AUTOMATIC PIPE-COUPLING.—C. O. COLE, Whatcom, Wash. Mr. Cole's invention relates to pipe-couplings for connecting air, steam, or other pipes of cars in a train with each other to form continuous pipe-lines. The object is to provide a coupler which is completely automatic in operation and insures a firm coupling of the pipes for the various lines without danger of leakage, allows automatic uncoupling on moving the uncoupled cars apart, and permits a manually-controlled relase of the coupling members by the operator.

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WANTED.—Man capable of taking charge of factory making special machinery, who can also take $2,000 or $3,000 interest in established plant. N. B. Harrington & Co., 106 Broadway, Buffalo, N. Y.

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Manufacturers: We can satisfactorily represent and handle your account. Correspondence invited. Welhener-Patrick Company, Manufacturers' Agents, 172 Washington Street. Chicago.

Inquiry No. 5476.—For makers of hollow brass wire.

FOREMAN WANTED.—A thoroughly capable man to take charge of brass shop employing about fifteen men. Must be between 30 and 40 years of age, married. Reply by letter only, stating experience and references to Wm. H. Wilkinson Co., West Medway, Mass.

Inquiry No. 5477.—For makers of handles for artists' pencils, also parties making the machinery for making the same.

Inquiry No. 5478.—For manufacturers of or dealers in a patent dishwasher.

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Inquiry No. 5480.—For the manufacturers of the cigar lighter which was patented by Clyde J. Coleman, or makers of any other electric lighter.

Inquiry No. 5481.—For manufacturers of metal, nickel or aluminium egg shells.

Inquiry No. 5482.—For automatic vending machines for selling liquors.

Inquiry No. 5483.—Wanted, to purchase a hardware store.

Inquiry No. 5484.—For machines for perforating paper patterns.

Inquiry No. 5485.—For manufacturers of metal garter trimmings, as hooks, slides, supporters and nonelastic garter web.

Inquiry No. 5486.—For makers of paper chair bottoms, imitation leather chair bottoms, also fiber and other material used for the same.

Notes and Queries.

HINTS TO CORRESPONDENTS.

Names and Address must accompany all letters or no attention will be paid thereto. This is for our information and not for publication.

References to former articles or answers should give date of paper and page or number of question.

Inquiries not answered in reasonable time should be repeated; correspondents will bear in mind that some answers require not a little research, and, though we endeavor to reply to all either by letter or in this department, each must take his turn.

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Minerals sent for examination should be distinctly marked or labeled.

(9380) L. E. G. asks: 1. How is a hand lead marked; that is, how are the marks and deeps laid off and how shown, also length of line? A. Sounding leads are generally laid off in fathoms below 5 and at 7, 10, 13, 17 and 20 fathoms, which latter is the usual length of the line with from 7 to 11 pounds weight. Deep-sea lines are usually 200 fathoms in length with 28-pound weights and marked at each 2 to 10 fathoms with leather and bunting tags so combined as to readily measure the fathoms as the line passes out. 2. How is a hand log marked? What is distance between marks, in feet or inches, on a log line to be used with a 30-second sand glass, or a 15-second sand glass? A. The hand log line is usually 150 fathoms long and should have 10 fathoms between chip and first knot for stray line. With a 30-inch glass the knot tags are 50 feet 8.03 inches apart and indicate sea miles or knots per hour. With a 15-inch glass the knot tags should be at one-half the above distance parts. 3. How is a 4 or 8 point bearing taken to tell distance of ship from land; that is, taken from bow to beam, or beam to quarter? A. The bow to beam or beam to quarter, or better, from bow to stern, may be taken as a measured base line and the angle of each end simultaneously taken from a shore mark, from which a triangle computation will give the distance. 4. What is the best material for a marine compass needle—ordinary soft iron or Norway iron? The compass cards I wish to use are 6 inches diameter and 1-32 inch thick pasteboard. Would needle 6x¼x1/16 inch be about right size? Being a marine compass, needle will be glued fast to card, of course. A. A compass needle should be made of tool steel, hardened and tempered. The card should be drawn on fine drawing paper and pasted to a thin piece of mica. Fasten to the needle with small lead rivets.

(9381) H. F. H. asks: Is the althea the true "Rose of Sharon"? Or which is the true or original "Rose of Sharon" mentioned in the Bible? Some claim the althea, others narcissus, and some again *Scilla maritima*. Is there any place where a person could get a copy of the flower as it grew or grows on the plains of Sharon? A. The article upon the "Rose of Sharon" in Smith's "Bible Dictionary" begins: "There is much difference of opinion as to the particular flower intended." If this is the case we cannot decide. There are no pictures dating back to the time of the writing of the Canticles, and no way whatever of determining the species of plant denoted by the name.

(9382) A. M. W. asks: A trolley car leaves the track a few feet. The trolley pole can reach the overhead wire. In running it back upon the tracks, the conductor made a connection between the rail and car wheel with the iron rod used to turn the switch: was it of any use? With a stated current carried by trolley wire, will the motors of a car show more power by having the rails of the track wired together, or is the bonding of the rails to prevent damage by the return current to other structures? A. The intention is to use the rails of the street-car lines for a return circuit of the current to the dynamo. If the rails are well bonded together this will result. If they are loosely connected the current will leak off and go by some easier path. On the way, it will take to pipes, water and gas, and destroy them. The bonding is to keep the return current in its proper place. When the conductor used a bar of iron to connect the rail to the wheel of the derailed car, he closed the circuit between the motor and the return path in the track, thus enabling the motor to get power from the line. With the earth connection only the resistance would be too high to allow enough current to flow to run the motor.

(9383) R. S. L. asks: Is it not a fact that the battleships and armored cruisers of our navy are built and are building without armored smokestacks? Are not the extremely lofty stacks of our later construction designed to obviate the necessity of forced draft? Would not these tall stacks be immediately riddled in an engagement, and thus deprive the vessel of a large part of her steam power when most needed, besides rendering the upper works untenable from smoke? Is it not a serious error to neglect to armor the stacks, and would it not be better for our constructors to follow in some respects the designs of Continental nations instead of the English? A. The armoring of smokestacks is a question that is attracting attention among naval designers, some of the latest vessels of the Russian navy being armored on that portion of the smokestack that is between decks. It would be impossible to carry the armor higher than this without making serious inroads upon the amount of armor that could be spared for other vital parts of the ship. We believe that as yet we have not been in the habit of armoring our smokestacks even at the bases; though we believe that the matter is now under advisement.

(9384) H. H. B. asks: We have a 50-horse-power side-crank, partially balanced valve Atlas engine in our mill. 1. Will this engine run without a wheel of any kind on the shaft? Our engineer says it will not, but I say that it will. Hence the argument and wager. A. A steam engine without a flywheel might possibly run with a jerky motion, which is not tolerable to good practice. Your engineer is about right. 2. Will a 55-horse-power boiler, now furnishing steam for a 50-horse-power engine considerably overloaded, furnish steam enough for a 75-horse-power Corliss engine? A. The 55-horse-power boiler should be of sufficient capacity, if not overrated, for 75 horse-power in a Corliss engine. 3. How much working advantage does a Corliss engine have over the same size plain engine? A. Plain engines vary in their consumption of steam per horse-power to a considerable extent, and for engines of equal cut-off there is a small percentage in favor of the Corliss engine.

(9385) A. F. O. asks: Is the following from the SCIENTIFIC AMERICAN of recent date, strictly correct? "A. It is not known why water expands in freezing. There are very few substances which do so. *Cast iron* and type metal are two others which have the same peculiarity, and which are very important to man." I always supposed that cast iron shrank at the moment of solidification. In the American Cyclopedia, Vol. IV., page 80, I read: "In the casting of cylinders, the shrinkage of the iron in cooling must always be particularly taken into consideration. This is quite uniform, and is 1 inch in 8 feet, or 1-96 linear measure." Do not pattern makers for stove castings always make the pattern a little larger than the size required for the finished casting? Regarding type metal, the textbooks on physics generally teach that *antimony* expands on solidification, and that that is why a proper admixture with lead secures the expansion necessary to give smoothness and sharpness to the type. In Fownes (Watts) Chemistry, p. 455, I am informed that antimony alone, like lead, will shrink on cooling, but that the *alloy* will expand. Will you kindly give me the exact truth in regard to both antimony and iron, but especially as to the latter? A. With reference to the change of volume at the moment of solidification—in which respect you criticise a recent reply to a query of ours—we may say that it is not supposed that any chemically-pure metal does increase in volume during the act of changing from the liquid to the solid state. The three substances which we mention, however, water, cast iron, and type, all expand in passing from the liquid to the solid condition in a marked degree. The quotation which you make from the American Encyclopedia, viz., "in the casting of cylinders, the shrinkage of iron in cooling must always be taken into consideration," is not to the point, since it particularly states that the iron is cooling, and the change into the solid condition must be complete before the substance can cool at all. This you will perceive if you refer to the subject of latent heat in any textbook of physics. When a liquid is in the act of solidifying it gives off a great quantity of heat without any change of temperature. Thus water cools to the temperature of 32 deg. before any ice forms, and when ice is formed it is still at the same temperature as the water in which it is floating, but you will observe that the ice could not float if it did not increase in bulk in freezing. Ice is approximately one-ninth lighter than water, and that one-ninth is the increase in bulk in solidifying. Similar reasoning will apply to any other substance. Most substances contract in the act of solidifying, and are in the solid form smaller and denser than in the liquid form. The result is that the solid sinks in the liquid. If you place a piece of wax in a dish and melt it—preferably such a dish as a test tube—the solid wax will remain at the bottom, while the melted wax overflows it; and this would be the case with the great majority of substances which can be melted by the application of heat. It is probably true, as you say, that type metal owes its expansion to the antimony which it contains, but the case of water is different. Ice formed from chemically-pure water floats upon the water in the same manner as ice formed in any lake or pond. So much for changes in the act of solidifying. Now, after the solid has been formed, it obeys the usual laws of expansion and contraction—heating expands and cooling causes a substance to contract. It is to this change the quotation you make above refers. The shrinkage of a metal in cooling must always be taken into account in making patterns for castings. But iron and type metal are the only metals which actually expand on solidifying, and which therefore may be employed for making exact reproductions of the fine lines and markings upon a mold. Lead, tin, etc., contract in solidifying, and always present rough surfaces in casting.

(9386) R. M. asks: 1. Would you explain the difference between the automatic cut-off engine and the flyball governor engine? A. The difference in the two styles of engines is in the method of controlling the admission of steam to the cylinder. The governor of the automatic engine controls the cut-off point of the slide valve, while the flyball governor controls the throttle valve only, in ordinary slide-valve engines, and also the cut-off in engines of the Corliss type. 2. Explain the term sharp cut-off as used in reference to steam engine cylinders. A. A sharp cut-off is a quick action cut-off, as in the Corliss type and in some special designs of the slide-valve type. 3. What are the mechanical differences between a high-speed engine and an ordinary engine? A. The high-speed engines are generally of the automatic type with short stroke, and perfection of the moving parts required by high speed. 4. What is the pressure of water per square inch of surface in the change from a liquid to a solid? Does the pressure increase for each degree of change of temperature from 39 to 32? Is the contraction the same for each degree below 32? A. Water being incompressible, its pressure becomes immense, and will burst the strongest vessels, if confined. Water contracts from 39 deg. to 32 deg., and suddenly expands about one-tenth of its bulk in freezing, after which contraction continues by fall of temperature at a greater rate per degree than any other solid—about 0.033 of an inch per degree in one hundred feet.

(9387) B. W. N. asks: Would you kindly explain the following question through your column of Queries and Answers? Why does not the sum of the included angles of a triangle equal 180 deg.? I had been taught that the sum of these angles always equaled 180 deg., but I read in a book on astronomy that if imaginary lines be drawn from the sun to the star Sirius, and from Sirius to the polar star, and from the polar star to the sun, forming a triangle, the sum of the angles formed by these lines did not equal 180 deg. A. The theorem in geometry is that the sum of the three angles of a plane triangle is equal to two right angles. From this value there is no deviation; you may consider it absolutely correct. It is also a geometrical theorem that the sum of the three angles of a spherical triangle is greater than two and less than six right angles. Hence the angles included by the three arcs of circles drawn upon the celestial sphere from the sun to the star Sirius, and from Sirius to the pole star, and from the pole star to the sun again, need not and do not equal 180 deg. The position of the pole star and Sirius with reference to each other does not change to any great degree, but the sun is changing its position with reference to these two stars every day in the year, and twice in the year must be upon the circle of the celestial sphere which passes through both these stars, and at these times no triangle is formed by the three bodies, for they lie on the same circle. At all other times during the year there will be a spherical triangle formed by the three bodies, the sum of whose angles is continually changing between the limits specified in the theorem quoted above.

(9388) E. R. E. writes: Can you tell me how much water would be discharged at the lower end of a pipe 18 inches in diameter and 100 miles in length, with a fall of 800 feet in that distance? How much difference would it make if said pipe was 4 or 6 feet in diameter for the first few miles, or until it reached a fall of 100 feet, then gradually contracting to 18 inches? Would water running this distance keep in constant motion, or would it *freeze* if the pipe was on the surface of the ground; that is, *above* ground? A. The pipe line of 18-inch pipe, 100 miles long, laid with a fairly even slope of 800 feet, should deliver 252 cubic feet of water per minute. If 25 miles is of larger size to give full flow, the 75 miles of 18-inch pipe with 700 feet slope should deliver 275 cubic feet per minute. The 4 or 6 feet pipe, with say a slope of 100 feet in 25 miles, will be too large and too expensive for a feeder to the 75-mile line. If it is only 2 feet in diameter, it will supply 360 cubic feet per minute, which will give an initial pressure to the long line equal to nearly 100 feet, and increase the flow of the 75 miles of 18-inch pipe to 300 cubic feet per minute. Such a pipe line would not be safe against obstruction by freezing to several inches thick on the inside of the pipe in extremely cold weather and at times of low discharge. It should have some protection in your climate.

(9389) F. S. K. asks: 1. Is there any liquid better than water to use in a hydraulic of an oil gas bench? A. The hydraulic main of an oil gas works should be charged with water only. There is nothing better. 2. Is there any part of the gas that is taken out by its passing through the water of the main? A. A small quantity of tar and ammonia and possibly sulphur are absorbed or detained by the water of the hydraulic main. 3. What is the best substance to use to purify oil gas? A. Water from jets triculating through a bed of coke in a vertical cylinder with the gas passing upward is the best purifier for oil gas.