the furnace is clay of the quality used in the manufacture of fire bricks, or even common bricks, moistened and mixed with granulated fire brick. The material known as "stove fix," used in repairing the lining of stoves, answers very well when mixed with granulated fire brick or pumice stone.

The can is filled to the depth of an inch with the material. The chambered bottom of the wine bottle is oiled and filled with the material and placed in the can as shown in Fig. 11. A ¾ inch wooden plug is inserted in a hole in the side of the can, to be afterward withdrawn to form the blast aperture. The can is then filled with the clay mixture, which is tamped in lightly. The material should not be too wet, and it is well to oil the bottle to facilitate its removal. When the filling operation is complete, the bottle is loosened and withdrawn. The cover is formed by filling a suitable band with the clay mixture. The furnace is allowed to dry for a day or so. The first time the furnace is heated, the temperature should be increased very gradually.

Cure of Inebriates.

From the *Quarterly Journal of Inebriety*, published at Hartford, Conn., under the auspices of the American Association for the Study and Cure of Inebriates, we make the following extracts from a recent lecture by Dr. Elliott, at Toronto:

Four conditions must be observed. The first condition of cure and reformation is abstinence. The patient is being poisoned, and the poisoning must be stopped. Were it an arsenic instead of an alcohol, no one would dispute this. So long as the drinking of intoxicants is indulged in, so long will the bodily, mental, and moral mischief be intensified and made permanent. Abstinence must be absolute, and on no plea of fashion, of physic, or of religion ought the smallest quantity of an intoxicant be put to the lips of the alcoholic slave. Alcohol is a material chemical narcotic poison, and a mere sip has, even in the most solemn circumstances, been known to relight in the fiercest intensity the drink crave which for a long period of years had been dormant and unfelt. The second condition of cure is to ascertain the predisposing and exciting causes of inebriety, and to endeavor to remove these causes, which may lie in some remote or deep-seated physical ailment. The third condition of cure is to restore the physical and mental tone. This can be done by appropriate medical treatment, by fresh air and exercise, by nourishing and digestible food given to reconstruct healthy bodily tissue and brain cell, aided by intellectual, educational, and religious influences. Nowhere can these conditions of cure be so effectually carried out as in an asylum where the unfortunate victim of drink is placed in quarantine, treated with suitable remedies until the alcohol is removed from his system, then surrounded by Christian and elevating influences, fed with a nourishing and suitable diet, and supplied with skillful medical treatment. His brain and nervous system will then be gradually restored to its normal condition, and, after a period of from six to twelve months in most cases, he will be so far recovered as to be able to return to his usual avocation and successfully resist his craving for drink. The fourth condition of cure is employment. Idleness is the foster mother of drunkenness, industry the bulwark of temperance. Let the mind of the penitent inebriate be kept occupied by attention to regular work, and the task of reformation will be shorn of half its difficulty.

Age of Parents and Vitality of Children.

Mr. J. Korosi, director of the Hungarian Bureau of Statistics, recently read a memoir before the Hungarian Academy of Sciences upon the "Influence of the Age of Parents upon the Vitality of Children," and in which, taking 24,000 cases as a basis, he reaches the following conclusions:

Children whose father is less than 20 years of age have a weak constitution. The issue of fathers of between 25 and 40 years are the strongest, while the descendants of fathers of over 40 years are weak. The healthiest children are those whose mother has not yet reached 35 years. Those born of mothers of between 35 and 40 years of age are 8 per cent weaker, and those of mothers of over 40 are 10 per cent weaker. The children of aged fathers and younger mothers have, as a general thing, a strong constitution; but if the parents are of the same age, the children are less robust.—*Revue Scientifique.*

The Argentine Republic.

E. L. Baker, United States consul at Buenos Ayres, has in the Consular Report for February, 1889, a very interesting and lengthy report on the Argentine Republic, its products and resources, showing its importance to our business people as a market for our products. Referring to the newspapers received at the consulate, Mr. Baker mentions the SCIENTIFIC AMERICAN and others which he has placed at the disposal of merchants, shippers, etc., believing that they have been the source of great benefit to those interested in trade and commerce.

Correspondence.

Cement for Aquariums.

To the Editor of the Scientific American:

J. C. M. in Notes and Queries No. 634 says: "An aquarium of mine, made of marble and glass, leaks at the joints." I have a very large one, and have experimented with many cements and putties. I find the following perfectly satisfactory:

	By measure.
Whiting	6 parts.
Plaster of Paris	3 "
White beach sand	3 "
Litharge	3 "
Powdered resin	1 "
	16 parts.

Mix the ingredients together thoroughly, then make into a putty with the best coach varnish. Only enough to set one glass should be made up at once, as it soon becomes too hard to work. The glass should be thoroughly bedded in the putty and left about a week to harden. Cover the joints with two coats of asphaltum. Cover over on to the glass. This will stand water for an indefinite period, and if properly done, will not leak. HARRY S. WOODWORTH.

Rochester, N. Y.

Formation of Gas in Hot Water Pipes.

To the Editor of the Scientific American:

In regard to the article on the formation of gas in hot water and steam pipes, mentioned in your issues of March 30 and April 13, if no other conditions are present than those mentioned in the several cases, it would seem clear that the gas is hydrogen.

One of the common ways of making this gas in the laboratory is to pass steam through a hot iron pipe, the oxygen of the water (steam) uniting with the iron, forming iron oxide or iron rust, thus setting free the hydrogen. Whenever rusting, which is accompanied by heat, takes place *under water*, there is some hydrogen set free by the chemical action. The interior surface of cast iron is more or less rough, which would facilitate chemical action.

The entire surface exposed to the action of water or steam would be considerable, so that the total amount of gas which might form, though but a very little came from each square inch of iron, would in time form quite a volume of gas. This action would be more rapid in new pipes than in old ones, and also in case the pipes were very hot. CHAS. E. ADAMS,

Teacher of Science, State Normal School.

Salem, Mass., April 22, 1889.

The Gas Check for Heavy Ordnance.

To the Editor of the Scientific American:

I notice in your No. 13, March 30, SCIENTIFIC AMERICAN, in an article headed "War Material of American Designing," that credit is given to Colonel Broadwell for inventing the gas check now used by Krupp and others. I am in doubt about Broadwell being the original inventor of a gas check of this kind, viz., where a ring or its equivalent is inserted in the sliding block having a chamber behind it, into which the gas enters and forces the ring against the end of the barrel when the explosion takes place.

I recollect very distinctly in 1855 or 1856 being shown this improvement by Mr. Hezekiah Conant; the cause that prompted this improvement being the leakage of gas between the breech slide and the end of the barrel in the Sharpe rifle. Mr. Conant was at that time employed at the Sharpe's rifle factory, and he showed me his invention in a rifle, which we tested. It made a thoroughly tight joint, and was considered perfect. It was adapted and applied to all the Sharpe rifles made afterward up to the time the metallic cartridge was put into use. I feel quite sure that Mr. Conant was ahead of Broadwell in using the pressure of gas to close the joint between the sliding breech and end of barrel. Several years after this Broadwell's check was adopted in Germany in large guns, and the writer, when at the German armories in 1873, saw them being made at that time and gave them a history of the invention.

Of course the improvement is public property now, but I have felt since Broadwell came out with his patent that Mr. Conant was the man who should have the credit of the invention. "Honor to whom honor is due!" See Conant patent, April 1, 1856, No. 14,554.

F. A. PRATT.

Hartford, Conn., April, 1889.

[The use of expanding devices in breech-loaders to prevent escape of gas dates back of Mr. Conant's patent, and is so stated by Mr. Conant himself, for in his patent above cited, he refers to examples, namely, Green's patent, 1854, Day's patent, 1855, also Josylin's patent, 1855, in which, as Mr. Conant admits, gas rings are used. The construction and arrangement of Broadwell's device is very different from Conant's; and the latter, probably, would not be applicable to heavy cannon. There is nothing in Conant's patent that anticipates Broadwell's device or detracts from Broadwell's priority as the man who rendered possible the use of the heavy breech-loading ordnance of the present day. Broadwell's patent was not granted until September 21, 1875—more than nineteen years after Conant's—and up to the date of Broadwell's invention it can hardly be said that any one had produced a great gun that was really safe and reliable. Broadwell's rings are now in general use throughout the world.—ED. S. A.]

Calcined Oyster Shells for Cancer.

To the Editor of the Scientific American:

Your paper of June 4, 1887, contained an extract from the London *Lancet* relative to treatment of cancer with calcium carbonate. There being no physician here, I treated an Indian woman who had been afflicted with a cancerous tumor to my knowledge for over four years. A couple of months after using the remedy it commenced to improve. It is now so small that it can be said to be healed. I would advise any one having a cancerous tumor to use calcium carbonate as directed, and also think it well worth republishing.

W. H. WOODCOCK.

The following is the paragraph as published in the SCIENTIFIC AMERICAN of June 4, 1887.

CALCINED OYSTER SHELLS AS A REMEDY FOR CANCER.

In a recent number of the *Lancet*, Dr. Peter Hood, of London, refers to a communication of his published in the same journal nearly twenty years ago, on the value of calcium carbonate in the form of calcined oyster shells as a means of arresting the growth of cancerous tumors. In a case which he then reported, that of a lady nearly eighty years old, the growth sloughed away and left a healthy surface after a course of the remedy, as much as would lie on a shilling being taken once or twice a day in a little warm water or tea. He now reports another case of scirrhus of the breast, in the wife of a physician, in which the treatment was followed by an arrest of the growth and a cessation of the pain, the improvement having now lasted for years, and no recrudescence having thus far occurred. He urges that the remedy can do no harm, and that the *prima facie* evidence in its favor is stronger than that on which, at Dr. Clay's recommendation, the profession lately displayed an extraordinary eagerness to try Chian turpentine. He would restrict the trials to well marked cases of scirrhus, and insists that no benefit should be looked for in less than three months.

The Tannin Treatment of Phthisis.

Dr. E. Houze, of the Hospital St. Jean, Brussels, after having tried the tannin treatment on all his phthisical patients for the last year and eight months, states as the result of his observations that it gives excellent results in all stages of the disease, and especially in the condition where cavities exist. Indeed he has no hesitation in declaring that of all the different kinds of treatment for phthisis which he has tried this has given by far the most encouraging results. The dose he employs ordinarily is fifteen grains, which quantity is taken three times a day. It is, as a rule, well borne. Where this is not so, it is ordered to be taken with meals. After the first few days the expectoration and the sweats diminish, the cough decreases, and in many cases the appetite undergoes a marked improvement.

The majority of the patients suffered from some slight degree of constipation, though in some this feature was sufficiently marked to require treatment; while others, again, suffered from diarrhœa.

The character of the expectoration changed for the better, the sputa becoming white and frothy instead of green and firm. In some cases the diminution of the expectoration was followed by increased dryness of the cough, so that the patients complained that it fatigued them more. This was easily remedied by prescribing a few spoonfuls of sirup of codeia. The physical signs underwent a remarkable change for the better, at least those depending on auscultation, moist rales giving place to dry rhonchi, and large gurgling rales decreasing progressively until they gave place to mere blowing respiration. These changes were evidently due to the drying up of the cavities, in consequence of which the hectic present in many of the cases vanished, the patients increasing considerably in weight and gaining strength in a remarkable manner. The percussion signs were not found to undergo so marked a change as those dependent on auscultation, but even here some improvement could be detected. No bacteriological observations were made.—*Lancet.*

Dynamite Shells.

J. W. Graydon's invention has for its object to enable shells loaded with large quantities of dynamite to be fired from ordinary guns with the usual powder charge. The improvements consist mainly in subdividing the shell charge into a number of small portions or pellets, each consisting of a small quantity of dynamite inclosed in a flexible envelope of paraffined paper. A further subdivison of the charge may also be effected by means of partitions, perforated or otherwise. In order to prevent the dynamite from becoming fired by the heat generated by the explosion of the ordinary propelling powder charge in the gun, the shell charge is entirely surrounded by an envelope of non-conducting material, such as asbestos cloth.

Home-made Perfumes.

There has been some discussion between two contributors of the *Druggists' Circular* regarding the practicability of druggists making their own perfumes at a profit. One says it cannot be done, the other says it can, and adds: "There is still something to be done in bottled perfumes, and when the make-them-yourself idea is applied also to those, it will give even better results" than the mere manufacture of the articles. "The druggist of average intelligence is already practically a perfumer, and the compounding of certain perfumes presents no difficulties greater than are met with in a new prescription. Moreover, in making such compounds the druggist will not only find a delightful occupation, but one which will yield him a handsome pecuniary return." The following are some of the formulæ which this writer recommends, the cost of production in no case exceeding 6d. per ounce:

White Rose.

Rose spirit	4 ounces.
Violet essence	2 "
Jasmine essence	1 ounce.
Patchouly extract	½ "

Essence Bouquet.

Rose spirit	4 ounces.
Ambergris tincture	1 ounce.
Orris	2 ounces.
Bergamot oil	¼ ounce.
Lemon oil	⅛ "

New Mown Hay.

Tonka tincture	4 ounces.
Musk "	1 ounce.
Benzoin "	1 "
Rose spirit	1 "
" geranium oil	40 m.
Bergamot oil	40 "
Alcohol (S. V. R.)	1 ounce.

West End.

Rose spirit	6 ounces.
Verbena extract	1 ounce.
Benzoin tincture	2 ounces.
Civet "	1 ounce.
Musk "	2 ounces.
Sandal oil	20 m.

Verbena.

Lemon grass oil	⅜ ounce.
Lemon oil	½ "
Alcohol (S. V. R.)	1 pint.

Heliotrope.

Vanilla tincture	8 ounces.
Rose essence	4 "
Orange flower essence	2 "
Ambergris tincture	2 "
Civet "	½ ounce.
Bitter almond oil	10 m.
Alcohol (S. V. R.)	ounce.

Microscopic Examination of Paper.

Mr. Herzberg, who has charge of the examinations of paper at Charlottenburg, has just published a very exhaustive work upon the subject, with numerous reproductions of microscopic preparations. He brings especially into prominence the peculiarities of certain fibers for rendering them easily distinguished.

The author uses a solution of iodine for recognizing the various fibers, which, according to their origin, assume various colors: (1) Wood wool and jute are colored yellow; (2) straw, "cellulose," and alfa do not change; (3) cotton, flax, and hemp are colored brown.

For disintegrating the paper, Mr. Herzberg does not employ the processes in common use. Mechanical appliances, either needles or a mortar, do not remove the size, starch, and weighing substances which in part conceal the structure of the fibers and render the examination of them difficult. He recommends that a small quantity of the paper to be examined be submitted to ebullition for a quarter of an hour in a 1 to 2 per cent solution of soda. In this way the foreign substances are got rid of and the fibers set free. The presence of wood wool will be ascertained, during the boiling, by the paper becoming yellow.

After this treatment, the whole is poured upon a brass strainer with fine meshes and is washed with pure water. The washed residuum is reduced to a homogeneous paste in a porcelain mortar.

In the case of colored paper, the coloring matter must be removed, if the boiling does not effect the removal. To this end, hydrochloric acid, chloride of lime, etc., is used, according to the chemical nature of the coloring matter. When the paper is not sized, nothing but water is used for the boiling. If the presence of wool in the paper is suspected, an alcoholic solution, instead of an alkaline one, is used, as the latter would dissolve the wool.

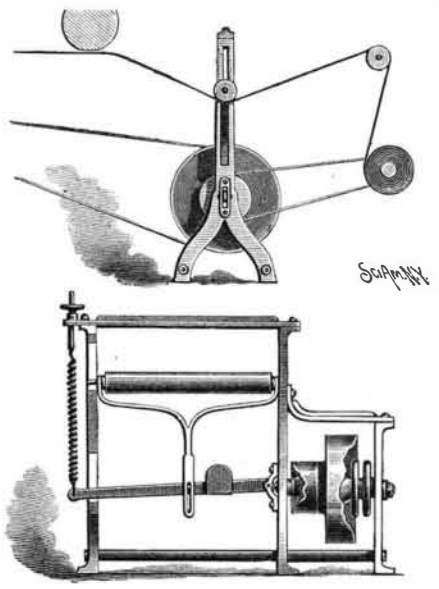
The solution of iodine in iodide of potassium may be more or less concentrated. The color produced varies in depth according to the concentration. The author generally uses the following formula:

Iodine	18 grains.
Iodide of potassium	30 grains.
Water	5 drachms.

For spreading the paste upon the object holder of the microscope he employs two platinum needles. The object holder is placed upon a white ground, so that the fibers will stand in relief more prominently. The paste is covered with a glass, and the excess of water is removed with blotting paper. For the determination of the fibers, a magnifying power of 300 diameters is best adapted; but, for ascertaining the relative proportion of the fibers, one of 120 diameters, that permits of taking in a wider surface, is preferable.—*Gutenberg Journal.*

AN IMPROVED AUTOMATIC CLUTCH AND TENSION MACHINE.

The illustration herewith represents a device primarily designed for use in printing labels or other matter in long lengths, where a web or strip is moved intermittently, and wound into a roll, the web being constantly taut. The invention forms the subject of a patent issued to Mr. Jeremiah C. Bill, of Willimantic, Conn. Upon the working shaft is a small, loose pulley, adapted to turn the winding drum by means of a belt, this pulley being adapted to be clutched to a larger fixed one on the shaft by friction or otherwise, each pulley having preferably, on the opposing faces, rubber or leather. The tension bar or roller under which the strip from the press passes has its shaft or gudgeons in slots of the main frame, the bar being mainly supported from a lever whose outer end is sustained by a coiled spring, while its inner end is pivoted in a bracket attached to the frame, in line with the operating shaft. The inner end of this shaft is slotted, and in the slot is a pointed plate, the point impinging against the end of the lever below its pivot, so that vertical movement of the tension bar or roller will impart a horizontal movement to the plate in the shaft slot. This plate is connected to a sleeve or ring placed loosely upon the shaft, and impinges against the boss of the



BILL'S AUTOMATIC CLUTCH AND TENSION MACHINE.

small, loose pulley, so that the outward movement of the plate forces the pulley in contact with the operating pulley. With this construction, between each impression of the press the strip is free, but it is otherwise kept constantly taut, and wound into a perfect roll upon the drum, the machine being entirely automatic. This machine is also equally applicable to the winding of paper from the paper machine, cloth from the loom, and other similar uses. By simply inserting the lever and bracket it will as well discharge from a roll, its action being governed entirely by the tension.

Injury to One of the Pneumatic Guns of the Vesuvius.

The guns of the new torpedo boat Vesuvius were tried near Philadelphia on April 24. The adjustments of the firing valve, which have caused considerable delay, had been satisfactorily made, and it only remained to prove that a two hundred pound shell could be thrown to all ranges inside of one mile and at the rate of one in two minutes.

Three dummy shells were fired successfully, the range being a little less than one mile. The fourth shell was different from those first fired, being a ten inch sub-caliber hollow cast iron shell, weighing 500 lb. It was placed in the middle gun, and when that gun was fired, the hollow cast shell immediately went to pieces in the gun. The breech section of the gun was badly wrecked and considerable damage was done to the mechanism. No one injured.

Photographing Patterns.

Sterling Elliott sends to the *American Machinist* the following plan for keeping track of patterns:

Spread a white paper on the floor, lay patterns on it in proper order, place on each pattern a small square of white paper on which is painted a black plain figure beginning with one, two, three, etc.; these may be cut from an old calendar, or painted purposely. Directly over the patterns suspend by any suitable means a photographic camera, and you have it. From the negative thus obtained, make two blue prints; send one to the foundry, and the old problem of marking patterns is not only solved, but lost patterns are much more easily found; for a pattern, unlike an actress, resembles its photograph every time.

Purification of Coal Gas by Oxygen.

The manufacture of cheap oxygen by the Brin process has rendered it possible to use this gas for destroying the sulphureted hydrogen present in crude coal gas. Mr. Vernon Harcourt, one of the gas referees for the metropolitan district, suggested some two or three year ago that oxygen gas would probably be found valuable for revivifying and keeping in an active condition the oxide of iron in the gas purifiers. When air is used for this purpose, it is necessary to remove the oxide of iron from the purifiers, or cause a lowering of the illuminating power of the gas; but if pure oxygen be employed, it can be introduced directly into the purifiers *in situ*, which can then be kept in constant use.

Mr. Ogden, the engineer of the Blackburn Gas Works, acting upon these views, found the process to work well in practice, and after an extended trial showed that this continual revivification of the oxide of iron had many advantages over the older method. The nuisance caused by opening the purifiers, and the loss of gas consequent on doing so, were prevented, and the labor of cleaning and recharging the purifiers saved. After these satisfactory results had been obtained at Blackburn, Mr. Valon conducted a series of experiments at the Westgate-on-Sea Gas Works. Mr. Valon found that by introducing pure oxygen into the purifier without removing the oxide of iron, a slight increase in the luminosity of the gas was produced, and the revivification of the oxide proceeded more regularly than in the former process. From the increase of luminosity of the gas, he was led to study the effect of mixing a limited amount of oxygen with the crude coal gas without the use of any oxide of iron purifiers, and found that under these conditions the lime purifiers alone were sufficient to efficiently remove the sulphur compounds present in the gas.

The proportion of oxygen which gives the best results appears to be 0·1 per cent of the volume of the gas for every 100 grains of sulphur per 100 cubic feet of crude gas. The sulphur remains fixed in the lime purifiers partly as free sulphur. The sulphur did not move forward when the lime became saturated with carbonic acid, as is the case where air is employed, and the lime could be used for about twice the usual length of time. The spent lime forms an almost odorless and dry substance, and has none of the objectionable characters of "blue billy." Permanent oxygen plant has recently been put down at the Ramsgate Corporation Gas Works, and it occupies only one-half the space which would be required for the purifying plant if oxide of iron were employed.

The chemist to Brin's Oxygen Company, Dr. L. T. Thorne, has not given any explanation of the chemical changes involved in the process, but it is obvious that the sulphureted hydrogen is partially burnt into oxidized sulphur compounds, which are subsequently absorbed by the lime. He states, however, that there is some free sulphur in the lime, and it would be interesting to know what proportion of the sulphur removed from the gas is in this condition. If the free sulphur forms a large percentage of the total fixed sulphur it may be possible that the process will resolve itself into a modification of the "Claus" sulphur recovery process, now at work at the Belfast Corporation Gas Works, and that the lime merely acts as a strainer or filter, and could therefore be replaced by coke or other material. If, on the other hand, the greater proportion of the sulphureted hydrogen is burnt by the oxygen into sulphur acids, which are absorbed by the lime, oxygen purification is not likely to be found as economical as the Claus process.

In the former, the gas manufacturer will have to buy both oxygen and lime, and sell a comparatively valueless sulphate of lime, while in the latter practically no lime is required, and the sulphur is recovered in a form which commands a good market for the manufacture of arsenic-free sulphuric acid. The slight increase in the luminosity of the coal gas is, however, an important factor in the problem. Many gas engineers would be glad to avail themselves of a process which would insure the luminosity of their gas being raised even a few tenths of a candle, and if a small quantity of free oxygen can be guaranteed to produce this effect, it should be a useful adjunct for rapidly improving the illuminating power of the gas.

We understand, says *Industries*, that the difficulties at first encountered in the manufacture of large quantities of the gas are now surmounted to such an extent that it is possible to produce oxygen by the Brin process in London at a price not exceeding 7s. 6d. per 1,000 cubic feet. In manufacturing districts, where fuel and labor cost less than in London, 1,000 cubic feet should not cost more than 5s., and in gas works and other large works where special facilities exist, a further reduction in price is possible.

Patents, Partnership, Property.

In a case where an invention is put in as part of the capital stock of a partnership, a patent granted on the invention becomes partnership property, according to the decision of the Supreme Court of California in the case of Hill *vs.* Miller.