Another most interesting machine is the Campbell's Combination

PRINTING PRESS

which is shown in operation, and to which it will be impossible to do full justice in our limited space. This press will not print unless the paper is fed in. The moment the sheet is not presented to the grippers, the inking rollers and all the other parts necessary to make the impression cease to move. The mechanism by which this beautifully automatic action is effected is a triumph of ingenuity. As the sheet is fed in, it passes over small apertures in the ends of a set of small air tubes, which are gently pressed down upon it, the paper thus acting as a valve, preventing the movement of a small plunger in a cylinder, which plunger, by suitable contrivances, controls all the other movements of the press. When we say that the "Aldine Press," the finest art journal published in America, is printed on one of these presses, we have said enough for its delicacy of execution. The press is shown by the Campbell Press Works, Thomas H. Senior, agent; office, *Sun* Building, New York. The same firm also exhibit a smaller press of different construction.

EDITORIAL SUMMARY.

GUN COTTON is now manufactured in England to an amount exceeding 100 tons per annum. The cotton fiber is reduced to a pulp, as in paper making, in which condition the excess of acids is readily removed. The pulp is compressed into disks, under a pressure of 18 tons to the inch, and then dried. These disks are ⅞ inch to 7 inches in diameter, and ½ inch to 2 inches thick. In the open air this compressed cotton burns intensely but without explosion; but when properly exploded under close confinement, its strength is from two to five times that of the same weight of gunpowder. If accidentally wetted, this form of gun cotton can be redried by exposure to the sun, or even by a gentle heat, without risk of explosion or deterioration.

NEW TEST PAPER.—Professor Böttger announces the discovery of a new re-agent, which, he asserts, is highly sensitive to the alkalies. It is a coloring extract of the *coleus verschaffelti*, and is produced by digestion, for 24 hours, in pure alcohol, to which a few drops of sulphuric acid have been added. The hue is a brilliant red, which turns green on contact with any alkali. It is not affected by carbonic acid, and will detect the slightest trace of ammonia in illuminating gas, if moistened and placed against an open jet. The presence of the minutest quantity of a carbonate of any of the alkalies is detected by it.

THE GLACIERS OF AMERICA.—The Rocky Mountains are likely to afford the explorers of this continent the same opportunities of investigation of the phenomena of glacier formation, and of meteorological occurrences at great altitudes, that Switzerland has so long given to Europeans. On Mount Ranier, in Washington Territory, there is a glacier ten miles in length by five in width, and many others are known to exist. The erudite weekly London publication, the *Academy* suggests the Rocky Mountains to the Alpine Club, as a field new to its members, who are by this time well acquainted with all the accessible peaks of Switzerland.

THE POLARIS.—We have received news from the *Polaris* and are able to report that she left Disco Island, off the coast of Greenland on August 17th. There had been a disagreement, between Captian Hall and the scientific members of the expedition as to the objects of the voyage, but this had been amicably arranged by Captain Davenport, of the United States ship *Congress*. Captain Hall has decided to keep to the west side of Smith Sound, as the other route, by Jones Sound, originally intended to be pursued, is likely to be more difficult of passage, the pack ice being already considerable in quantity.

THE RHYSIMETER.—Our English advices inform us of the invention of a new instrument called by the above name, for measuring the force of flowing liquids. It exhibits the force of impact of the moving fluid, and is somewhat similar in construction to the anemometer. Another obvious purpose for which this indicator can be used, that of measuring the speed of ships, will probably be its most valuable application. A column of mercury forms the index, and the instrument may be mode self registering and recording.

OIL WORKS IN RUSSIA.—At Riazan, a large city 150 miles to the southeast of Moscow, Russia, extensive works for raising and refining petroleum are now in course of erection, for which the necessary machinery is being constructed in England. The coal mines at Kharloff and in the neighborhood of Taganrog are known to lead to deposits of enormous extent, and it is believed that the supply of oil from these mines will be practically inexhaustible.

Examples for the Ladies.

W. Kelly, of Amsterdam, N. Y., earned with a Wheeler & Wilson Machine, in 14 years, $14,564, in making coats; an average of more than $20 a week, with but a few cents for trifling repairs.

Foreign Patents.

The population of Great Britain is 31,000,000; of France, 37,000,000 Belgium, 5,000,000; Austria, 36,000,000; Prussia, 40,000,000; and Russia, 70,000,000. Patents may be secured by American citizens in all of these countries. Now is the time, while business is dull at home, to take advantage of these immense foreign fields. Mechanical improvements of all kinds are always in demand in Europe. There will never be a better time than the present to take patents abroad. We have reliable business connections with the principal capitals of Europe. A large share of all the patents secured in foreign countries by Americans are obtained through our Agency. Address MUNN & Co., 37 Park Row, New York. Circulars with full information on foreign patents, furnished fre

Business and Personal.

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Answers to Correspondents.

SPECIAL NOTE.—This column is designed for the general interest and instruction of our readers, not for gratuitous replies to questions of a purely business or personal nature. We will publish such inquiries, however when paid for as advertisements at 1·00 a line, under the head of "Business and Personal"

ALL reference to back numbers must be by volume and page.

SUBSTITUTE FOR ALCOHOL FOR BLOW PIPE LAMPS.—A. K. wishes a substitute for alcohol. I have tried several, but have not found one efficient. In the use of alcohol, a large part of the burning surface is invisible while soldering, and thus a larger blaze is required to direct it. If a few drops of kerosene be added, the whole of the blaze is visible, thus enabling the operator to use less burning surface; for he can direct the whole amount to the purpose for which it is needed, and at the same time economizing the burning of the alcohol.—R. B. F., of N. Y.

DIMENSIONS OF A RIGHT ANGLED TRIANGLE.—I think C. E C. will find his dimensions for a right angled triangle nearer correct by the following method than by the others already given. Given the three angles and perpendicular—let A B C be a right angled triangle; C, the right angle, A, the angle between base and hypothenuse. Let a, b, c, be the sides respectively, opposite these angles; then sine $A = a \div c$, or $c = a \div$ sine A, which, by using logarithms, gives value of c to be log. $c =$ log. $a -$ log. sine A. To find b: tan. $A = a \div b$, or $b = a \div$ tan. A, or log. $a =$ log. $b -$ log. tan. A. Squaring sides does not insure the accuracy this does, unless they are even squares and roots.—E. H. J., of Ga.

DIMENSIONS OF A PLANE RIGHT ANGLED TRIANGLE.—The base and angles being given, to find the perpendicular and hypothenuse. The solution by J. L., of N. Y., is good as far as it goes. The equation in the form given requires two operations for each of the sides containing the right angle. Then he refers to the square root to find the hypothenuse, which requires four more operations, thus requiring six shots to bring down the game that may as well be brought down with two, thus: For the perpendicular, multiply the base by the tangent adjacent angle; and for the hypothenuse, divide the base by the cosine adjacent angle. The solution by N. F. P., of ——, begins well, but as to the hypothenuse he is badly fogged; he gets parts of two rules mixed up, that do not pertain to the question; then, to show another method for this side, he gives a rule not known to the disciples of Davies. He says: "Multiply the square o the base by the square of the perpendicular," etc. The solution of F. E N. E., of Mass., is subject to the same objection as that of J. L. The plan of solving a triangle partly by trigonometry, and partly by some other method—as by the square root, or by mechanical construction—is like a farmer plowing half a field with a polished cast steel plow, then throwing it by for an old fashioned spud or wood plow. Moreover, no matter how much the principles underlying an operation may be elucidated, the rule should be terse and concise to the last extremity. But D. B., of N. Y., bears off the palm. He says "the squares of the two sides containing the right angle will be proportional to each other inversely as the two angles are." This is something new, a proposition not known to Euclid, or Descartes, or Legendre.—H. C. P., of Mich.

ROLLING BODIES—The problem of the three balls, too, in the same column, is as unfortunate as that of the triangle; both answers are incorrect. The second one would be well enough as far as it goes, if "not" were introduced between the words "will" and "roll;" and the person who would pick up that ball first down the plane, for the gold ball, would be badly cheated, as the gold ball would be the last one down the plane. The explanation would be too long in an answer of this kind but it is readily given. See "Gregory's Mathematics," Art. 6, page 241, or "Bartlett's Analytical Mechanics," example 6, page 243, with the final equations on page 246, same example, for a discussion of this question, though a good idea of it may be had without going into the calculus, as Mr. Bartlett has done.—H. C. P., of Mich.

DIMENSIONS OF RIGHT ANGLED TRIANGLE.—In your paper of Sep. 16th, N. F. P. gives the following rule for finding the hypothenuse "Multiply square of base by square of perpendicular, extract the square root of result." Thus, if the base be 3, and perpendicular 2, hypothenuse will be 6, or more than the sum of the other sides, which proves that a straight line is not always the shortest distance between two points.—W. L. S., of N. Y.

CONSTRUCTION OF BELLOWS.—In the issue of September 9th, T. E. L. gives directions how to equalize the flow of air from a pump or bellows, by boring an inch hole in a keg, and fastening it to the bottom of a tub two thirds full of water. If there were any great flow of air, surely this would not equalize the pressure, as the friction of water in such a small hole would prevent any tendency in that direction. Moreover, if there were no friction, the pressure of the water outside would vary inversely as the quantity of air in the keg. A common pair of blacksmith's bellows, with a weight on the top, would regulate the flow much better. By turning a tub upside down, and letting it float in water after the manner of a gasometer, a tolerably even pressure may be secured.—W. L. S., of N. Y.

FLOW OF WATER THROUGH PIPE.—In answer to J. R. B. (query 17, Sep. 16) I would say that we have found the same trouble with a lead pipe that he has with an iron one. The pipe is laid in uneven ground, and from one point there is descent both ways. Our theory is that the air which is always held in suspension in spring water, collects at this point, and can only be driven out by a rapid flow of water. If a torrent of water could be forced through the pipe, no doubt the air would be forced out at once, but with only a moderate increase of speed, it is natural to expect that the pipe should take some time to clear itself.—W. L. S., of N. Y.

HEATING SURFACE OF BOILER.—I will reply to A. H. G. (Sep 16, 1871), in regard to heating surface of boilers, by referring him to the "Practical Examiner on Steam and the Steam Engine," page 24, where it says: "The extent of heating surface ought not to be less than nine square feet, and one square foot of furnace bars, to each nominal horse power." The rule is a very good one.—J. K. W., of Mich.

TWIN BOILERS.—S. T. P., of Ind.—Will the objections urged against tubular boilers when the water supply is connected, as, for instance, the forcing he water from one to the other, on account of hotter fire under either, be applicable to two portable engines and boilers, each engine supplying its own boiler, and having a steam connection only from the dome of each, above the water? Answer: We think not.

COLORING GOLD.—Let R. L. K. take one ounce nitrate of soda, and one half ounce of chloride of sodium, and dissolve in a slight excess of warm water, afterwards adding to the solution about five drams hydrochloric acid. The solution should be kept boiling while the work is in it.—R. S., of Mass.

STEPS FOR WATER WHEELS.—If querist (No. 3, Sep. 16th) will use locust—the end turned spherical—and keep it under water while running, it will last for years; it is better than lignum vitæ.—M. W., of N. J.

HEATING FURNACE.—If N. S. H. (query 12, Sep. 16th) will take an iron pot or box, fill it with lead, and heat it to redness, he can heat his springs without danger of overheating; this is the way files are heated for hardening.—M. W., of N. J.

H. G. F., of Nevada.—You can have your ores analyzed which will determine the percentage of precious metal. Send your specimens to John C. Draper, Professor of Chemistry, in the University Medical College. His terms are reasonable, and you can rely upon his analyses being correct. His address is 429 Lexington Avenue, New York.