- ing a curve will travel more on the high than on the low side. How do they do it when the wheels on both sides are making the same number of revolutions? A. The face of the tire is generally ' coned," and the outer wheel runs on a larger diameter; also, the inside wheel slips or slides to a certain extent, depending on the radius of the curve. 2. On what principle does an injector work? A. By the velocity and consequent momentum given the water by the effluent steam.
- (24) V. V. G. asks: Will a locomotive without train, with a 41/2 foot wheel disconnected on one side, be equal to a 9 foot wheel? Will a locomotive run faster with one side disconnected? A. The locomotive will not travel faster than the wheel travels. Disconnecting one side makes no difference so long as the wheels have the same velocity.
- (25) R. H. D. asks: What is the best way to irrigate a strawberry field, 1/2 acre, water to be taken from a lake, highest point 9 feet above low water; greatest distance 200 feet; time water is wanted, during the month of June? I can pump in a tank by hand and spread by gravity, or draw with team and self-filling | tank attached under wagon. Is there a better or cheaper plan? A. Put up a windmill to pump into your tank, and spread by gravity.
- power tubular boiler to test with waterpressure; took the one having two cylinders? A. Two engines. water from a pond covered with ice, boiler was out doors; thermometer about 26°, or 6° below freezing cloudy day; gave it a pressure of 120 lb, in that condition. How much steam pressure would it be equal to? I claim it would be as hard on the boiler as 150 lb. steam or hot pressure. A. It would be harder on the boiler, because the water has no elasticity, while the actual pressure would be the same. The iron would also be more brittle at the low temperature.
- (27) A. B. P. writes: I have a large cistern, and the pipe that feeds my boiler is constantly five feet under water. Would it be injurious to the boiler. or in any way objectionable, to let the exhaust from the engine into the cistern at the top of the water, if I use country tallow only in the cylinder? A. No, unless you use the tallow in large quantity.
- (28) G. H. C. asks: 1. What was the depth of girders and what was the width from outside to outside of same across the track on the recently destroyed spans of the Tay bridge? A Depth 27 feet, width between girders about 12 feet. It was a single track bridge. 2. Are hexagonal nuts ever used on bolts in fish plates in this country, or are they all square? A. They are almost invariably square. 3. Is a fish plate bolt screwed up tight as any other bolt in any piece of machinery, or is it left moderately loose to admit of expansion and construction of rails? A. It is screwed up tight, but the fish plate has a little elasticity.
- (29) A. O. K. writes: 1. I have charge of trouble with leaks at the bottom of the water legs, caused by fractures in the cast iron "ring" surrounding the fire box. Calking does no good; I have also tried a cement of iron turnings, salammoniac, and sulphur, placing it on the cracks, but that also failed to stop the leaks. Bran does better, but does not stop them enworked well into the cracks, fill above it with hydraulic cement 1 to 2 inches thick, being careful that the top of the cement issome distance below the top of grate bars. 2. I want to black small casting by dipping. Can you give a recipe for a paint for this purpose that will have a gloss after becoming dry? A. Use asphaltic black varnish,
- recently, he asserted that the wagon brake produced greater effect in retarding the vehicle when barely allowing the wheels to turn, than when it locked them entirely. I said he was mistaken, but could give him no why? A. Your friend is correct. It is true also of rail. the cause of the figures instead of crystallization, as a road brakes when the wheels are locked; the same surcomes glazed; when allowed to turn, new surfaces are
- (31) C. E. B. asks: 1. Of what kind of Fit a mandrel the size of the shaft in the box and cast around it.
- (32) J. H. W. asks for a recipe for a toilet lotion that will improve complexion of ladies, which contains nothing injurious. A. We do not recommend the skin attainable by no artificial means.
- 20 feet deep, and I have a pump with 1 inch gas pipe; it mmon iron piping. The water tastes a theiron. How can I keep it from tasting? A. Use wood tubing instead of the iron pipe.
- (34) J. C. S. asks: How can cattle hoofs or horns be melted so as to form a transparent composition? A. Horns are soaked in hot water until the bone are cut. Hoofs are usually cold pressed. Neither are melted as suggested.
- (35) J. A. W. writes: Can you tell me the usual way of covering leadwith powdered chromium for negative plates, and do you consider such plates equal to carbon? Do you know of an imitation or any substitute for hard rubber? A. The metallic chromium according to Beasley, is pressed into the surface of the turn the edge of everything I have tried. A. It is lead by passing between steel rolls. It compares favorably with carbon in some electrotypes. Celluloid can be it, use a revolving disk of thin sheet iron or copper supmade to closely resemble ebonite or vulcanite.
- (36) J. S. writes: I wish to build a small steam launch of the following dimensions: Length over

- (23) W. F. asks (1) why an engine in mak- diameter, 36 inches high, 90 or 100 one inch tubes. Engine, cylinder 5 inches by 6 inches stroke, working pressure 150 lb. The exhaust steam to be led through the bottom of the boat and along the keel to and around the stern, then forward and empty into a tank in the boat. The diameter of the exhaust pipe will be 114 inches, length about 30 feet under water. Will 30 feet of $1\frac{1}{4}$ inch pipe have enough surface to condense all the steam; if not, how long ought the pipe be? A. No; do not use less than 2 inch pipe.
 - (37) R. E. W. asks: By what process is condensed milk made? A. The fresh milk is pumped into large air tight vessels (vacuum pans) placed over a warm water bath and connected with air pumps, by ditions of earlier voyages of Europeans to America, but which a partial vacuum is maintained within them. Under these circumstances the milk boils and parts with its water at a very low temperature. Where the milk so condensed is to be preserved for a very long time, i is mixed with a certain per cent of pure white sugar and put up in hermetically sealed cans.
- (38) A. B. F. asks (1) for the dimensions of scow that will carry about 40 tons of freight in addition to her engine, and not draw over 18 inches of water. A. About 75 or 80 feet long and 15 feet beam. 2. What would be the power of an engine to drive it at about 4 miles per hour with a stern wheel? A. Two engines, 6 inches cylinder and 2 feet stroke. A. Which (26) W. F. H. writes: We had a 40 horse is best for such a boat, an engine with one cylinder or
 - (39) F. A. S. asks: 1. Is it true that Bessemer steel cannot be used for mould boards for plows, or bottoms of road scrapers. A. Yes. 2. Is it because such steel cannot be properly hardened? A. Yes. 3. If it cannot be made sufficiently hard, why is it? A. It contains too little carbon to be materially affected by the ordinary hardening process
 - (40) J. B. R. writes: I have a private telegraph line, two wires, 1/2 mile long. The line is annealed wire, such as tin men use in putting up stoves. The line has been in use three years. It has been broken several times and spliced. I use three cells Watsons battery to charge the line. It works good for three or four days, then it ceases to work until I cross the wires in the office for a few minutes, then it will work again as stated. Why will it not work all the time? The current is very strong when I cross the wires in the office. A. Without further data we cannot explain the action of your line. It is probable, however, that the resistance of your line is excessive. Use regular telegraph wire. If you require a small wire, use copper.
- (41) F. H. L. asks if there is any composition of brass that can be melted in an ordinary coal stove that is of sufficient hardness to cast small models from and its composition. A. Common yellow brass may be readily melted in a coal stove, but it is doubtful if brass can be easily made in an ordinary stove, as the copper, which must be first melted, fuses at a much a boiler of the locomotive type. I have considerable higher temperature than brass. A very good formula for yellow brass is copper 70 parts, zinc 30 parts.
- (42) J. A. C. asks how are the teeth put in the small bracket saws not larger than 1-16 inch wide. A. A number of steel plates having the thickness of the saws are clamped together and placed in a milling matirely. How can they be stopped effectually? A. First ase coarse Indian meal on the inside, and when it has of plates simultaneously. The saws are then sheared from the edges of the plates, and the plates are again melted, and so on.
- (43) G. D. R. writes: On page 69, current volume, Scientific American, I find an article by G. F. Barker, entitled "Crystallization in Canada Balsam." I have frequently observed the figures assumed by balsam or Damar varnish, when boiled between slips of (30) A. R. B. writes; Riding with a friend glass; and they are like the cut in the article referred to. If the gum is thick enough and allowed to cool under pressure, the figures are permanent. I am not prepared to dispute or discuss anything; but unless I was sure the glass in question had not been exposed to a " prairie satisfactory reason. Am I right, and if so, please explain fire" or some other source of heat, I should say heat was heat sufficient to boil balsam will not char wood, or if face is constantly presented for friction and soon be. carefully applied, scorch varnish. My proposition can be easily demonstrated by any one with a drop of balsam and two small pieces of window glass.
- (44) B. T. F. writes; In Scientific Amerimetal is the rings in an engine cylinder composed of? CAN, February 7, 1880, page 91, article 4, C. M, K. asks:

 A. Generally cast iron. 2. How can I run Babbit t
 metal boxes for a saw madrel or other shafts? A sian insect powder. I tried it and got rid of the terrible
- (45) G. H. writes: Having discovered traces of silver in several places upon large tracks of land we own in this region, we should like to have some simple method of testing or assaying specimens such lotions. Temperate living, plenty of out-of-door of the rock. From tests made in the East of several exercise, and frequent bathing impart a clear vigor to different specimens, we are led to believe the stuff will yield from \$35 to \$40 a ton, but wish to try this ourselves. Can you tell us of any simple apparatus? A. (33) J. F. P. writes: I have a well that is Charge into a 6-ounce crucible (a Battersea F answers very well) 1 ounce each of the ore and dry bicarbonate of soda, 2 ounces of litharge (free from silver), 3 ounce of argal, and cover with 1/2 inch of dry salt. Heat the crucible until the contents are in a quiet state of fusion, remove from the fire, cool, break, and clean the lead button by pounding on an anvil. If the button weighs more than, say, half an ounce, scorify it is easily separated, when they are softened in hot down in a scorifying dish in an open muffle. Heat 114 water, slit up, and spread out between warmplates under inch bone ash cupel in the muffle, drop into it the pressure. From these plates the articles referred to button, and keep up the temperature of the muffle to a bright red heat until all the lead has been scorified off and absorbed by the cupel, and the small bead of gold or silver (if the ore contains any) becomes well rounded and clear. The ore must be finely powdered, and the whole of it passed through an eighty-mesh sieve.
 - (46) E. B. L. asks: How to cut up and work into shape retort carbon. It is very hard, and will worked in the same manner as glass or stone. To saw plied plentifully with emery and water. To shape it, use an iron lap supplied with sharp sand or emery and
- all 25 feet, beam 5 feet, depth 334 feet. Boiler 24 inches (47) G. W. H. asks how can I drill

through stone or earthenware vases holes, ¼ in. say, to ½ in. diameter? The vases are about ¼ in. thick. A. Use a copper tube for a drill, and supply it with emery

(48) W. H. P. asks: Who was the first man who had knowledge of the existence of the American continent? A. Seeing that the most ancient vestiges of man thus far discovered have been found on this continent in formations antedating a portion, if not the whole, of the Glacial Period, history may be pardoned for not recording the first comer's name. white man certainly known to have visited our continent was Leif Ericsson, in the year 1001. There are trathe historical evidence of such visits is insufficient.

[OFFICIAL.]

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Car starters, J. Hill, Williamsport, Pa. Elevator, hydraulic, C. W. Baldwin, Brooklyn, N. Y. Gas regulator, M. G. Wilder, Brooklyn, N. Y.
Paper, compound for, R. A. Fisher, Philadelphia, Pa. Paper, manufacture of, R. A. Fisher, Philadelphia, Pa. Paraffin, refining, W. Bell, New York city.

Photo relief engraving, G. C. Bell, Brooklyn, N. Y. Puddling furnace, W. Stubblebine, Bethlehem, Pa Railroad rails, manuf. of. G. Webb, Johnstown, Pa. Steam boiler, heating apps., J. Evans, Philadelphia, Pa... Steel, treatment of, G. Webb, Johnstown, Pa

PRINCIPLES OF HORSE SHOEING.-By Geo. Fleming, V.S. A paper describing the proper method of shoeing horses so that the animal's feet may be kept always healthy and sound. How much the walls of the hoof should be requeed, and how the operation should be performed; the kind of shoes that should be selected; how they should be fitted; the number and size of nails that should be used, and how the face of the hoof should be treated. Followed by a description of a modified form of the "Charlier" method as successfully followed by the author for many years. Contained in Scinktific American Supplement, No. 205. Price 10 cents. To be had at this office and from all newsdealers.