## NEW BOOKS AND PUBLICATIONS.

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

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 refer ence 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.)

TABLE OF CONTENTS

- 1. Elegant plate in colors showing a cottage at Bronxville, N. Y., recently erected for B. L. Clark, Esq. Two perspective elevations and floor plans. Estimated cost \$5,000. Mr. William A. Lambert, architect, New York City. A modern and pleasing design.
- 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.
- 3. A dwelling at Edison Park, Ill. Cost \$1,700. Architect, Mr. F. W. Langworthy, Chicago, Ill. A model designifor its class and cost. Two perspec tive elevations and floor plans
- 4. A very attractive residence recently erected for A. C. Garsia, Esq., at Flatbush, L. I. Two perspective elevations and floor plans. Mr. John E. Baker, architect, Newark, N. J. A modern design
- 5. An \$800 summer cottage built for A. R. Doten, Esq., at Casco Bay, near Portland, Me. Perspective elevation and floor plans. Mr. Antoine Dorticos, architect, Portland, Me.
- 6. Perspective elevations and floor plans of a handsome residence recently completed for George W. Catt, Esq., at Bensonhurst, L. I. A very picturesque design. Cost \$8,100 complete. Mr. S. S. Covert, architect, New York.
- 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.
- 8. The house of Fraucis I. at Abbeville, France.
- 9. A stable and conservatory attached to the residence of John Cottier, Esq., at Bensonhurst, L. I. Perspective elevation and ground plan. Messrs. Parfitt Bros., architects, Brooklyn, N. Y.
- 10. A residence at Ardmore, Pa., in the Queen Anne style. Perspective elevation and floor plans. Cost complete \$6,750. Architects and builders, Messrs. J. B. Cornell & Sons, Philadelphia, Pa.
- 11. A cottage at Edgewater, Ill., erected for Edgar Smith. A unique design in the Colonial style. Cost \$7,800 complete. Two perspective elevations and floor plans. Mr. G. W. Maher, architect, Chicago,
- 12. An attractive cottage at Bath Beach, Long Island. N. Y., recently erected for G. W. Snook. Esq. Two perspective elevations and floor plans. Mr. Percey Emmett, architect, Bath Beach, Long Island,
- 13. Miscellaneous contents.—Wood pavementin London. reservation of wood.—Methods of co ing .- Carved and fancy mouldings, illustrated. -A new sash lock.-Automatic heat regulation in houses, etc., illustrated.-Woodwork vs. flame.-Curiosities about wood .-- Cement water tanks .--An improved hot water heater, illustrated .-- How to cool a cellar.—A new woodworking machine, illustrated. - An improved stage bracket iron, illustrated.-Party walls.-Architectural metal orna ments, illustrated.

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References to former articles or answers should give date of paper and page or number of question.

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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 lineeed oil and raw lineeed, tinted with either brown umber or lampblack, for a neutral ground. 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 left to dry.

(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; chimney flues and pipes at Paris, illustrated.—The iron passed over the surface smooths it, and assists adpassing of red brick.—Long distance house move hesion. The box resists sulphate of copper baths, but marine and chrome yellow. not cyanides.

> (6287) H. F. asks: Does not the attraction of the field (in a motor) of the armature, at all | for economical fuel. A. Mix coal, charcoal or sawdust, 1 points directly opposite the poles, tend to stop the revo- part; sand of any kind, 2 parts; marl or clay, 1 part; lution of the armature? In other words, are not the lateral attraction of the outer edge of the field, of the into balls of a convenient size, and when the fire is suffipole of the armature, and theequal repulsive force of the opposite outer edge of the field, the only propelling little above the bar, and they will produce a heat conforces 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 the latter are constantly shifting in the direction opposed French mustard. A. The following is M. Lenormand's

(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 sugar 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.

of size named, working under 7 feet of fall, having all thewater 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 flume. 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 41/2×6 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 re sults? 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 square 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? a few American firms in France and in Belgium. Good Knowing the velocity at point of discharge, at what pressure 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

 $640 \times 049 \times 3 \text{ vol } \times 60 \text{ sec.} = 39 +$ 144

or say 40 cubic feet of free sir per minute, and

40<sup>c</sup>′ -=0<sup>.</sup>2<sup>c</sup>′ area, 200 ft. pr. m.

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. says: 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, 1894, 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 ap-

(6295.) M. J. W. asks for a formula in quantity as thought proper. Make the mass up wet ciently strong place these balls, according to their size, a siderably 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

(6296) G. de B. asks for a formula for receipt: Flour of mustard, 2 lb.; fresh parsley, chervil, celery and tarragon, of each, 1/2 oz.; garlic, 1 clove (or

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## INDEX OF INVENTIONS

For which Letters Patent of the United States were Granted

October 30, 1894,

## AND EACH BEARING 'THA'T DA'TE.

[See note at end of list about copies of these patents.]

	Advertising device, automatic, May & Morrisey	528,334
	Advertising device, automatic, May & Morrisey Advertising sign device, W. C. Morrison	528,256
	Alkaline salts, process of and Ropa atus for elec- trolytic decomposition of, H. Y. Castner	528.322
	Alloy, aluminum, R. I. Koman	528,181 528,513
	Aluminum, reducing, Gooch & Waldo	528,365
	Alarm. See Burglar alarm. Fire alarm. Alkaline salts, process of and spoß atus for electrolytic decomposition of, il. Y. Castner. Alloy, aluminum, R. I. Roman. Aluminum, improving surfaces of, A. V. Davis Aluminum, reducing, Gooch & Waldo Armature for dynamo-electric machines and making same, T. H. Hicks. Axle, vehicle, J. Miller. Ballot box, registering and canceling, E. K. Tolman.	528,204 528,482
١	Ballot box, registering and canceling, E. K. Tol-	528.191
	man	528,491
ı		528,370
	Bed and table combined, folding, L. Kabell Bedclothes holder, G. H. Hollidge	528,432 528,328
	Reer, manufacturing, P. Kropf	528,374 528,134
	Bedelothes holder, G. H. Hollidge. Bed, folding, E. M. Knoblaugh Beer, manufacturing, P. Kropf. Bell ringing mechanism, W. G. Alexander. Belt tightener, M. Waddell. Beverage cooler, J. Busch. Beverages from ice, making, C. Fong. Bicycle, J. Carr. Bicycle, L. Ferguson. Bicycles, etc., drive gear mechanism for, S. Kaltonik.	528,242 528,4 3
	Beverages from ice, making, C. Fong	528,514 528,145
	Bicycle, L. Fergusou	528,423
	tonik. Boiler. See Heating boiler. Steam boiler. Steam or hot water boiler. Boiler, R. Wildman.	528.352
	Boiler cleaner, automatic, J. H. Barr	528,283 528,299
ļ	Bolting reel, E. R. Draver	528,504
	Book holder for desks. G. W. Pai sley	528.488
	Boot or shoe polishing device, E. Stanwood	528,349
	Bottle cap cork holding, W. H. Northall	528,380
	Bottle stopper or cap, F. W. Fletcher	528,470
	Shipping of service box.	E00 10F
	Bracket. See Staging bracket.	528,137
	Botter. See Heating botter. Steam botter. Steam or hot water boiler. Boiler. R. Wildman. Boiler deaner, automatic, J. H. Barr. Boiler furnace, steam, E. R. R. Hoyt. Botting reel, E. R. Draver. Book holder fordesks. G. W. Paisley. Boot bolder fordesks. G. W. Paisley. Bootback attachment, W. H. Cole. Booto or shoe polishing device, E. Sta nwood. Boring machine, H. C. Schulz. Bottle cap cork holding, W. H. Northall. Bottle cappinglmachine, G. W. Lebolt. Bottle stopper or cap, F. W. Fletcher. Box. See Ballot box. Dice bex. Match box. Shipping or service box. Brace and bit, J. W. Banner. Bracket. See Staging bracket. Brake beam and reinforcing clamp therefor, H. B. Robischung.	590 090
	Brush holder, M. Wool	528.267
i	Burglar alarm, door locking, H. J. Mitchell	528,206
	Button, J. Skilling	528,397
	Cable gripper, J. Whitall.	528.313
	Camera, J. E. Blackmore	528,140
ı	Brake. See Car brake. Brake beam and reinforcing clamptherefor. H. B. Robischung. Brush holder. M. Wool Bucket fastener, H. L. R. Wolf. Burklar alarm. door locking. H. J. Mitchell. Burner. See Gas burner. It burner. Button. J. Skilling. Cable grip, Ormerod & Charles. Cable grip, Ormerod & Charles. Camera. See Magazine camera. Camera. J. E. Blackmore. Can body crimping machine, H. Schaake. Can body forming machine, H. Schaake. Can body forming machine, J. K. Underdown Can bead flanges, machine for crimping, H.	528,305 528,192
	Can body forming machine, J. K. Underdown Can head flanges, machine for crimping, H. Schaake. Can opener, C. F. Keller. Can opener, C. F. Keller. Can opener and vestcable parer, combined, G. H. Mitchell Can top cleaning machine, C. A. Burt. Car brake, P. McMullen. Car brake ratchet handle, J. Seeberger. Car brake shoe and dresser, J. E. Warswick. Car coupling, J. Bird.	528,306
	Can holder, W. V. McKenzie	528,259 528,371
1	Can opener and vegetable parer, combined, G. H.	528.517
	Can top cleaning machine, C. A. Burt	528,462 528,302
	Car brake ratchet handle, J. Seeberger	528,492 528 198
•	Car coupling, J. Bird	528,460 528,466
ı	Car coupling, O. G. Oden	529,363 529,346
	Car curtain fixture, W. H. Bean	528.501 528.501
	Car, elevated railway, A. L. Widdis	528,407
١	Car heating system, E. H. Gold	528,158 528,171
l	Car brake shoe and dresser, J. E. Warswick. Car coupling, J. Bird. Car coupling, W. H. Edwards. Car coupling, O. G. Oden. Car coupling, S. Selden. Car curtain fixture. W. H. Bean. Car, dump, G. A. Roberts. Car, elevated railway, A. L. Widdis. Car fender, W. G. Kerr. Car beating system. E. H. Gold. Car mover A. Kuebeler. Car platform, J. Krebbiel. Car platform, J. Krebbiel. Car protector, automatic railway, C. Klettner.	528,170
	Car mover a Rebeler Graphard of Car platform, J. Krebbiel Car platform, J. Krebbiel Car protector, automatic railway C. Klettner Car safety device, electric J. M. Kelly. Car, ventilator, H. H. L. Car, ventilator, H. H. L. Car, ventilator, G. Moncur Car wheel, C. Roberts. Carburetor, O. Moncur Card settling machine, C. W. Arnold Carriage spring, C. A. Beblen. Carries See Egg carrier. Package carrier. Cart, self.loading, G. F. Fischer. Cart, self.loading, G. F. Fischer. Cart, self.loading, G. F. Fischer. Cart, self.loading, G. F. Carburet Care. Care Case. See Card case. Combination case. Cast er. Schlientz & Fink Caster, ball, L. B. White. Chimney, E. V. Wingard. Chlorine and caustic soda, electrolytic apparatus for the manufacture of T. Drake Chopper. See Cott Cor. Comper.	528,438 528,231
	Car wheel, C. Roberts.	528,278
	Card setting machine, C. W. Arnold	528,354
	Carrier. See Egg carrier. Package carrier.	500,400
	Carving machine, R. Morgeneier	528,337
	Cast er, Schlientz & Fin k	528,210
	Chimney, E. V. Wingard.	528,453
	for the manufacture of, T. Drake	528,153
	Churn dasher, C. S. Rogers	528,519
ļ	Cigarette paper, machine for applying paraffin to,	528,166
l	Clamp. See Lace clamp.	528.332
	for the manufacture of, T. Drake. Chopper. See Cotton chopper. Churn dasher, C. S. Rogers. Cigar bunch mach ine, H. Jerstrum. Cigarette paper, mach ine for applying paraffin to, A. C. Marchal. Clamp. See Lace clamp. Cleaner. See Boiler cleaner. Sewer trap cleaner.	F00 500
	Cloth cutting machine, J. Bloch	528,220 528,217
	Clothes drier, C. E. Cochrane	528,216 528,222
	Coal or ore separating apparatus, F. Pardee	528,498 528,386
	Coffee mill, C. D. Anderson.	528.289 528,499
١	Combination case, A. J. Enllow.	528,201 528,421
1	Collar fastener, horse, M. T. Burke	528,420 528,143
1	Collar, horse, W. T. Fell	528,422 528,490
į	Cleaner. See Boiler cleaner. Sewer trap cleaner. Cloth cutting machine, J. Bloch. Cloth cutting machine, J. Bloch. Cloth cut th gn ahi nel. Wolf, Jr. Cloth notching machine, J. Wolf, Jr. Clothes drier, C. E. Cochrane. Clothes rack, T. M. Anderson. Coal or ore separating apparatus, F. Pardee. Coal screen, G. W. Cross. Coffee mill, C. D. Anderson. Coffee or tea pot. W. O. Hyrd. Combination case for cards, etc., A. J. Estlow. Combination case for cards, etc., A. J. Estlow. Collar fastener, horse, M. T. Buyke. Collar, horse, W. T. Fell. Collar, horse, C. P. Dillips. Collars or cuffs on shirts, device for holding, Feiner & Saxton. Conduit sections, apparatus for manufacturing, J. F. Cummings. Conduit, underground, J. F. Cummings. Conduit, underground, J. F. Cummings. Conduit, underground, J. F. Cummings. Conveying material, F. E. Duckham Cooler. See Beverage cooler. Cotton chopper, J. J. Green. Cotton chevator and distributer. Moffit. & Wil-	528,469
ļ	Concentrator, J. Norbom Conduit sections, apparatus for manufacturing.	528,442
1	J. F. Cummings Conduit, underground, J. F. Cummings	528,290 528,291
	Conveying material, F. E. Duckham	528,417
	Cotton chopper, J. J. Green	528,159
ļ	Cotton elevator and distributer, Momit & Williams Cotton opening machines, feeding mechanism for, J. C. Potter.  Counterbalancing momentum of reciprocating elements, means for, M. N. i orney.  Coupling. See Car coupling. Pape or rod coup- ling. Rod or pipe coupling. Thill coupling. Crane, traveling, W. M. Brooke.  Crystallization of saccharine or other solutions, L. Wulff.	528,177
	for, J. C. Potter	528,389
,	elements, means for, M. N., orney	528,291
ĺ	ling. Rod or pipe coupling. Thill coupling. Crane, traveling, W. M. Brooke	528 249
	Crystallization of saccharine or other solutions,	528 407
•	Crystalization of saccasine or other golutions, [A. W. Uhermann. Cultivator, hand, E. Franklin. Cuttivator, wheel, E. Children. Cutout automatic electro-magnetic, Stanley & Braddel. Cutter. See Kraut cutter. Thrasher bad	528,382 528,425
	Cultivator, wheel, E. Children.	528,425 528,413
1	Braddell. Cutter See Kraut autter Threehen had	528,186
	cutter. See Araut cutter. Thrasher bad cutter. Dental mirror E. R. Hitchcock	590 100
	Dice box, E. Gregory.	528,428 528,400
	Direct-acting engine, J. Kidd	528,299
	Door attachment, N. W. Cowdrey.	528,323 528,323
	Door, fexible, E. Brown	528,358
	Door stop. C. W. Case	528,146 528,146
	cutter.  Dental mirror, F. B. Hitchcock  Dice box, F. Grezory  Digester, H. W. Stebbins	1128, <b>4</b> 33 528,375
ļ	Drier. See Clothes drier. Drying articles, H. D. Williamson Drilling machine, Gilpin & McHargue	528,496
•	warms machine, trupiu & menargue	040.462