charge leaves the gun. A. The kicking or recoil of a gun commences at the instant that the ball begins to move. The impulse lasts until the ball leaves the muzzle. The recoil continues after the ball leaves, from the momentum generated by the first impulse.

(26) J. inquires: 1. How to prepare a rust cement for iron? A. Wrought iron filings, 65 parts; sal ammoniac, 2½; sulphur (flowers), 1½; sulphuric acid, 1. The solid ingredients are mixed dry, sulphuric acid diluted with sufficient water being then added. This cement dries after two or three days, and unites with the iron, making a very resisting and solid mass. 2. Also an iron cement for high temperatures? A. (1.) Iron filings, 20 parts; lime powder, 45; borax, 5; common salt, 5; permanganate of potash, 10. The borax and the salts are dissolved in water, and are then mixed with the two first named ingredients as quickly as possible and used. This cement changes at a white heat to a glassy mass, which is perfectly airproof. (2.) Permanganate, 25 parts; zinc white, 25; borax, 5. These are treated with a solution of soluble glass, and used at once. This cement must be left to dry slowly, and then it will resist the highest temperatures.

(27) G. H. asks for the process of preparing a bichromate solution for a small electric light battery. A. M. Trouve in his improved electric battery takes 150 grammes of bichromate of potash powder to a like amount of water, and after slaking adds, drop by drop, 450 grammes of sulphuric acid. The liquid warms and the salt dissolves, while no crystals are formed on cooling, nor are chrome alum crystals deposited in the cell. The elements are arranged with two carbons to each zinc, the latter being so placed that it can be drawn from the solution. With 12 elements and the solution above described, it is stated that 10 incandescent lamps can be kept at work for five hours, each lamp giving 10 candles. There is thus 100 candle power for five hours.

(28) J. H. writes: Please inform me if there is a method known to ascertain whether there is any moisture left in kiln dried timber, or in other words to find out when timber used in carriage building or any equal mechanical branch is dry enough. Is there any cheap chemical test to detect the presence of water in timber, warm yet from the kiln? If so, what is the agent, and how is the test performed? Can timber like hickory or oak be dried too much, and if so, is the original tenacity lost for good, or will exposure to the atmosphere restore it again? A. There is a way of ascertaining the quantity of water left in timber after kiln drying, first by putting a known quantity by weight, as a sample, into an iron retort and subjecting it to a heat that will discharge all the water, and then weighing the remainder for ascertaining the amount discharged. The best and most reliable way of determining is by practice and experience, as to the heat of the kiln and time used in drying. You can dry the wood too much and make it brittle, or kill its toughness. Over dried wood works crisp under the tools. Exposure to moisture only partially restores it.

(29) R. R. C. asks: Will you inform me of the nature of the composition or the kind of metals used for the regulation of the heat, by reason of the expansion or contraction of the metal, in artificial hatching machines, hot houses, or for other purposes where a standard degree of heat is desired? A. Metallic regulators should be made of metals having the greatest difference of expansions if possible such as steel and zinc, combined in a spring. Iron and brass make good regulators by making the strips one or two feet long, soldering together, and coiling up like a clock spring.

(30) W. W. M. asks: 1. Will you inform me what will make hoof and horn material pliable, so that it will not get hard and brittle, and how may it be welded? A. Horn may be welded or joined by heating the edges until they are quite soft and pressing them together until they are cold. It may be softened, after sawing it into plates or sheets, by exposing it to powerful pressure between hot iron plates. Before pressing, the pitch must be removed, and the horn softened, first by soaking for some days and then boiling in water. 2. What will prevent sulphuric acid from destroying woody and fibrous materials? A. Nothing; sometimes a coat of varnish or paraffin may be applied with advantage, but it is very difficult to prevent the acid from getting through. 3. In making an electrical machine, as in SUPPLEMENT 161, could the electro magnets be made similar to an ordinary horseshoe magnet? A. Thema-chine may be made in the manner described. 3. Will the electrical force generated by one dynamo run another? Yes, but at considerable expense of power.

(31) A. E. S. asks: 1. How can flowers be preserved in their natural form and color? A. Insert their stems in water, in which 25 grains ammonium chloride (sal ammoniac) have been dissolved. Flowers can be preserved in this way for 15 to 30 days. To preserve them permanently for several months, dip them into perfectly limpid gum water and then allow them to drain. The gum forms a complete coating on the stems and petals, and preserves their shape and color long after they have become dry. 2. What is a cheap and effective disinfectant for outside use about house and barn, etc.? A. Carbolic acid or zinc sulphate, both of which are poisonous.

(32) A. S. writes: W. R. asks how to use charcoal in casting brass, in No. 14 of Notes and Queries, SCIENTIFIC AMERICAN of May 19, 1883. Tell him to make a flame of the outer bark of the birch tree and thoroughly smoke the mould in every part, and he will get a perfect casting.

(33) W. M. H. asks: 1. What process will enable me to letter or stencil letters and figures upon glass, such as glass signs for advertising purposes, that may be done cheaply and quickly? A. Etch with hydrofluoric acid. See SCIENTIFIC AMERICAN SUPPLEMENT, No. 313. 2. By what process can I drill holes in glass? A. Make a circle of clay or cement rather larger than the intended hole; and use a drill formed of a copper tube and supplied with emery and water.

(34) E. M.—The following method of etching on silvered glass is given by Leclere, of Paris. Glass which is thinly silvered is coated with a very thin coat of asphalt. A photographic cliche or a properly cut pattern of dark paper, pasteboard etc., is laid upon the asphalt coat when dry; and the whole then exposed to the rays of the sun, which will render the asphalt, whenever the latter is exposed, insoluble. The protected asphalt coating is then washed away with benzine, and the silver coating beneath it is etched with nitric acid, while the drawing or patterns will appear in silvered lines and figures upon the glues.

(35) A. C. F.—The following inks afford copies without a press:

1. (Black).

Nigrosine C. P. fine	10 ounces.
Glucose "A"	1½ ounces.
Hot water	1¾ pints.
Glycerine	1¼ ounces.

Dissolve the nigrosine by trituration in the hot water, then add the other ingredients and strain through a piece of silk. If too thick when cold, dilute to the proper consistence with water.

2. (Blue).

Cotton blue (aniline) C. B.	6 ounces.
Glucose "A"	1 ounce.
Glycerine	¼ ounce.
Hot water	2 pints.

Proceed as directed for black ink (above). In preparing these inks it is essential that the water should be kept quite hot while the operation of trituration is performed. The trituration should be continued until all of the dye has been taken up by the water. The straining must be performed hot, otherwise the filtering cloths quickly become clogged. In purchasing nigrosine and aniline blue, obtain if possible the purest quality. Cheap grades of these dyes are almost invariably heavily adulterated with dextrine.

(36) P. F. S.—The following varnish is recommended for coating the stalks of flowers for the preservation of their color and general character:

Isinglass	11 ounces.
Concentrated glycerine	9 "

The isinglass to be softened by first soaking it in cold water, and then dissolved in the glycerine by digestion and agitation with the latter heated to 212° Fah. over a water bath. When properly prepared this varnish is colorless, and when cold resembles rubber in all but color. Another varnish recommended for this purpose is prepared from:

Bleached gutta percha	1 ounce.
Deodorized benzole	7 "

The gutta percha is cut into fine shreds and gradually added to and agitated with the solvent kept hot or (warm) over a sand bath—away from fire. The whole flower may be dipped into this varnish, shaken, and exposed to the air to dry. Another preparation suggested for this purpose is plain collodion diluted one-third and mixed with two per cent of camphor, also dissolved in a small quantity of ether and alcohol.

(37) C. W. N. K. writes: Would you kindly inform me through your paper the size screw it would take to run a boat 12 feet long by 3½ feet beam, and whether it would be better to have a two blade or a three, supposing it revolves at the rate of 375 a minute? A. The diameter will depend somewhat on the draught of water. We think 15 inches or 16 inches diameter, two blades, best.

(38) G. B. asks: Can you inform me how mosaics are made? A. The enamel used is a kind of glass, colored with metallic oxides, and it is so fusible that it can be drawn out into threads, small rods, or oblong sticks of varying degrees of fineness, slightly resembling the type used by compositors. These polychromatic rods are kept in drawers properly numbered, so that the artist always knows to which case to repair when he requires a fresh supply of a particular tint or tints. When the picture is commenced the first step is to place on the easel a slab of marble, copper, or slate, of the size fixed upon; and this slab is hollowed out to a depth of about three and a half inches, leaving a flat border all round which will be on a level with the completed mosaic. The excavated slab is intersected by transverse grooves or channels, so as to hold more tenaciously the cement in which the mounts of enamel will be embedded. Then the hollowed slab is filled with "gesso," or plaster of Paris, on which the proposed design is traced in outline, and usually in pen and ink. The artist then proceeds to scoop out a small portion of the plaster with a little sharp tool. He fills up the cavity thus made with wet cement or "mastic," and into this mastic he successively thrusts the "spiculæ," or the "tesseræ," as the case may be, according to the pattern at his side. In the broad folds of drapery or in the even shadows of a background, or a clear sky, his morsels of enamel may be as large as one of a pair of dice; in the details of lips, or eyes, or hair, or foliage, or flowers, the bits of glass may be no larger than pins' heads. The cement, or mastic, is made of slaked lime, finely-powdered Tiburtine marble, and linseed oil and when thoroughly dry is as hard as flint. Sometimes the mastic which fills the cavity is smoothed and painted in fresco with an exact replica of the pattern, and into this the bits of glass are driven, according to tint, by means of a small wooden mallet. If the effect produced wounds the artist's eye, he can easily amend the defect by withdrawing the offending piece of enamel and driving in another while the cement is still wet; and, by observing proper precautions, it can be kept damp for more than a fortnight. When the work is completed any tiny crevices which may remain are carefully plugged with pounded marble, or with enamel mixed with wax, and the entire surface of the picture is then ground down to a perfect plane, and finally polished with putty and oil.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

F. A.—The specimen is simply mica in clay, of no value at all.

COMMUNICATIONS RECEIVED.

On a New Electrical Condenser. By N.
On the Orbits of Planets. By C. W. H.
On the Theory of the Turbine. By S. W. R.
On Electricity in Printing Offices. By T. H. B.

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AND EACH BEARING THAT DATE.

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Plane, bench, D. M. Fielding 277,556
Plane, bench, F. A. Mershon 277,767
Planter and fertilizer, combined corn, G. H. Saltsman 277,513
Planter, corn, J. Linnrott 277,495
Planter, hand corn, S. M. Macomber 277,757
Plow, J. Ring 277,786
Plow point, chilled, G. Wiard 277,816
Plow, sulky, J. Lane 277,749
Plowing machine, steam, Malone & Hamel 277,751
Pole safety bar attachment, vehicle, A. Burson 277,676
Post. See Fence post.
Pot. See Coffee pot.
Potato digger, J. W. Cook 277,461
Powder duster, W. B. Allen 277,655
Power. See Horse power.
Preserving food, L. M. Mitchell 277,768
Press. See Baling press. Cheese press.
Pressure gage, thermo steam, P. Bonte 277,446
Printing machine air cushioning apparatus, L. C. Crowell 277,550
Printing on metals, process of and composition for making a drier for ink used for, H. Mathieson 277,499
Printing press gage pin, E. L. Megill 277,500
Punching machine, metal, Wilder & Parry 277,817
Quadricycle for land and water, H. S. Blanchard 277,667
Rack. See Rein rack.
Railway rail, A. McKenney 277,766
Railway rail spike, W. J. Morden 277,597
Railway rail, tubular, A. McKenney 277,765
Railway signal, telegraphic, R. M. Hunter 277,569
Railway switch, T. J. Daly 277,552
Railway switch, J. Elmer 277,697
Railway switch stand, Beard & Hinckley 277,539
Range, J. A. Price 277,781
Reaming and tapping, device for, J. F. Piper 277,507
Refrigerating liquids and means employed therefor, also apparatus for the subsequent treatment of the refrigerated liquids, Young & Neilson 277,822
Refrigerating oils, fats, etc., apparatus for, Sideley & Mackay 277,797
Refrigerator and producing artificial cold, W. C. Wren 277,649
Rein holder, H. A. Hudson 277,734
Rein rack, P. Bossidy 277,668
Ring for halters, tie straps, pessaries, etc., H. G. Farr 277,473
Road mender, L. Lamborn 277,748
Rocking attachment for chairs, H. H. Schneider 277,617
Roller mill, J. Warrington 277,525
Rolling mill, S. T. Wellman 277,815, 277,860
Rope and cord fastening, C. S. Upton 277,632
Rotary crusher, D. Bushman 277,543
Rubber cloth, machine for manufacturing, F. E. Aldrich (r) 10,325
Running gear, E. Prescott 277,780
Sash fastener, H. Bausch 277,441
Sash fastener, W. L. McKelvey 277,591
Saw guard, J. G. Groff 277,711
Sawhandle, J. Neimeyer 277,502
Saw mill dog, T. H. Kennedy 277,841
Saw swage, J. Mather 277,589
Scraper, road, A. J. Nellis 277,771
Scraper, sulky dirt, H. M. D. L. Babcox 277,826
Screening device for middlings, flour, etc., cut off for, G. Cottreall 277,547
Screw driver, I. M. Furbish 277,561
Screw driver, D. Nei 277,599
Secondary battery, E. Boettcher 277,445
Seed drill, garden, A. H. Sherwood 277,620
Seeder, hand broadcast, Yoder & Carmien 277,861
Sewing machine, A. Lambert 277,747
Sewing machine, button hole, J. W. Lufkin 277,755
Sewing machine needle, H. G. Suplee 277,629
Sewing machine tension, G. A. Brady 277,449
Sewing machine trimming attachment, T. C. Robinson 277,787
Shaft, wagon, W. H. Barrett 277,440
Sheet delivery apparatus, L. C. Crowell 277,548
Shelving, adjustable and portable, B. F. Roberts. 277,510
Shirt, C. N. Davis 277,553
Shirt, T. Kimball 277,744
Shirt, S. Wallach 277,524
Shirt, J. S. Williams 277,527
Show box, C. E. Scott 277,515
Shutter, flexible jointed, J. P. Recker 277,608
Shutter worker and blind slat operator, combined, D. Beal 277,663
Signal. See Railway signal.
Signallight, percussion, C. E. Masten 277,498
Skylight, metallic, G. Hayes 277,425
Sled brake, N. Parker 277,775
Sofa, C. J. Bruschke 277,454
Sofa and bath tub, combined, C. A. Baker 277,438
Soldering iron, A. P. Olmstead 277,601
Speaking tube apparatus, G. J. Quinsler 277,508
Splice, F. Grinnell 277,478
Split switch, Crowley & Temple 277,684
Spring. See Vehicle spring.
Stand. See Camera stand. Railwayswitch stand.
Staples, machine for forming, W. A. Root 277,615
Station indicator, H. Koehler 277,745
Steam generator, W. P. Magreevy 277,844
Steam generator, L. H. Page 277,848
Steel, apparatus for making Bessemer, T. H. Burridge 277,831
Stool, store, J. S. Sammons 277,514
Stopper. See Bottle stopper.
Stoves, safety casing for railway car, B. D. Stevens 277,854
Straining machine, T. R. Ryan 277,789
Straw stacker, F. F. Hartwich 277,720
Straw stacker, C. Leffingwell 277,750
Stump extractor, H. B. Hawes 277,484
Sugar from molasses, sirups, or the juices of plants, etc., extracting, C. Steffen 277,521
Sugar, salt, etc., apparatus for the manufacture of, J. A. Cook 277,823
Suspenders, B. Petchaft 277,776
Switch. See Railway switch. Split switch.
Syringe, O. Hendrick 277,568
Table. See Extension table.
Tank. See Tempering tank.
Tapping and facing machine, F. H. Richards 277,611
Tassel, J. O. Remington 277,609
Tempering tank, A. A. Simonds 277,518
Thill, sleigh, G. H. Lusk 277,843
Thrashing machine, J. H. Melick 277,595
Thrashing machine, J. Rumely 277,512
Tie. See Necktie.
Toy, W. Leggett 277,581
Toy gun, H. P. Marks 277,496
Toy theatrical stage, J. H. Singer 277,798
Traction engine, Rider, Snyder & Frick 277,784
Trap, R. W. Armstrong 277,656
Trough. See Fish egg hatching trough.
Truck, C. W. Ford 277,699
Tug, shaft, G. Purdy 277,782
Turpentine and other wood products and for the manufacture of charcoal, process of and apparatus for the recovery of, H. M. Pierce 277,505
Turpentine, process of and apparatus for the manufacture of, H. M. Pierce 277,506
Type holder and separator, L. K. Johnson 277,740
Underwaist, child's, M. E. Higgins 277,726
Valise, folding, W. S. Marshall 277,497
Valve. See Vapor burner valve.
Valve, L. J. Kolar 277,492
Valve, balanced slide, G. Shone 277,795
Valve, check, A. Riegler 277,509
Valve, globe or stop, F. H. Hambleton 277,713
Vapor burner valve, D. E. Bangs 277,661
Valves, device for proving globe, F. Lunkenheimer 277,756
Varnish, etc., apparatus for making, W. M. Bailey 277,584
Vehicle platform gear, P. B. Cunningham 277,834
Vehicle running gear, J. Herbrand 277,725
Vehicle spring, J. H. Moran 277,770
Vehicle spring, Penn & Whitney 277,504
Vehicle spring coupling, T. D. Lines ..... 277,583, to 277,585
Vehicle, two wheeled, M. Halfpenny 277,482
Vessels, construction of, J. S. Birch 277,443
Violin bow retainer, C. F. Albert 277,653
Vise, W. Johnson 277,570
Vise, N. M. McLeod 277,592
Wagon box and hay rack, combined, Leslie & Hall 277,751
Wagon box fastener, P. Stafford 277,801
Wagon, dumping, I. B. Hammond 277,488
Washing machine, C. Bradford 277,670
Watchcase, E. C. Fitch 277,865
Water in houses, distribution of, A. Dumas 277,691
Water wheel, turbine, C. M. Baker 277,535
Weather strip, T. Urie 277,858
Well boring machine, W. J. Sherman 277,794
Wells in quicksand, etc., formation of deep, J. B. Edson 277,695
Wells, side leak or sand wall washer for oil, J. M. Reardon 277,607
Wheel. See Emery wheel. Gear wheel. Water wheel.
Whip coupling, E. Phelps 277,778
Wine, apparatus for maturing sherry, M. T. De Abreu 277,554
Wire barbing machine, F. W. Brainerd 277,451
Wire, let off mechanism for looms for weaving, C. Smith 277,628
Wood dressing machine, S. R. Bailey 277,827
Wood preserving composition, L. N. Teachman 277,810
Wrench, J. McAlpin 277,590
Yoke, neck, Z. Norton 277,508

DESIGNS.

Carpet, E. Fajon 13,903
Cracker or biscuit, A. J. Medlar 13,909
Curtain band, B. Dreyfus 13,902
Curtain band, J. O. Remington 13,904
Fender, J. H. White 13,907
Flowerpot bracket, H. R. Van Eps 13,905
Flower stand, H. R. Van Eps 13,906
Gimp, H. Davenport 13,901
Oilcloth, C. T. & V. E. Meyer ..... 13,910 to 13,915
Stove, G. O. Bergstrom 13,899
Upholstery fabric, D. B. Kerr 13,908
Window shade pull, C. W. Clark 13,900

TRADE MARKS.

Alloys of copper in the form of sheets, tubing, hollow ware, and cartridge shells, Brown & Bros 10,264
Beer, ale, porter, and all carbonated drinks, bottled, Consolidated Bottling Company 10,265
Calf skins, calf kids, and goat kid skins, Bittel, Tepel & Eilers 10,263
Candies and sugar toys, C. Grimm & Co 10,270
Cement, plaster, lime, coloring for mortars, and kaolin, Prentice & Hackett 10,274
Electric machines, dynamo and magneto, J. B. Tibbits 10,275
Overalls, shirts, underwear, pants, suspenders, and collars, H. Exstein & Co 10,268, 10,269
Soap, hard, Summit City Soap Company 10,276
Soap, laundry and toilet, Lautz Bros. & Co 10,273
Tobacco, chewing, P. H. Hanes & Co 10,271, 10,272
Wine, champagne, Deutz & Geldermann 10,266, 10,267

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