinburgh and Glasgow Railwayin 1842. See SCIENTIFIC AMERICAN, November 3, 1694, for an interesting account of the first trials. The first cable car was operated in San Francisco by A. S. Hallidie, in 1871.

(6293) E. S. - The bird's skin sent is that of a female golden crowned kinglet (Regulus satrapa), a common winter bird from the Northern States southward.-F. M. C.

(6294) W. A. V. asks how to make stencil paint. A. Take shellac, 2 oz.; borax, 2 oz.; water, 25 oz.; gum arabic, 2 oz.; lampblack, ficiency. Boil the borax and shellac in water till they are dissolved, and withdraw from the fire. When the solution has become cold, complete 25 oz. with water, cil, it must be made thicker than when it is to be apTO INVENTORS.

An experience of nea ly fifty years, and the preparation of more than one hundred thousand applications for pa-tents at home and abroad, enable us to understand the laws and practice on both continents, and to possess un-equaled facilities for producing patents everywhere. A synopsis of the patent laws of the United States and all foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low, in accordance with the times and our ex-tensive facilities for conducting the business. Address MUNN & CO., office SCIENTIFIC AMERICAN, 361 Broad-way, New York. way, New York.

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October 30, 1894,

AND EACH BEARING 'THA'T DA'TE.

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iron passed over the surface smooths it, and assists adhesion. The box resists sulphate of copper baths, but for blue, ultramarine; and for green, a mixture of ultranot cyanides.

(6287) H. F. asks: Does not the attracpoints directly opposite the poles, tend to stop the revolution of the armature? In other words, are not the pole of the armature, and theequal repulsive force of the forces that cause the armature to revolve? A. Your query is not very clear. The simplest general statement is that the armature is kept so polarized that the line connecting the poles of the field is constantly at an angle with the line connecting the poles of the armature, and

(6288) L. P. says: Given a 30 inch turbine water wheel to work under 7 or 71/2 feet fall, what head); 12 salt anchovies (all well chopped); grind well should be the width and depth of race to convey water to ' together, add salt, 1 oz.; grape juice or singar to sweeten, of this work have won for it the LARGEST CIRCULATION, the wheel? What would be the minimum space that, and sufficient water to form the mass into a thin paste could be allowed between bottom of wheel and bottom, by trituration in a mortar. When put into pots a red hot of wheel pit to give good results? About what horse iron is momentarily thrust into the contents of each, and power could be expected from a wheel of a good make a little wine vinegar added.

marine and chrome vellow.

(6295.) M. J. W. asks for a formula tion of the field (in a motor) of the armature, at all for economical fuel. A. Mix coal, charcoal or sawdust, 1 part ; sand of any kind, 2 parts ; marl or clay, 1 part ; in quantity as thought proper. Make the mass up wet lateral attraction of the outer edge of the field, of the into balls of a convenient size, and when the fire is sufficiently strong place these balls, according to their size, a opposite outer edge of the field, the only propelling little above the bar, and they will produce a heat considerably more intense than common fuel, and insure a saving of one-half the quantity of coals. A fire thus made up will require no stirring nor fresh fuel for ten hours.

(6296) G. de B. asks for a formula for the latter are constantly shifting in the direction opposed French mustard. A. The following is M. Lenorman³'s receipt : Flour of mustard, 2 lb.; fresh parsley, chervil, celery and tarragon, of each, 1/2 oz.; garlic, 1 clove (or