Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

NEW BOOKS AND PUBLICATIONS.

THE ROAD MASTER'S ASSISTANT AND SECTION MASTER'S GUIDE. By W. S. Huntington. Revised and enlarged by Charles Latimer. Published by the *Railroad Gazette*, 73 Broadway, New York city.

This is a valuable treatise on a branch of railroad work about which not much has been written, and yet upon which the safety and economical management of railway lines very largely depend. The best feature of the book is that it avoids technicalities and addresses itself directly to the practical side of its subject. It begins with track laying, and takes up in order the topics of laying the rails, spiking, construction of cattle guards, culverts, etc., ballasting, elevation of curves, track repairs, frogs, and switches, etc. The volume is clearly written, and contains numerous good illustrations.

UPLAND GAME BIRDS AND WATER FOWL OF THE UNITED STATES. By A. Pope, Jr. Published by Scribner, Armstrong & Co., New York city.

We have already directed attention to this magnificent work, the sixth part of which, recently issued, is now before us. The present number contains two splendidly executed water color facsimiles of paintings of the Canada Grouse and the Wood Duck, together with the descriptive letter press. Both as a work of art and as a contribution to the literature relating to the natural history of the country, this collection of plates will be of lasting value.

DETERIORATION AND RACE EDUCATION. By Samuel Royce. Edward O. Jenkins, Publisher, 20 North William street, New York.

The author thinks that the race is deteriorating. He holds that society, and the means of preventing ever present morbid tendencies from settling into abnormal and anti-social formations, must be the chief study of the future teacher; and that the great work of the latter is the application of physical, mental, and social hygiene to the physical, mental, and social degeneracy as manifested by an excessive rate of mortality, insanity, pauperism, and crime. The work is well written, and abounds in illustrative facts and instances, together with much useful statistical information gathered from a wide range of literature.

STUDIES IN LUKE. S. R. Wells, Publisher, 737 Broadway, New York. Price 60 cents.

This is the original Greek text of the Gospel, and an interlined literal translation, together with illustrative foot notes, appendix of weights, coins, names, phrases, and other explanatory matter.

We have received Reports and Awards of the Centennial Exposition, covering Groups 28 to 36 inclusive. As a maximum average we suppose that about half the contents of this voluminous series of reports has some utility; the remainder, being simply lists of the premium winners, is of no value perceptible to us. It may be of interest for John Smith to read that his production is "commended for excellence of design, beauty of finish," etc., and perhaps, if very few exhibitors in common with him attained like commendation, the general public might find therein a useful guide as to the relative importance and merit of the various exhibits; but as several thousand contributors come in for like encomiums, this portion of the work will be appreciated chiefly as showing how rich the language is in commendatory adjectives. We have already noted several good reports in the series, and to this list we can now add those of the Judges on Educational Exhibits and on Horological Apparatus.

Notes & Queries

(1) J. L. asks: What is a good way to case-harden iron links and blocks for locomotives? A. Heat the metal to redness, sprinkle prussiate of potash upon it, and plunge into cold water.

(2) "Subscriber" writes: In making soda water, what is the best practical proportion of sulphuric acid to marble dust? A. Mathew recommends 3 lbs. of marble to 5 pints of sulphuric acid.

(3) F. A. L. asks: How can I remove the black color caused by rubbing a match against the side of an ornamental bright brass match box? A. Use a little moistened emery on a soft cloth; or first apply strong hot potash solution to the parts, wash this off with water, then moisten with nitric acid, rub with sawdust or a soft cloth and water, dry, and relacquer. Dilute alcoholic shellac solution colored with dragon's blood and turmeric is the lacquer generally used.

(4) H. P. writes: Last fall I bottled some cider, "curing" it with sulphite of lime and mustard seed. At present the most of it lacks life, although an occasional bottle has sufficient carbonic acid gas to give an agreeable taste. Can you suggest a way to enliven the dead cider? A. Add about 30 grains of bicarbonate of soda and one third that quantity of citric acid to each bottle, stopper securely, and invert for a time.

(5) C. B. T. asks: What is a good and cheap substitute for linseed oil in making putty? A. Menhaden and cotton seed oils have been used, either alone or mixed with a little linseed oil.

(6) C. R. P writes: By leaving the key of a telegraph instrument open, thus breaking the circuit, does the liquid in the battery cease to operate on the amalgamated zinc? A. The battery fluid does not entirely cease to act on the zinc and mercury. These metals would in time be gradually dissolved, even if the electric circuit were kept open. It would then be said that the "negative" was dissolved by "local action."

(7) T. A. T. asks: What is the speed of a perpendicular fall of water of 100 ft. at a temperature of 4° Celsius? A. About 2½ seconds.

(8) C. W. B. writes: Recently an artisan in this town dissolved a quantity of gold (coin and old jewelry) by the aid of nitro-muriatic acid. From the solution he threw down a precipitate with aqua ammonia. This precipitate was placed on a filter and allowed to drain dry, but not washed. The precipitate and containing filter paper were then placed in a crucible with carbonate of soda and carbonate of potash. The crucible was then placed on a forge, and, when heat was raised, an explosion took place great enough to shatter the crucible and scatter its pieces and the fire of the forge to all parts of the shop. What was the cause? A. A large part of the precipitate formed by the addition of ammonia to the gold solution consisted of ammonium aurate or fulminating gold ($Au_2O_3 4NH_3OH_2$), a very explosive compound; we do not wonder at the result.

(9) F. C. C. asks for a simple mode of testing the inflammability of coal oil. A. In a small cup or glass place a quantity of the oil to be tested, and immerse in the oil the bulb of a good thermometer; suspend the cup containing the oil in a vessel of water and gradually heat the water; move about close to the surface of the oil a lighted taper, and note the degree on the thermometer at which the oil begins to emit inflammable vapor (the flashing point), and again that at which the oil inflames. Oil to be used in lamps should not take fire below 115° Fah. In applying the lighted taper the flame must be kept away from the glass of the thermometer.

(10) J. S. asks: How are the different cuts of files denominated? For instance, what constitutes "bastard cut," "second cut," etc.? A. Bastard cut is a little finer than a rough file. Second cut is still finer than a bastard; then comes smooth, superfine smooth, and dead smooth.

(11) J. P. asks: What is the chemical composition of the "Pharaoh's serpents?" A. The light solid matter composing the "serpent" consists of mellone, melam, and mercuric sulphide; the substance from which it is evolved (the "egg") is mercuric sulphocyanate—the precipitate obtained by the addition of mercuric nitrate to solution of ammonium or other alkaline sulphocyanate, washed and dried.

(12) T. R. S. asks: Is there any process by which strong or rancid butter can be cleansed and restored to its original condition? A. Rancid butter may be improved by working it over with fresh cream; also by digesting it for a short time in a melted state with a quantity of fresh, granular animal charcoal, free from dust, and after straining thoroughly, reworking. See p. 102, vol. 36.

(13) I. H. T. writes: Suppose a block of ice with a thermometer imbedded in it in a temperature 10° above zero. Will the thermometer go to zero if the ice be placed in an atmosphere of zero? In other words, does the temperature of ice vary? A. The temperature of ice varies with the temperature of surrounding objects below 32° Fah.; the thermometer would register 0°, provided the conditions remained constant long enough.

(14) P. M. B. asks: Can a ⅝ inch round rod of iron, say 60 feet long, secured at each end of a building with a nut and washer, with no support in the center, be drawn taut enough to sustain from 400 to 500 lbs., to be carried along the same by a car, without bending? A. It cannot be made to carry any weight whatever without some deflection. You will find rules for amount of deflection in works on the strength of materials.

(15) M. C. asks: What is meant by the internal grooving and pitting of boiler plate? A. Grooving is the formation of channels in the iron, and pitting is the formation of little depressions of dish form made in the iron at various places.

(16) W. M. B. writes: I have frequently noticed during a storm that the thunder which succeeds a flash of lightning sometimes commences far off towards the horizon, and gradually increases in intensity until it ends in a loud burst nearly over our heads. As the discharge is accomplished in an instant almost, why is it that we hear the thunder from a distance first sometimes? A. The following explanation, from "The American Cyclopedia," may be satisfactory to you: "This sound may be prolonged, as it is reflected in echoes by the clouds; or, as suggested by Sir John Herschel, it may come in successive impulses to the ear, as brought from an instantaneous discharge that extends for miles along a line directed away from the observer. So the terrific sudden crash may be the result of a flash occurring all around the observer, with no great difference of distance from him in the points of the discharge."

(17) J. C. W. asks: Would an iron railing or cresting on the roof of a building increase the danger from lightning? A. No. The iron railing would assist in protecting the building if it were connected with a rod well grounded in the earth.

(18) G. H. C. asks: Can black oxide of manganese be dissolved so as to produce a jet black liquid suitable for an ink? I have made a solution in hydrochloric acid, which produces a brownish green liquid? A. None of the manganese salts form solutions suitable for inks. Strong aqueous solution of potassium permanganate forms purplish red ink, which flows readily from a pen and soon turns brownish black.

(19) J. W. B. asks: 1. What pressure per square inch is necessary to reduce or compress atmospheric air of common density, inclosed in an airtight cylinder, to one half, one fourth, and one eighth its volume? A. If the temperature of the air is maintained constant during the compression, the pressure varies inversely as the volume. 2. What are the advantages claimed for hydraulic elevators over steam ones? A. The motion of the hydraulic elevators is claimed to be smoother and more free from jars.

(20) S. R. S. asks: How can I harden brass wire which has been softened? I have tried slow cooling in stove and in ashes, but without success. A. By rolling or hammering it cold.

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

E. A. P.—The dextrin is of good quality. It contains a very little starch and a trace of glutinous and saccharine matters. Use hot water and do not add too much of the dextrin flour at a time.—H. O. T.—No. 1 is colophonite and black garnet in pyroxene; apparently also zircon. No. 2 is coccolite and wollastonite with garnets and a small quantity of pyrites and mispickel. No. 3 is mostly actinolite—a variety of horublende.

FLOATING AND SUSPENDED MAGNETS; Experiments illustrating the Action of Atomic Forces, the Molecular Structure of Matter, Allotropy, Isomerism, and the Kinetic Theory of Gases. By ALFRED M. MAYER. 22 figures. Phenomena of Compressibility and Porosity; two Essential Chemical Laws; and the Modern Doctrine of the Composition of Matter clearly explained. Matter in Constant Motion; Character of Motion. Diffusion of Gases explained. Why Heat Expands. The same elements occurring under different Forms. Minute Instructions for performing Pleasing and Instructive Experiments illustrating the Foregoing Laws of Matter, the only Materials required being a few needles and corks and a bar magnet. How to Exhibit these Experiments before a large audience. The Most Important Laws of Chemical Constitution Demonstrated in the Simplest Manner. Also, a paper by HENRY A. MOTT, JR., on the Application of Polarized Light to the Examination of the Alkaloids of the Quinin Group, and Samples of Unknown Composition. Contained in SCIENTIFIC AMERICAN SUPPLEMENT No. **129.** Price 10 cents. To be had at this office and of all newsdealers.

THE INTERIOR OF THE EARTH. ABstract of Address before the Cumberland Association for the Advancement of Literature and Science. By SIR GEO. B. AIRY, F.R.S. Triangulation; how the Earth is Measured. Dimensions, Form, and Variable Density of Earth. Tremendous Pressure at Center. Rotation of Earth. Fluid Condition of Interior; Singular Occurrence in Surveying. Heat; Volcanic Action everywhere. Earth's Magnetism and its Variations. How the earth was formed. Nebulæ, what they are; Heat from their Condensation; Curious Facts; the Nebular Hypothesis. What the Spectroscope Reveals. Density of Earth, Sun, and Planets. Cause of Volcanic Action. Also, VESUVIUS and the Surrounding Country. By Prof. C. E. CROSBY. Its Topography, Geological History, and Present State. Its connection with Historic Events, the Destruction of Pompeii, Herculaneum, etc. Phenomena and Explanation of Eruption. The Grotto del Cane, &c. Both papers contained in SCIENTIFIC AMERICAN SUPPLEMENT No. **129.** Price 10 cents. To be had at this office and of all newsdealers.