

Lunar Caustic for Purifying Spirits.

Although some sorts of spirits are associated in our minds with lunatics, and others with "moon-shiners," the subject of which we are about to speak is of a quite different nature, being at once scientific and practical.

Berlien has discovered the fact that raw spirits can be purified by treatment with a solution of nitrate of silver and subsequent rectification. From two to two and a half parts of dry nitrate of silver are sufficient for one million parts of crude spirits, a ten per cent water solution being employed. The odor is entirely removed from the worst quality of crude spirits by this infinitesimal amount of silver; a good quality of raw spirits requires correspondingly less, and a one per cent or a one-hundredth per cent solution of silver is then employed.

IMPROVED STEAM BOILER.

The boiler shown in the annexed engraving is intended to accomplish three very important results: First, the rapid generation of steam by a complete exposure of the water to the action of the fire; second, to superheat the steam by forcing it into contact with the smoke flues through narrow openings; and third, to prevent the destruction of the upper ends of the flues by cooling them with the moisture carried up by the steam.

To accomplish the first result a series of flues are arranged in clusters in the fire box, as clearly shown in the engraving. These clusters, generally composed of nine tubes each, are each joined to a single tube passing through the crown sheet. By this arrangement a great extent of water surface may be exposed to the heat without obstructing the smoke flues or taking up a great deal of the crown sheet surface. A circulation is maintained through a tube connecting the lower end of the cluster with the water-leg of the boiler.

It will be noticed that near the upper head of the boiler there is a horizontal partition dividing the steam room of the boiler into two portions, the upper portion being the reservoir for dry steam. The apertures through the horizontal partition are a little larger than the flues, so that the steam in passing to the upper compartment of the boiler is brought into close contact with the flues and superheated. This not only relieves the steam of all superfluous moisture, but it tends to preserve the flues by preventing overheating.

This boiler presents a large and efficient heating surface, and it has, without much additional cost, a superheater which will always supply dry steam.

Between the horizontal partition and the tube sheet a ring of L-shaped cross section is attached to the inner surface of the boiler shell, forming a receptacle for mud and other impurities in the water, which are carried upward by the natural circulation of the water, and which, in boilers of ordinary construction, find their way to the water-leg, impeding the generation of steam and working destruction to the boiler.

The inventor informs us that he can generate 100 lb. steam pressure in five minutes with this boiler, and that it will rapidly and economically generate steam for continuous work. The boiler is especially adapted to steam fire engines and other forms of portable engines where both compactness and great power are required. These boilers are made by the La France Fire Engine Company, of Elmira, N. Y., who should be addressed for further information.

Tree Culture on Waste Land.

Hitherto the abundance of natural timber in this country has made it easy to dispense with timber culture, and for the most part our land owners have taken little interest in such slow-growing crops. This state of things, however, is rapidly passing away. The demand for special woods for manufacturing purposes is steadily and rapidly increasing, while the natural supply is diminishing and must ultimately become quite inadequate. Meantime there are millions of acres of land suitable for timber culture and for nothing else, except poor pasturage that our land owners are allowing to lie waste and idle for lack of a little forethought, and too frequently our would-be thrifty farmers will risk their surplus means in wild-cat speculations, promising but never yielding large and speedy returns, when the same money spent in planting timber would soon convert their worthless swamps and stony places into valuable properties.

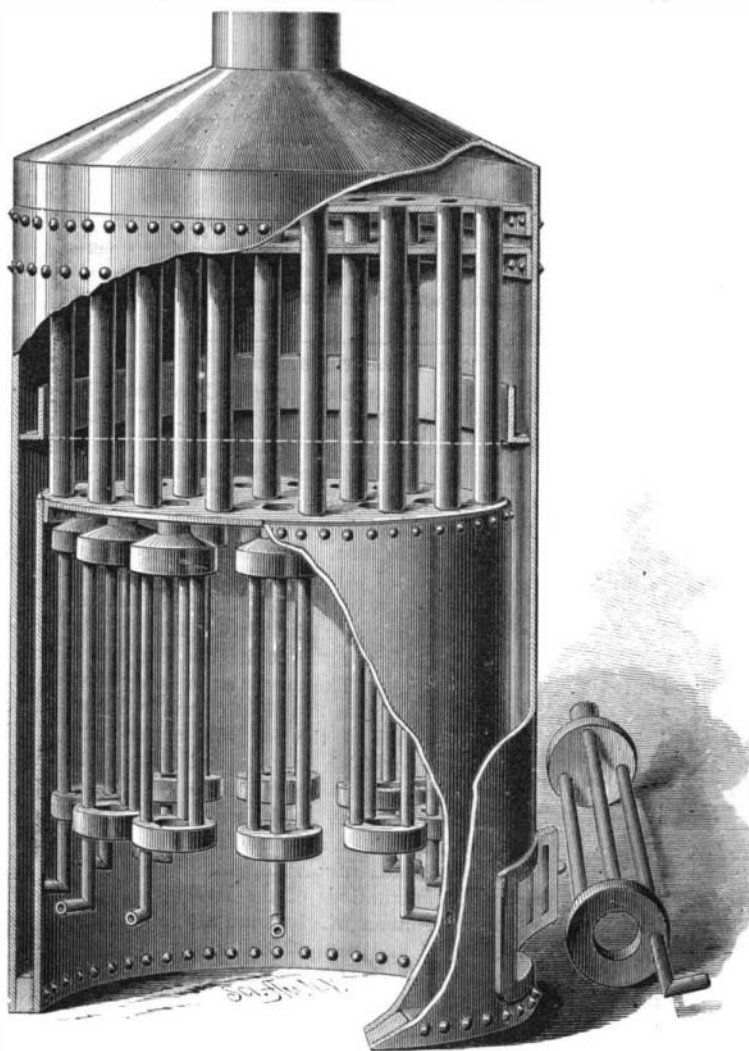
A correspondent, writing from Wisconsin, tells of a piece of land that was planted with walnut twenty-three years ago. The land was flooded every spring and summer, and was unfit for any ordinary cultivation. The trees are now from sixteen to twenty inches through, and have been sold for \$27,000. No particulars are given as to the cost of planting the grove or the amount of attention it has had during the years of growth. There can be little doubt, however, that the investment was small in comparison with the return, and the land would otherwise have remained entirely unproductive. To the country the timber crop was so much clear gain. It is clear that our national resources

might be enormously increased by a similar utilization by timber culture of lands which are now left unused and unproductive; and the planters would find their groves a surer investment for the security of their family possessions than any savings bank deposit.

Photozincotypes.

In Moll's *Notizen*, Herr J. Husnik writes as follows on photozincotypes with a sensitive asphalt solution:

We have at last reached the point of a more intimate knowledge of asphalt, and have thereby obtained a correct explanation of many of its properties hitherto kept secret.* It appears that by treating this substance with ether certain less sensitive components are removed, so that a residue "insoluble in ether" is left, which possesses in a considerably higher degree that sensitiveness to light so much desired in order to render the asphalt process practically useful. The way in which asphalt manifests its sensitiveness to light consists in becoming insoluble, or difficult of solution in its usual solvents, after exposure. Thus, a zinc plate, coated with an asphalt solution, which has been exposed for some time under a linear negative, may be developed by spirit of turpentine, so that all the whites dissolve while the lighted parts remain undissolved. And if, after fully developing, the zinc plate be washed first with spirit and then with water, and now allowed to become perfectly dry, the operation of etching may at once be begun;



LA FRANCE'S PATENT STEAM FIRE ENGINE BOILER.

but, as such a plate had formerly to be exposed for hours in the sun, and for days—in winter even for weeks—in the shade, in order to get a good picture which could be developed with turpentine, it was not possible to turn the process to practical account. Gillot, Yves, and Barret, and other firms in Paris have, however, employed the asphalt process for years, but the secret of the greater sensitiveness of their solution was never known.

In Switzerland and America also one often heard of the asphalt process being employed for zincography, and, as already mentioned, the veil has now been torn from the secret. We know at last that progress in this process is to be sought in the direction of elimination from the solution of the insensitive particles.

Such a sensitive solution can, when requisite, be diluted with a little anhydrous benzole (not benzine, in which asphalt is insoluble). Benzole which contains a little water cannot be used either, as in drying it would cause the asphalt solution to wrinkle up and would not furnish an equal surface.

The solution must be kept perfectly free from dust. Before being coated the zinc plate should be carefully dusted, and any excess of the coating solution should be poured off into another vessel, and not back into the stock bottle until it has stood to settle for a couple of days, after which the upper part may be poured back. When the film has become dry it may be slightly warmed and then exposed under a clear line negative—preferably in the sun, as then only half an hour of an exposure is required. The plate is now laid in a bath containing oil of turpentine, and when the image has become visible the denser portions may be

* Dr. Kayser's examination of the properties of asphalt.

gone over with a small soft pencil, so that they may be developed at the same time as the lights.

When the shadows appear sufficiently clear, remove the plate and coat it with alcohol or place it in a bath containing alcohol, and when the oil of turpentine has been partially washed out, place it under a jet of water falling from a certain height, so that the water may come in contact with the whites and remove any oil of turpentine that might still be adhering to them.

The development is an operation requiring great care and rapidity of work, which can only be learned by practice. The plate, being well developed, is next warmed, and when it has cooled again the next stage is the etching. Should the shadows, however, not be deep enough, they should be gone over with a pencil dipped in oil of turpentine, and when that has been allowed to act for a short time the whole plate should again be washed in the above mentioned turpentine bath, and the procedure with the alcohol bath and the water tap repeated. This plan gives sharp pictures, and may be used with advantage for much reduced reproductions of woodcuts.

ENGINEERING INVENTIONS.

An improved scow, from which the load can be dumped conveniently and rapidly, has been patented by Mr. John R. Knuth, of New York city.

Messrs. William H. Burden and Frederick C. Burden, of Cleveland, Ohio, have invented an improved car axle journal oiler which is simple and effective. It consists of two conical wheels connected by a square shaft, and pressed against the journal by a spring contained in the journal box. An endless chain is suspended from the shaft and extends into the oil in the journal box.

Mr. John U. Mueller, of Detroit, Mich., has patented an improved jetty shutter. The invention consists of one or more rows of piles, driven some distance apart somewhat back from the line of breakers and on the line of the intended improvement, said piles being securely connected some distance above water level with longitudinal beams, and further stiffened and secured by braces and ties, while fastened to the inner longitudinal beams are the shutters, which are intended to form a settling basin for the mud, sand, clay, gravel, etc., driven by the waves toward the shore.

Messrs. William P. Woodruff and Charles H. Woodruff, of New York city, have patented an improved elastic packing for piston rods and other rods that slide through stuffing boxes. It is so constructed as to retain its elasticity when pressed down by the gland. It is formed of a central core of metallic turnings, surrounded by a layer of cloth and alternate layers of anti-friction metal and brass in the form of narrow strips wound spirally upon the cloth-covered core, and in the combination, with such packing rings, of an anti-friction metal seat, having a large ring groove in its upper side and two or more small concentric ring grooves in its lower side.

Mr. Eugene H. Angamar, of New Orleans, La., has patented a boiler adapted for application to horse cars now in use, so as to utilize such horse cars without material changes. The invention consists in a boiler made in two portions, separated by a mediate chamber, the water and steam spaces of the parts being connected by pipes.

Astronomical Items.

A writer in the *Providence Journal* says: If the planet Neptune was discovered or supposed to exist on account of certain perturbations in the movements of Uranus, and if the erratic movements of Mercury reveal the presence of planets within his orbit, why should not the near approach of Jupiter to the sun stir up a commotion in his fiery elements? The sun is still diversified with spots, and the planet is near enough to perihelion to make his influence felt. Astronomers have been wise prophets thus far as to the influence of the commencement of the sun-spot cycle. Tornadoes and cyclones of extreme severity have borne witness to abnormal conditions of the atmosphere, and a wave of intense heat, such as has not occurred for a quarter of a century at this season of the year, has confirmed the exactness of previous observations. We must still expect the usual storms, waves of heat, and auroral displays that follow the maximum of sun spots; we have yet to learn whether the coincident perihelia of the four great planets will increase and prolong the elemental warfare. This is one of the most interesting problems of the day, as well as one of the most practical and important. It will not meet with a hasty solution, for the period of observation extends to the year 1885.

The June moon falls on the 22d. The morning sky of the 2d will show a lovely picture of the waning crescent of the old moon, near to the brilliant Jupiter and his less distinguished rival Saturn. On the 6th, one day before her change, she will be near Venus.