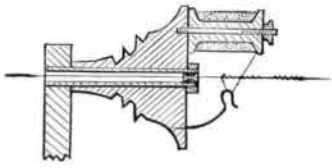


(19) R. K. writes: I am about building a screw propeller launch, 25 feet long and 5 feet beam, to be run by an engine with cylinder 2x5 inches. About how many miles an hour, with 150 lb. of steam on, would she run, with a 3-16 inch steel boiler, size 20x35 inches? A. If boat has good model, probably 4 1/2 or 5 miles per hour. 2. Where and at what price could I get a complete description of the electro-magnetic engine? A. The back numbers of the SCIENTIFIC AMERICAN and SUPPLEMENT contain all of the recent information on this subject. 3. What is the cost of running a magnetic engine as compared with a steam engine of the same power? A. The cost of running a magnetic engine is about 50 times as great as steam. 4. About what is the price of a six horse power magnetic engine? A. We think there are no engines in market of that size.

(20) D. L. M. writes: In a fire engine at work, throwing water through 200 feet of hose with an inch nozzle, where is the greatest pressure of water: as it leaves the engine, or at the inch hole at the end of the nozzle? A. At the pump.

(21) J. F.—A simple device for covering wire is shown in the annexed engraving. A 3/8 tube



having a smooth exterior is screwed into a wooden standard, and supports a wooden pulley that carries a spool containing the silk or cotton with which the wire is wrapped. The thread passes from the spool through the small wire guide hook, thence to the wire to be covered, which is drawn slowly through the tube as the pulley revolves. The pulley may be turned by connection with a lathe, or it may be driven by a belt from the driving wheel of a sewing machine. The wire being covered may be drawn through the machine by hand, or a reel may be easily attached and arranged to take motion from the pulley.

(22) W. P. asks: 1. If a sulky or gig is being run around a course or a circle, with a horse hitched to the same, which way will it upset, or which way is it liable to upset: towards the center of ring or the outside? A. Toward the outside. 2. If a locomotive is running around a sharp curve, do not the driving wheels on the inside of curve have to slip on the rail? A. One or both wheels must slip. 3. What will I put on common paper to make impression paper for transferring patterns on wood? A. See p. 283 (23), Vol. 40, of SCIENTIFIC AMERICAN.

(23) F. R. R. writes: 1. In the SCIENTIFIC AMERICAN of August 9, page 91, communication (10), H. W. F. describes a cheap battery. I wish to ask: 1. What is the battery fluid? A. 2 parts of bichromate of potash dissolved in 20 parts of hot water. When cold add 1 part of sulphuric acid. 2. Where can the gas carbon be obtained, and how prepared? A. It is obtained from the retorts of gas works. It may be chipped or sawed into shape, but it is usually pulverized, mixed with soft coal dust, and calcined in iron moulds. Plates of this kind may be had from any dealer in electrical supplies. 3. Can it be made from lampblack? A. No. 4. Is the amalgamated zinc the same as that commonly used in plumbing, roofing, etc.? A. No, it is not as pure as it should be; however, it may answer your purpose.

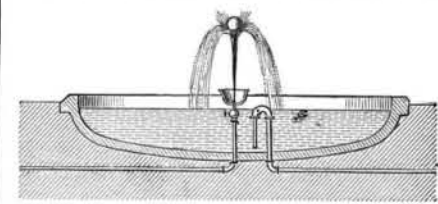
(24) R. W. D. asks: 1. What chemical should I use to saturate paper to be used on a chemical telegraph? A. Nitrate ammonia, 2 lb.; muriate ammonia, 2 lb.; ferri-cyan. potassium, 1 ounce; water, 1 gallon. 2. Also, is there sufficient resistance in above paper to keep current from passing through it? A. No; the current must pass to make the mark. 3. How can I gild iron to resemble brass, inexpensively? A. Clean the iron by scouring, and rub it with sawdust slightly moistened with a dilute acid solution of copper sulphate. Rinse, dry, and lacquer if necessary. 4. What is the resistance of one mile of No. 14 galvanized iron wire? A. 51 ohms.

(25) C. C. H. asks how to arrange connections on a telephonic line having three telephones and using electric alarm bells as calls. A. Use single stroke bells on a closed circuit. Have a switch to throw the bell out, and the telephone into the circuit after the alarm.

(26) C. A., Jr., asks: 1. Is there any particular rule for cutting threads with simple or compound gearing, given only the number of threads in feed screw; if so, what are they? A. T S I = N; t' t' = S. T representing the number of teeth in traverse screw wheel; S number in stud wheel gearing in mandrel; t number in wheel upon mandrel, and t' number in gearing upon stud pinion, gearing in T; I number of threads per inch upon traversescrew; N number to be cut. 2. We have for one engine two horizontal boilers and one steam drum. What is the gain by having a safety valve on each boiler and one on the drum? Why couldn't we do with only the one on the steam drum? A. If there are shut off valves to your boilers, you should, for safety, have a safety valve to each boiler, none is necessary to the drum if the communication to the boilers is free. 3. How do you find the horse power of an engine? A. See p. 267 (4), Vol. 40, SCIENTIFIC AMERICAN.

(27) A. K. asks: What is the greatest altitude yet reached by a railroad? A. Some railway memoranda lately published in Germany give the highest points yet reached by existing railways passing over mountain ranges or through mountain passes. The Apennine line reaches a height of 2,024 feet; the Black Forest line, 2,789 feet; the Semmering, 2,920 feet; the Caucasian line, 3,198 feet; the St. Gothard (tunnel), 3,786 feet; the Brenner, 4,475 feet; Mont Cenis (tunnel), 4,390 feet; the North Pacific, 5,420 feet; the Central Pacific, 7,021 feet; the Union Pacific, 8,573 feet; while a railway over the Andes climbs to 15,646 feet.

(28) J. W. W. writes: I inclose you section of small fountain reservoir, with (I think) a novel automatic siphon. We built two small fountains in a portion of the yard where the inmates have access to them, and fearing the overflow pipe would be tampered with, I put in a siphon overflow as shown in the cut.



It answers two purposes, acting as a positive overflow, and, when it is desirable to clean the basin, the entire body of water can be siphoned out by putting a small wood plug in the air hole at the bend. This device has been working about two months under a variable pressure of water, and the water line never gets above the return elbow, or below the bottom of air hole.

(29) E. H. M. asks how to obtain crystals of bismuth. A. This is effected most easily by melting two to four pounds of the metal in a hemispherical iron ladle, allowing it to cool slowly until a crust is formed on the surface, then breaking this with a wire and pouring out quickly the still fluid metal from within. This yields, if not always large crystals, at least faces, from which project the corners of numberless cubes. Fine large crystals, with beautiful stair-like arrangement, can be obtained only by making the bismuth chemically pure, which is a tedious operation.

(30) P. H. V. asks whether one billion represents one thousand millions or one hundred millions; please put the figures the way they should be written to represent one billion. A. 1,000,000,000. French method correct for this country.

(31) C. M. D. writes: To-day when the wind was blowing pretty briskly, I felt, as I sat at my window in sixth story, a tingling sensation in my forehead, just above and between my eyes, such as would be caused by application of one of poles of an electric battery to that part. Can you account for it? Could there have been a current of electricity in the air? The wind was blowing from Western Union building and across hundreds of wires toward me. I have some curiosity to find out the cause of the sensation, which was not unpleasant, and which was not neuralgic or painful in the least. A. We think the sensation experienced by you could hardly have been produced by electricity. It was probably due to the cooling of the forehead by the rapid evaporation of perspiration; however this is a subject that will bear investigation.

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

A. S. C.—It is a titaniferous iron ore; it cannot be smelted to advantage.—G. F.—A. The pyrrhotite is not nickeliferous and cannot be profitably worked for the small amount of gold which it carries. B. is not free milling—it contains too much galena, though not enough for smelting. It must be roasted.—H. W. McC.—Impure kaolin, or porcelain clay, if properly washed may be useful in the manufacture of cheap white ware, etc.—N. G. F. B.—They are tourmaline, muscovite in quartzite, and biotite.—W. M. H.—No. 1. Missing. No. 2 contains 80 per cent of lead. No. 3 is also rich in lead, carrying about 5 ounces of silver per ton. It may be smelted in the simple blast furnace; few smelters desilverize their lead. It is sold as base bullion on assay.—J. E. B.—No. 1 is plumbago; if properly washed and purified, worth about 7 cents per lb.—B. F. J.—It is a bituminous shale; it will yield oil, gas, and tar upon distillation. No. 2 is a jaspery hematite. No. 3 is an impure limonite. No. 4 is a silicious limestone, and if properly burned will doubtless yield a good hydraulic cement.—F. J. R.—No. 1 is chalcopyrite, a copper ore. No. 2, the gray part is fibrous zeolite. No. 3 is hornblende and quartz. No. 4, fibrous amphibole. No. 5 is leucopyrite or arsenide of iron.—S. A. S.—The vine sent is the climbing wild hemp (Mikania scandens), common in the middle Southern States.—J. E. T.—The box contains fragments of semi decomposed orthoclase and sandstone, serpentine rock and impure manganite, or ferromanganese.—J. M.—It is nodular iron pyrites, iron sulphide.

COMMUNICATIONS RECEIVED.

- On the Cause of Boiler Explosions. By A. J. P.
On the Wheel Question. By J. K.
On the Movement of Light in Space. By A. S.
On Easily made Slide Valve. By F. O.
On Diet. By T. B. McC.
On the New Optical Delusion. By C. L., H. W. F. A. O., R. H. B.
On Safety Appliance for Boilers. By P. C. F.
On Optical Delusion. By G. A. S.
On Diffusion. By S. R. S.

[OFFICIAL]

INDEX OF INVENTIONS

FOR WHICH Letters Patent of the United States were

Granted in the Week Ending July 15, 1879,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

Table listing inventions and their patent numbers, including Agricultural implement, Aluminous cake, Ammunition case, Animal trap, Awl handle, Axle and axle box, Barrel stand, Basket, Bath tub, Bed, Bell ringer, Bellows, Blind slat retainer, etc.

Table listing inventions and their patent numbers, including Boot and shoe heel, Bottle crimping, Bottle wrapper, Box nailing machine, Bracelets, Brush, Bucket, Buckle, Buckwheat hulling apparatus, Burglar alarm, Can box, Car brake, Car brake, automatic, Car coupling, Carding engine, Carding machine, Carriage coupling, Carriage top, Carriage top and rail, Cart, barrel, Cartridge, Casting metals, etc.

Table listing inventions and their patent numbers, including Paper pulp apparatus, Paper pulp machinery, Paper and corer, Pen, Pencil sharpener, Pitman joint, Planter, Plated ware, Plow, Potato digger, Printing machine, Pump automatic, Pumping engine, Pyrotechnic signal, Quicksilver furnace, Railway, Railway crossing gate, Railway, elevated, Railway frog, Railway signal, Refrigerating house, Refrigerator, Register and indicator, Rocking chair, Rocking chair, folding, Rolling mill, Rolling mill, metal, Saw mill, Sawing machine, Scoop, Sewing machine hemmer, Sheet metal can, Shelf bracket, Shoe, Snap hook, Spark arrester, Spark arrester, C. F. Lochner, Spinning machine fliers, Spinning rings, Spool and bobbin, Stamp, Stamp, perforating, Stamp, hand, Steam engine, Steam heater, Steel, manufacture of Bessemer, Stove, cooking, Stove, hay, Stove oven, Stove, reservoir cooking, Stud for boots and shoes, Sugar solutions, Swing, Teaching penmanship, Telegraph, autographic, Telegraph line, Telephone, Thill coupling, Tilting chair, Time detector, Tin box, Tire setter and fastener, Tongs, pipe, Tool combination, Traction engine and steam plow, Trunks, Type, printing, Type writing machine, Umbrella frame, Valve, globe, Valve spindles steam-tight, Vapor engine, Vehicle spring, Velocipede, Wagon, dumping, Wagon, road, Wagon running gear, Warehouse, Washer cutter, Washing machine, Washing machine, C. F. Sheppard, Waterproof fabric, Weather strip, Weigher, automatic liquid, Window guard, Window ventilator, Wringing machine clamp, Yeast, preparing.

TRADE MARKS.

Table listing trade marks and their owners, including Axle grease, Chewing and smoking tobacco, Chicory and other substitutes for coffee, Cigarettes, Cigars, Compound for tempering and refining steel, Cotton goods, Cough sirup, Dress shirts, Food for children, Hoes, Illuminating oils, Plug chewing tobacco, Washing powder, Whisky, Volatile ink.

DESIGNS.

Table listing designs and their owners, including Card basket, Carpet pattern, Lock face plate, Ornamental chain.

English Patents Issued to Americans.

Table listing English patents issued to Americans, including Boot nailing machine, Exercising apparatus, Gearing conversion, Knitting machine, Railways, Regulator for steam engines, Transmitting rotary motion, Water meters, Weighing machine for grain, Wrench.