window shades from curling on the sides when exposed to the beat of the sun. A. Try the addition of a trace of glycerine to the size.

(28) C. E. R. asks: 1. Is the pressure the same on the bottom of steam boiler as on the top? A. The pressure is as much greater at the bottom, than the pressure of steam, as is due to the head of water. 2. What is the largest size steam engine cylinder ever made? A. We suppose the largest cylinder is that of the drainage engine at Harlem lake, 144 inches diameter.

(29) J. M. M. asks: 1. With what color are paraffine matches colored? A. Usually the colors are pigmental and not dyes, such as red and yellow lakes, ochers, Prussian blue, and green, etc. 2. If it is aniline how is it applied and mixed? A. The aniline dyes may be introduced by first dissolving them in alcohol. The merest trace of the dyestuff is sufficient. 3. Is there any liquid color for dyeing matches in the market? A. We know of no color sold especially for this purpose.

(30) F. T. R. asks: How is brass made and melted? My experiments have resulted in a blue flame and ashes. A. Yellow brass—zinc, 30; copper, 70; for turning (common) copper, 90 lb.; zinc, 10 lb.; lead, 1 to 5 oz. Red brass for turning copper, 24 lb.; zinc. 5 lb.; lead, 8 oz. Red brass, free, for turning copper, 160 lb.; zinc, 50 lb.; lead, 10 lb.; antimony, 41 oz. Another—copper, 32 lb.; zinc, 10 lb; lead, 1 lb. Best red brass for castings copper, 24 lb.; zinc, 5 lb.; bismuth, 1 oz; put in bismuth last. In melting use a black lead crucible, put in the copper and heat in a crucible until melted (requires a very bright red, or white heat). When the copper is barely hot enough to remain liquid, add the zinc, with a little borax and charcoal powder. The zinc must be dry. Where lead, antimony, or bismuth is one of the constituents, stir in these just before taking from the fire to pour. Stir with a stick of green wood, skim and pour. In remelting brass use a quick fire and add a little zinc to make up for that invariably lost in the operation.

(31) W. M. C. asks how to put a black bronze on gun barrels. When the guns or carbines are first issued to us they have a lustrous black bronze, which lasts about six months and wears off, leaving the barrel smooth and bright. I think that it is applied with a brush or by a dip, as muriatic acid takes it off clean, leaving the barrel bright. What I need is a recipe such as a soldier can use. I think that a liquid preparation would be the thing, if possible. A. The blue color is due to a thin film of oxide formed in tempering. We know of no way of reproducing the film without reheating the whole barrel. A thin coating of spirit copal varnish, diluted (with alcohol), somewhat and properly colored with aniline blue, may be used to imitate the color and appearance, but it is not very durable.

(32) T. W. asks if a glass ball placed on top of a flag staff on a house is any protection against lightning. A. No, the glass ball would not be any protection from lightning. The proper protection would be a three-quarter inch iron rod, made if possible in one continuous piece, or in sections with soldered and riveted joints, extending from the staff or highest point on the house to the ground, and connected underground with the iron water main pipe or iron gas pipe; the connection between rod and pipe being by soldered joints. This would afford a large area of conducting material under ground in direct connection with the rod. No rod is a protection unless it is thoroughly joined to a large conducting surface in the earth.

(33) J. P. sks for formula for electro-plating iron on other metals. A. Neutral ammonio sulphate of iron (double sulphate of commerce) three-fourths lb.; water, 1 gallon; dissolve and filter. Use a clean iron anode, clean the work thoroughly. (See Nickel Plating, p. 153, Vol. 43, SCIENTIFIC AMERICAN.) Use a moderately strong battery. The success of the operation depends very much upon the preparation (thorough cleansing) of the work. 2. Is the formula given in No. 1, new volume, for electro-plating brass, patented? A. No.

(34) J. H. M. writes: Some makers of boilers, to be used in connection with pipes for heating dwellings and greenhouses by the hot water system, have, in this country and in England, used pipes for grate bars, intending that the water in the boiler should circulate through these pipes, and expecting to obtain greater efficiency from the exposure of more surface to the action of the fire. In what respect is an apparently good theory practically defective, for it seems to have been adopted by but few, and to have been abandoned by some who have experimented with it? A. Such "water grates," as they are called, are not used for economy of fuel, but because they are more durable than the ordinary grate. Coal burning locomotives are frequently fitted with them

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

R. P. W.—It is a fine silicious sand, useful for polishing purposes and for glass making; might also find a market with pottery manufacturers and artificial stone makers.

COMMUNICATIONS RECEIVED.

A Plan for the Reformation of the Orthography of the English Language. By H. A. S.

On Solar Phenomenon. By J. C.

NEW BOOKS AND PUBLICATIONS.

EXTRACTS FROM CHORDAL'S LETTERS. New York: *American Machinist* Publishing Company.

These selections from the contributions of "Chordal" to the *American Machinist* make an interesting, entertaining, and usefully suggestive addition to the literature of the machine shop. The author discusses shop work and shop management with much practical shrewdness, and in a manner that mechanics, artisans, and wide-awake working men generally cannot help but enjoy.

YELLOW FEVER: ITS SHIP ORIGIN AND PREVENTION. By Robert B. S. Hargis, M.D. Philadelphia: D. G. Brinton.

Dr. Hargis is an enthusiastic disciple of Professor Gamgee as to the nautical origin of yellow fever, though he professes to have developed the same theory long before. This book comprises a number of articles on the subject published in several medical journals during the past year.

STUDIES IN SONG. By Algernon Charles Swinburne. New York: R. Worthington.

Swinburne's command of singing English is marvelous. His verses are unequaled in sweep and melody. If he could only freight them with thought and feeling of equal quality he would be a poet, and a great poet.

THE SCIENTIFIC BASIS OF SPIRITUALISM. By Epes Sargent. Boston: Colby & Rich. 12mo, pp. 372. $1.50.

Of the two classes of men—those who believe in spiritualism and those who reject the spiritual hypothesis—one must be grievously in error: perhaps both are. We are inclined to think that the one (however correct on the main point) errs as much in denying real phenomena because they are not readily explainable under a too limited theory of what is natural, as the other does in over haste to accept phenomena which are misunderstood or fraudulent, because they tell in favor of that most marvelous of men's inventions—the supernatural. Mr. Sargent's book is not likely to change radically the belief of either class. The natural material out of which men have created and peopled the supernatural, the "invisible universe," the "spirit world," or whatever it may be called, will have to be much more broadly and minutely understood, both as regards its origin and its character, before the question of fact and fancy involved in spiritualism can be brought to any real scientific basis.

SPONS' ENCYCLOPEDIA OF THE INDUSTRIAL ARTS, MANUFACTURES, AND COMMERCIAL PRODUCTS. Edited by G. G. Andre. 30 parts. Each 75 cents. New York: E. & F. N. Spon.

Parts 15, 16, and 17 of this encyclopedia complete the subject of explosives, and embrace feathers, fibrous substances, floor cloth, food preservation, fruit, fur, coal gas, gems, glass, and graphite.

[OFFICIAL.]

INDEX OF INVENTIONS

FOR WHICH

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AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for one dollar. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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Sofa bed, F. Laermans, San Francisco, Cal.
Transfers for freight, A. E. McDonald, New York city.