Artificial Production of Cyanides and Ammonia.

A series of experiments upon the synthetical production of cyanogen compounds by the mutual action of charcoal, gaseous nitrogen, and alkaline oxides or carbonates, at high temperatures and under great pressure, are described, says *Nature*, by Prof. Hempel in the new number of the *Berichte*. Bunsen and Playfair long ago showed that when charcoal and potassium carbonate are heated to redness in an atmosphere of nitrogen, a certain quantity of cyanide of potassium is formed. Since that time Margueritte and Sourdeval have further shown that barium carbonate may be used in place of the potash, and that the barium cyanide produced may be again decomposed by steam into ammonia and barium carbonate. These reactions afforded a theoretically continuous process for the conversion of atmospheric nitrogen into ammonia, a process which, if it could only be worked on the large scale, would doubtless be of immense value. Unfortunately, however, only small proportions of the substances appear to enter into the reaction at ordinary pressures. Hence the yield is not sufficiently large to render the process economical. Prof. Hempel, however, by means of a simple pressure apparatus, has shown that the reaction is very much more complete, and when potash is used, very energetic, under the pressure of sixty atmospheres.

His apparatus consists of a strong cylinder closed at one end, and worked out of a single block of steel. The steel top screws tightly down, so as to form a closed chamber, and is pierced with two apertures—one for connection with the compressing pumps, and a second to admit the passage of an insulated copper rod. Within the steel cylinder is placed a smaller cylinder of porcelain, in which the mixture of the alkaline oxide or carbonate and charcoal is placed. Through the center of this mixture passes a rod of charcoal, which is connected above with the copper rod and below with the steel cylinder itself, in such a manner that when the wires from a strong battery or dynamo are connected with the projecting end of the copper rod and the exterior of the steel cylinder respectively, the rod of charcoal becomes heated to redness. The pumps are then caused to force in nitrogen gas until the desired pressure is registered on the gauge. Experimenting in this manner, it was found that the amount of barium cyanide formed in fifteen minutes under a pressure of sixty atmospheres was nearly four times that formed at ordinary atmospheric pressure; while in the case of potassium carbonate the reaction was so energetic that in a few seconds the heated carbon rod itself was dissolved. Hence it is evident that the formation of cyanides by heating together alkaline carbonates and charcoal in an atmosphere of nitrogen is greatly accelerated by largely increasing the pressure under which the reaction occurs.

Novel Life-Saving Belt.

Mr. Rossi-Gallico, from Italy, lately read a paper on the merits and adaptations of this invention before the members of the Balloon Society of Great Britain, London.

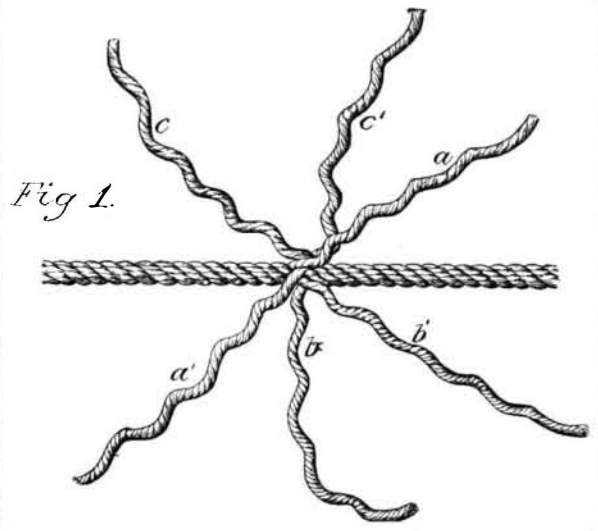
The belt is very compact, light, portable, and, in a non-inflated state, flat, and can be worn without the least inconvenience. Its inflation is effected by carbonic acid gas, instantaneously produced by the combination of acids and alkalies with which the compartments of the belt are charged on its being brought into contact with water. The one intended for passenger use inflates, as we have said, on touching water; that intended for the use of officers and seamen is made different. It is easily understood that a belt which would inflate simply by being brought into contact with water would be rather inconvenient to wear for those whose duties expose them more or less to a wetting. So to avoid this a special arrangement is made. The acid and alkali are introduced into the belt in a liquid form, and when the moment arrives for the services of the belt being required, all the wearer has to do is to pull two small tassels, which at once allows the chemicals to mix, and the belt is at once inflated. This was demonstrated at the lecture by Sig. Rossi-Gallico, who inflated both classes of belts, the one by wetting, and the other by pulling the strings, in something like fifteen seconds. The belt was also shown inclosed in a brass bomb furnished with cord to allow of its being swung to a distance from the ship, and is so constructed that on its touching the water it sinks for a second, and then a fully inflated belt appears on the surface with sufficient floating power to support two men for forty hours. The belt can also be discharged by rocket to a drowning person quite 1,000 yards away, and may carry a line with it to draw to shore or deck the person to be rescued.

The Atlantic Ocean Mail Steamers.

The Teutonic, City of New York, Majestic, and City of Paris will next year be run on different dates, making together a weekly service such as cannot be excelled in the world, since they are all 20 knot boats, and all come within a few minutes of each other in the duration of the now very fast transatlantic trip—about 5 days 20 hours.

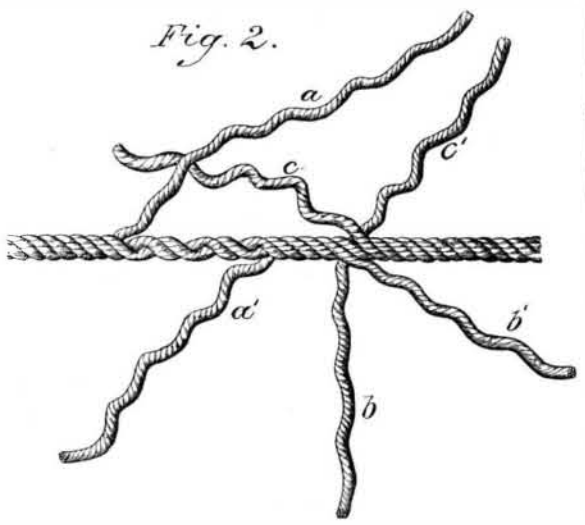
LONG SPLICE FOR ROPES.

The illustrations show how to make a long splice by a method somewhat different from the regular way. It is especially valuable for uniting ropes used in

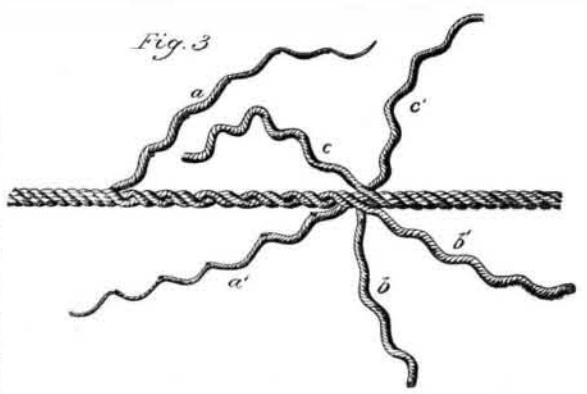


power plants. The union can be made so neatly as to be indiscernible.

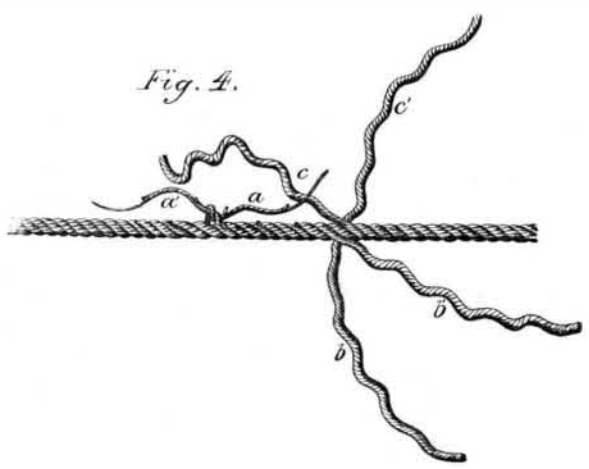
The ends to be united are first unlaid for at least as many turns as there are threads in each strand. The ends are then "crotched," as shown in Fig. 1. The process of making a regular long splice is started.



Strand a is unlaid and strand a' laid in its place. In regular practice this would be done without any reduction or tapering, which regular method is shown in Fig. 2 in process of execution. Then, when at a sufficient distance, a and a' would be allowed to meet. Half of each would be cut off, and the other half would be knotted and stuck away beneath the strands.



In the method now to be described, a systematic tapering takes place. The place where the strands are to unite having been settled upon, half as many turns of both strands as there are threads in a strand, counting backward from the place where the two strands are to meet or unite, are unlaid. The rope shown in



the drawings is supposed to have six threads in a strand, or to be "eighteen thread stuff." Hence each of a given pair of strands, say a and a', is unlaid three times, counting backward from the place of meeting, and at that point a single thread is cut and removed. They are laid up each one more turn, and a second thread is removed; one more turn brings them together, when a third thread is cut out of each, leaving each of half the original thickness. Here they are knotted or twisted, as shown in Fig. 4, a right-handed knot being used. This knotting and consequent doubling of the reduced strands, it will be seen, maintains the original thickness of the strand, each strand at this point being three threads in thickness. The ends of the loose strands are again wrapped around the laid-up tapered strand until the next turn is reached, when an additional thread is cut out, leaving two. This reduced portion is twisted around the laid strand, which, at this point, is four threads in thickness, until the next turn is reached. There another thread is cut out, and the single thread left is wound around the laid strand, here five threads in thickness, and is finally cut off.

It will be observed that this leaves the strands in all places of the exact original thickness of six threads.

In ropes in which the number of threads are uneven, one strand is unlaid one turn further back and is reduced one thread more than the other at the first knot, and the same principle is carried out, the twisted or united strands always being kept of uniform thickness.

In Fig. 3, the reduction of the strands thread by thread is shown. It is better practice not to reduce them all at once, but to do it turn by turn as fast as they are laid up, as described above. The reduction after knotting is best accomplished in the same way, although the operation can be carried out as shown in Fig. 3 and Fig. 4. The threads too should be cut off so as to lie underneath the strand, and so be hidden, if a very neat job is wanted.

Strand c is unlaid in the opposite direction, or to the right, and c' is laid in its place. These are treated exactly as a and a' were.

Strands b and b' are each unlaid for half as many turns as there are threads in each, in the present case for three turns, and reduced one thread, laid up one turn each and reduced by another thread, laid up a second turn and reduced by a third thread, and are knotted and twisted as described, the loose strands being reduced one thread for each turn given in the finishing twisting.

This splice has been used with great success by Mr. W. A. Wood, of this city. He has employed it on rope driving bands of rawhide, as well as on manila rope, and it has given the greatest satisfaction. The splice being of uniform thickness, the band runs better and the spliced portion lasts as long as any other part.

Resuscitation of the Apparently Drowned.

In the *Transactions* of the Medico-Chirurgical Society of London, Dr. Bowles gives the following excellent advice: After the patient has been placed for a moment with face downward, to allow the escape of water from the mouth and throat, he is turned on the side and *kept on that side* continuously, except when (about fifteen times a minute) the body is rolled for a few seconds on the face again. By *keeping the same side always up*, the lung on that side becomes clear. Turning first one and then the other side up is dangerous, because thereby the partly cleared lung is suddenly flooded with fluid from the lung which was downward. It is better to clear one lung entirely than to have both half cleared. Each time the body is turned upon the face a little more froth and water escapes from the mouth and nostrils. If one lung is thus cleared it may escape the inflammation which results from the inspiration of water. When the upper lung has been almost cleared, it is useful to raise the upper arm above the head as in the Sylvester method, since the entrance of larger quantities of air into the lung is now safe. Pressure upon the back at each pronation assists the escape of water somewhat, and it has a good influence on the heart, aiding the propulsion of the blood toward the lungs. The continued use of the prono-lateral method is an excellent mode of keeping the pharynx clear of obstruction. The *Medical Record* speaks approvingly of this treatment in a recent editorial, and considers it superior to the usual Sylvester or Marshall Hall method.

Carbon Cores for Casting.

The well-known difficulty experienced by both iron and brass founders in making smooth, true holes in castings by coring has led to various experiments with a view to the discovery of something better than the cores commonly used. Mr. E. R. Dale, C.E., writes us that cores of carbon are coming into use in England and meeting with favor for work of all kinds, but especially for the class of work requiring long holes of small diameter.

At present they are supplied in 10 inch lengths from ½ inch to 1½ inches in diameter. They are smoother than sand cores, and will keep for any length of time without wasting. Holes may be cored in many kinds of work which would otherwise have to be bored. The carbon core does not break in the mould, and often may be used the second time.

These cores are said to resemble electric light carbons, and are perforated longitudinally.

Making a Will which will Stand.

Some time last summer a young man in Pittsburg, Pa., tendered his own will for filing in the office of Register of Wills, which was refused as contrary to law. The matter has been widely commented upon in the newspapers, the main point insisted upon being the perfect authenticity which must attach to such a will, and the unlikelihood of any contest. But the prime fact is here lost sight of that the law regards a will as going always with the testator, and as being open to amendment, variation, or destruction by him so long as he lives. It is of no legal effect during the testator's life, and the common law rule has been that a marriage and the birth of a child after the execution of a will operated to revoke it, unless by provision made in the will or by other competent evidence an intention by the testator that there should be no such revocation was shown; while by the statutes of this and many other States any children born after the will is made and not mentioned or provided for by the will take such share as would come to them if the father had died intestate.

The different States have various statutes limiting to some extent the manner in which a testator may dispose of his property—as, for instance, in New York State, no person leaving a wife, or child, or parent can devise more than half of his or her estate to charitable or educational institutions, etc.; and all statutory limitations, as well as proof that the will itself is *bona fide* and sufficient, must, if called in question by any person interested, be passed upon by the proper court, before good title can be conveyed under the will. The contest over the Fayerweather will in New York is probably due, principally, to the great increase in the value of the estate from the time of making the will, in 1884, to the death of the testator, six years later. The increase is estimated at three million dollars, all of which was to go to the executors, although it is said they had private written directions as to the disposition they were to make of it. Therefore a will to stand, if contested, must have no provisions conflicting with statute law at the time of the testator's death, at which date only the will becomes operative and falls under the provisions of the law.

The plan of filing wills with probate or other public officers during the testator's life may therefore be considered worse than useless. Ninety-nine hundredths of the will litigation is not on the question of actual execution, but (a) upon the condition of the testator's mind at the time of execution, as to competency and freedom from undue influence; (b) the meaning and effect of specific provisions contained in the will; (c) the legality of specific provisions in view of positive statutes and rules of law.

Upon all these questions the plan of the Pittsburg young man would produce more harm than good.

Value of Observation.

The late Rev. Henry Ward Beecher once said that he never saw anybody do anything without watching to see how it was done, as there was no knowing but that some time he might have to do it himself. This habit of observation once served him in good stead. "I was going," he says, "across a prairie when my horse began to limp. Luckily, I came across a blacksmith's shop, but the smith was not at home. I asked the woman of the house if she would allow me to start a fire and make the shoe. She said I might if I knew how. So I started the fire and heated the shoe red hot, and turned it to fit my horse's foot, and pared the hoofs, and turned the points of the nails out cunningly, as I had seen the blacksmith do, so that in driving into the hoof they should not get into the quick, and I shod the horse. At the next place I went to I went straight to a smith and told him to put the shoe on properly. He looked at the horse's foot and paid me the greatest compliment I ever received in my life. He told me if I put on that shoe, I had better follow blacksmithing all my life. Now, I never should have known how to do that if I had not looked on and seen others do it."

Another writer in a contemporary on the same subject says:

Everyone should cultivate the faculty of observation. If he does so designedly, it will not be long before he will do so unconsciously. It is better to learn a thing by observation than by experience, especially if it is something to our detriment. One would prefer to know which is the toadstool and which is the mushroom by observation rather than by experiment, for the latter might cost him his life. There is hardly a vocation in which observation is not of great service, and in many it is absolutely essential. It adds to the proficiency of the chemist, the naturalist, the mining expert, and the bushman. Observation quickens experiment. It leads to inference, to deduction, to classification, and thus theories are formulated, sciences established. An observing boy will become an observing man, and, as boy and man, he will have an advantage over those who have not cultivated the faculty. He knows a thousand things that the unobservant boy does not know. He does not get the knowledge from books or from others, but acquires it for himself, through the use of his eyes and ears, and properly appreciates it for that reason. A child may know more than a philosopher about matters that may not have come under the observation of the philosopher. A little girl entered the study of Mezerai, the celebrated historian, and asked him for a coal of fire. "But you haven't brought a shovel," he said. "I don't need any," was her reply. And then, very much to his astonishment, she filled her hand with ashes and put the live coal on top. No doubt the learned man knew that ashes were a bad conductor of heat, but he had never seen the fact verified in such a practical manner. Galileo noticed the swaying of a chandelier in a cathedral, and it suggested the pendulum to him. To another inventor the power of steam and its application was suggested by the tea kettle on the stove. A poor monk discovered gunpowder, and an optician's boy the magnifying lens.

New Submarine Boat.

The French submarine boat Gymnote was recently tried at Toulon, and demonstrated its ability to pass through a blockaded line and escape attention in spite of systematic efforts to watch, trace, or discover its course. According to the *Revue Industrielle*, it plunged and remained under water forty minutes. It rose to the surface in a distance of more than two miles and a half from its point of departure, and had passed under the watched line of demarkation without being seen. After having ascertained where it was, it remerged to return. It again crossed the line, but this time two of the parties on the lookout for it got a glimpse of it, not, however, sufficiently distinct to enable them to trace and pursue it. The course of the boat was in both instances rectilinear.

RECENTLY PATENTED INVENTIONS.

Railway Appliances.

STATION INDICATOR.—James N. Winn, Darien, Ga. This is a device to be placed on the cars of a steam road, to be operated by the engineer from the cab by compressed air or steam transmitted through flexible couplings, to indicate approach to the different stations, the invention covering an improvement in construction and arrangement on a formerly patented invention of the same inventor.

CAR DOOR. — John W. Crumbaugh and Leander C. Prater, Kansas City, Mo. A combined bridge and cross bar is connected to the door jamb, to slide integrally therein, and adapted to be fastened across the door space or let down to form a bridge or gangway, the device facilitating the opening of the doors of stock cars, strengthening them, and enabling cattle conveniently to pass in or out in loading or unloading them.

CAR COUPLING. — Charles W. Manchester, Feesburg, Ohio. The drawhead of the car is, by this invention, provided with a central opening adapted to register with a like opening formed in a revoluble cylinder pressed on by a spring, with other novel features designed to form a simple and durable construction which shall be very effective in operation and automatic in coupling.

CAR COUPLING. — George H. Duke, Hotchkiss, Col. The drawhead of this coupling has a depending beveled flange in its upper side, a spring-pressed drawbar having a beveled forward end and a locking shoulder, with a coupling link beveled and having a shoulder to engage the shoulder of the drawbar, the forward end of the latter being pressed against by a central boss, the coupling being effected automatically.

RAIL JOINT.—Frank F. Hoeffle, Meridian, Miss. This invention provides for a metal plate or box having upwardly extending flanges between which a rail may rest, there being gripping devices between the flanges adapted to clasp a rail, a wedge pointing upwardly between one of the flanges and a gripping device to hold it firmly against the rail, the device being designed to obviate the use of bolts, nuts and nut locks.

Mechanical.

WATER WHEEL.—Levi M. Sharps, Lake View, Oregon (deceased, W. M. Sharps, administrator). This invention relates to a former patented invention of the same inventor, and covers a novel construction and combination of parts forming an improved wheel designed to be very simple and durable, and very effective in operation.

TICKET PRINTING MACHINE.—Gideon B. Massey, Mamaroneck, N. Y. (deceased, Sarah R. Massey and Stanley A. Bryant, administrators). This invention provides a machine to print and number tickets in successive series, the blanks being supplied from a roll of continuous paper and cut off as delivered from the machine either singly or in strips, the invention being more especially designed for printing railway, ferry and bridge tickets, etc.

Electrical.

GALVANIC BATTERY. — George A. Smith, Halifax, Canada. A cell contains the exciting liquid, in connection with elements formed of rods of zinc and rods of carbon, and a mechanism is provided for plunging and lifting the elements and holding them at any desired height, the construction affording a large surface for the action of the liquid, and making a simple and powerful battery for the use of physicians, surgeons and experimentalists.

TELEGRAPH BLANK. — John O. Donnell, Lowville, N. Y. This a blank for telegraph, telephone or other messages requiring an answer or a duplicate for reference, and consists of a perforated double blank divisible into independent blanks, with opposite perforated end flaps, whereby the blanks may be made to form their own envelopes and be folded up and sealed.

Agricultural.

PLOW. — William W. Leak, Montgomery, Ala. This is an improvement in that class of plows in which the points or sweep blades are made of metal sufficiently thin to form an edge, to avoid the necessity of sharpening and resharpening the blades, the brace frame and bars dispensing with all useless material and lightening and cheapening the construction, while permitting the free passage of soil thrown up in operation.

Miscellaneous.

RAPID TRANSIT APPARATUS. — Lieut. John S. Parke, U. S. A., Rosebud Indian Agency, Rosebud, South Dakota. This invention provides for the construction of a railway track having a rack formed of plates arranged at an incline lapping one another; and provided with cushioning plates, while the locomotive has a revolving group of cannons or barrels arranged to fire a piston against the rack, to utilize the explosive force of gunpowder or some analogous material to attain great speed in the running of carriages or trains.

SALT PAN. — Daniel Shirley, Hutchinson, Kansas. This is an apparatus having a furnace under the evaporating pan, in connection with a settling pan having a flat float resting on the liquid, while flues extend through the settling pan below the float, the construction being designed to prevent the buckling or warping of the pans and obtain the best results from the fuel used.

COMPOSITION FOR ROADWAYS, ETC.—Henry Benjamin, Montreal, Canada. This is a composition of matter also designed to serve for sidewalks, fireproof roofing, vault linings, and various building purposes, and has for its ingredients finely divided iron particles, such as the waste products from iron mines or iron sand, and a bituminous substance, mixed and incorporated together by heat to a pasty consistency.

AXLE BEARING. — James S. Patten, Baltimore, Md. This is a self-oiling bearing, the axle having a spindle portion with longitudinal groove communicating with an oil reservoir, a spring-actuated rod sliding in the groove, and the axle box having a cam also acting on the rod, the invention being an improvement on a former patented invention of the same inventor.

STOCK HITCHING DEVICE.—Andrew L. Hinchman, Lowell, West Va. This invention consists of a guide with independent movable clutch blocks, a latch on one block engaging the other block, and cords for pulling the blocks together to retain the halter, with other novel features, for securely hitching and unhitching animals without entering the stalls, and simultaneously unhitching any number of animals.

TYPE WRITING MACHINE.—Gilbert L. Depuy, Garland, Texas. A keyboard carriage is pivoted on a threaded shaft in a light frame, and an inking attachment and mechanism moves the carriage along the shaft as the writing proceeds, the machine being very small and adapted to be carried in the pocket, for use to do the work of a pencil or pen.

TYPE WRITER FOR THE BLIND.—Lizzie Sthreshley, Austin, Texas. This is a machine to produce writings for the blind under the "point" system, and embraces improvements in the construction and combination of parts in the carriage feeding, the spacing, and the embossing mechanism.

BOOK STAND.—Julius W. and Charles T. Knipp, Napoleon, Ohio. This is a stand for conveniently supporting a dictionary or other large book, and the construction permits of tilting or turning the table in any desired direction, while it can be locked in place in such position as wanted, the stand also presenting an ornamental appearance.

TEMPORARY BINDER. — George A. Blackburn and Daniel J. Brimm, Columbia, S. C. This is a binder especially designed to hold catalogues, indexes, scrap books, and newspaper files, and has but few and inexpensive parts, while designed to be easily operated and securely hold such papers and documents in place.

MUSIC LEAF TURNER.—James Maret, Mount Vernon, Ky. Combined with a series of fixed ratchets are sleeves carrying leaf-turning arms, and having volute springs at their outer ends with hooks to engage the ratchets, there being also clasps to engage the leaves and spring catches to hold the arms, whereby the leaves may be turned in succession by the liberation of spring-actuated arms, the arms being used independently of each other.

COUPON ACCOUNT BOOK. — David F. Parker, Red Cloud, Neb. This is a book with leaves having memorandum spaces and smaller side spaces on each of which is formed a coupon representing dollars or fractional parts thereof, and adapted to serve as a substitute for the ordinary pass book used by purchasers of goods at retail.

PREPARING CHOCOLATE. — Victor Tobias and Heinrich Fischer, Berlin, Germany. This invention relates to the making of a liquid chocolate thoroughly free from fat, which can be preserved for a very long time, and consists of a process in which whey or poor milk is heated to a boiling point, adding cocoa and sugar, cooling the mixture, and removing the cocoa butter.

SIGN. — Henry Britten, London, England. This sign is composed of tubes arranged at right angles to each other and connected by couplings, letters being suspended by links from the horizontal tubes, forming a sign for conspicuous display with large letters on the tops of buildings, and so made that there will be but little strain upon the framework.

CELLAR DOORS. — Charles E. Golden, Oskaloosa, Kansas. This is an attachment for raising and lowering doors, whereby the door when released will be automatically opened, and may be automatically closed when desired, by means of a weight on a crank arm acting as a pendulum.

ADHESIVE PLASTER. — Richard K. Gregory, Greensborough, N. C. This plaster is of cotton or linen or similar material saturated with a compound of gum turpentine, alcohol, tannic acid, cane sugar, gum camphor, bichloride of mercury, carbolic acid, etc., for use over a wound, the ingredients of the plaster being insoluble in water, and possessing superior antiseptic and anæsthetic properties.

CUP HOLDER. — James Sutherland, Honolulu, Hawaii. This invention consists of a ring adapted to receive a cup, and a spring clamp formed on the ring at right angles to it, adapted to engage the rail of the table, the device being made of a single piece of steel wire, and specially designed to hold cups, glasses, etc., to the table on board of a ship.

PIPE STOPPER. — William Baguley, New York City. This invention provides a simple and inexpensive stopper specially designed for closing the ends of waste pipes when a test is applied to discover flaws and imperfections which would permit the escape of sewer gas.

BOTTLE STOPPER. — Michael J. McHugh, Jersey City, N. J. This is a sectional stopper, the sections of which may be easily fitted together and will be self-securing when so fitted and applied, the stopper being one which may be conveniently inserted in bottles and will be efficient in use.

BOTTLE DISK. — Alfred L. Bernardin, Evansville, Ind. This is an improvement in the tin or other metallic disks or top plates fitting upon the tops of corks in tightly corked and wired bottles, the construction being designed to operate to secure the desired spreading and compression of the cork at its top.

ANIMAL TRAP. — William T. Mellon and John A. Best, Atlantic City, N. J. Combined with the cage is a tilting platform having a trigger post, there being a pendent wicket within the cage and a latch dog to lock the wicket when it falls from the trigger post, the device being adapted for use without a bait, and especially designed to catch rats and mice, etc.

NOTE.—Copies of any of the above patents will be furnished by Munn & Co., for 25 cents each. Please send name of the patentee, title of invention, and date of this paper.