SCIENTIFIC AND PRACTICAL INFORMATION.

RESEARCHES IN SANTONINE

MM. Cannezzaro and Sestini note their investigations of santonic acid, which is much more energetic and more strongly characterized than santonine. It is obtained by the combination of one molecule of water with one molecule of santonine by the prolonged action of hot alkaline solutions. The formula is $C^{15}H^{20}O = C^{15}H^{18}O^3 + H^2O$. The acid is a colorless substance unalterable by light, little soluble in water at ordinary temperature, but readily dissolved in boiling water, becoming on cooling deposited in the form of fine prismatic crystals. It is very soluble in ether and alcohol, and moderately so in chloroform and acetic acid. It melts between 353·8° and 357·4° Fah., differing from santonine, which melts at 370° Fah. The reddish violet color, which characterizes the latter substance when treated with alcohol and caustic potash, is not noted in santonic acid. It gives quite a strong acid reaction, and decomposes carbonates dissolved in tepid water with a brisk effervescence.

The same authors give the name santonates to the metallic derivatives from the acid, and consider that the term santonites should be applied to the compounds that M. Heldet has obtained by treating santonine with metallic hydrates or carbonates. Santonate of soda is made by a warm dissolution of santonic acid and carbonate of soda. The salt is deliquescent, and very soluble in water and in alcohol. The formula is $C^{15}H^{19}NaO^4$. The santonate of baryta is prepared by saturating a solution of santonic acid by hydrate of baryta. Santonate of silver is made by heating santonate of baryta to redness in nitrate of silver. This salt is amorphous and quite soluble in water.

THE REFINING OF COTTON SEED OIL.

Dr. Dotch communicates to the SCIENTIFIC AMERICAN the following method and proportions for refining cotton seed oil: 100 gallons of the crude oil are placed in a tank, and 3 gallons of caustic potash lye, of 45° Baumé, are gradually added and well stirred for several hours; or the same quantity of oil is treated with about 6 gallons of soda lye of 25° or 30° Baumé, and heated for an hour or more to about 200 or 240° Fah. under perpetual stirring, and left to settle. The clear yellow oil is then separated from the brown soap stock, and this dark soap sediment is placed into bags, where the remainder of the oil will drain off; and the sediment has a marketable value of 3 or 4 cents a pound for soap makers. The potash lye has to be made in iron pots, but the oil and lye may be mixed in wooden tanks.

TO REMOVE GREASE SPOTS.

In the removal of grease from clothing with benzol or turpentine, people most generally make the mistake of wetting the cloth with the turpentine and then rubbing it with a sponge or piece of cloth. In this way the fat gets dissolved, but spread over a greater space and not removed; the benzol or turpentine evaporates, and the fat covers now a greater surface than before. The only way to radically remove grease spots is to place soft blotting paper beneath and on top of the grease spot, which spot has first been thoroughly saturated with the benzol and then well pressed. The fat gets now dissolved and absorbed by the paper, and entirely removed from the clothing.

FELTING RABBITS' HAIR.

These hairs were formerly treated with a solution of mercury in nitric acid for the purpose of enhancing their felting properties. A mixture of nitric acid and treacle is proposed as a substitute.

THE DEPILATION OF HIDES WITH CHARCOAL.

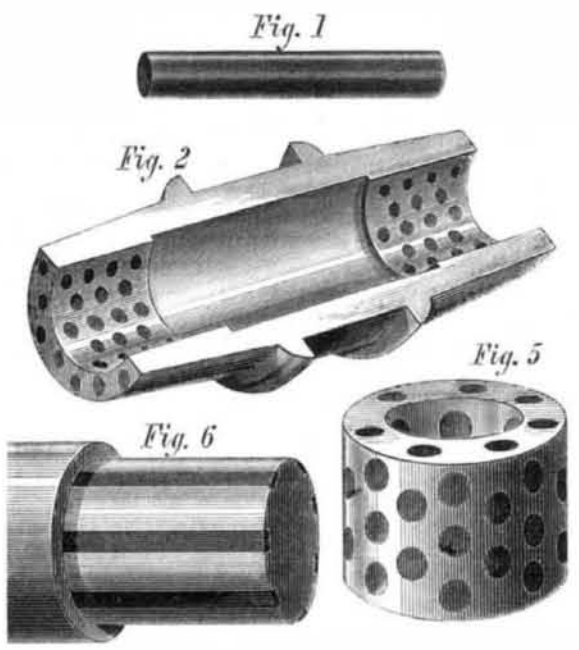
Andersen discovered that pulverized charcoal applied to sheepskins produces the depilation of the hair. Charcoal, as is well known, has the property to take up large quantities of oxygen from the atmospheric air, and the oxygen in this form seems to exert a chemical influence on the fatty substance present in the neighborhood of the glands of the hair roots. An oxidation takes place in the pores of the skin, which destroys the glands and loosens the hair. Finely powdered charcoal is mixed with sufficient water to make a thin paste, and the hides immersed for 4 or 5 days and well turned over in the meantime, when the hair can be taken off at once. Hides treated with charcoal do not require further treatment, as is the case now with the lime process: and after being washed with water, they are ready for tanning. This will be a great advantage to the tanning trade, as leather treated in this way possesses more toughness, solidity, and flexibility. The other advantages of this treatment are great saving in time and labor, each hide weighs ½ to 1 pound more, and has less spots, the work is more pleasant and healthy, the splitting with the machine is more easily accomplished, and the cost price is the same as with lime, as the charcoal can be used over again. Animal or vegetable coal can be used in any quantity, having no deleterious property whatsoever; and for each hide 6 or 10 pounds, with the necessary quantity of water, are sufficient. The temperature should be 61° or 70° Fah., and can easily be maintained by introducing steam into the vats. The tanning process is facilitated, as no lime is left behind to neutralize the tannic acid.

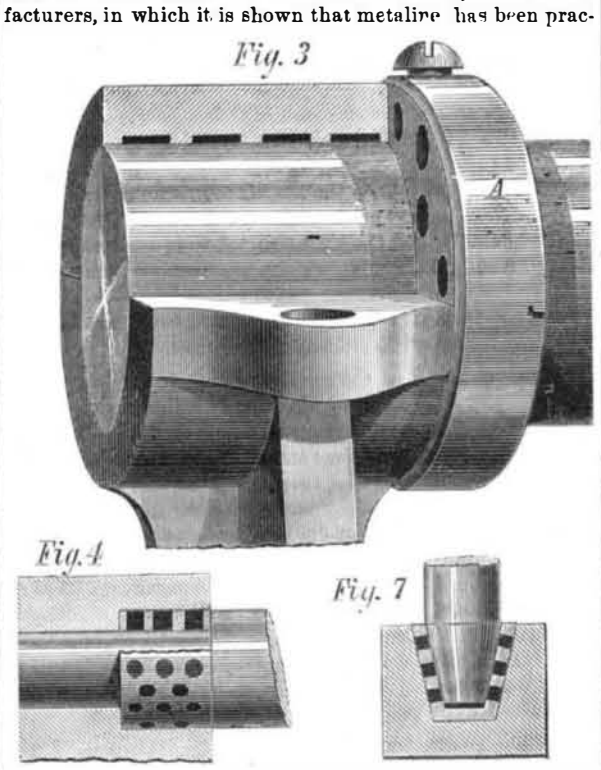
A Handy Device for Teamsters.

In a short time, winter will have so far set in that our country roads will become well blocked with snow and mud, rendering the hauling of heavy machinery, wood, stone, or other large loads, no small burden upon ordinary teams. A great deal of labor and hard tugging may be saved if every wagon or truck is provided with 100 feet of stout rope and a single pulley. A snatch block is the best arranged with a strong hook, and the usual construction for slipping the tight of the rope under the strap to the sheave instead of waiting to reeve the line through on end. If a wagon gets stuck in heavy mud or in the snow, the driver has only to fasten his block to the tongue, reeve the rope through it, and attach one end to a tree or post and let his team pull on the other. Their work is of course just halved, or rather they bring twice as much power to bear in dragging the wagon clear. There are plenty of other applications of this simple device, which will readily suggest themselves. With a couple of skids for an inclined plane, heavy logs could be easily drawn on a sleigh by the unhitched team. Another case where it is likely to be useful is when loaded sleighs attempt to cross a wooden bridge. Although the horses draw the load very easily over the snow, they are often unable to start it over the generally denuded wooden flooring of the bridge, and hence would be materially aided by the tackle hitched on as we have described.

METALINE.

The accompanying engravings and description are designed to call the attention of our readers to a substance which is now offered as an absolute substitute for every kind of lubricant, compound or simple, now in use; which is claimed (and the assertion is based on experiments, so far as they have extended) to be practically indestructible, and which once applied to a machine is to render the apparatus for ever independent of the dash pot or oil can. We may state, at the outset, that the material appears to present this difference from oil, that, while the latter serves as a screen between the surfaces, keeping them apart and preventing interlocking, the present antifriction composition gives evidence of producing like results by filling up the microscopic cavities and leveling the minute projections of the parts in contact, producing uniform and highly polished faces. That the friction is reduced to a less percentage than one sixtieth of the weight, we are not at present, in the absence of positive proof, prepared to assert; and hence, save so far as is indicated in the general law that hard lubricants diminish the resistance most, we are unable to institute a direct comparison, in point of theoretical reduction of friction alone, between this and other anti-attrition compounds of softer nature. It may be added, however, that numerous cases are submitted by the manufacturers, in which it is shown that metaline has been practically employed with a marked advantage in instances where oil has proved inefficient; so that at least it may be said that the new substance has claimed for it, and to all appearances on substantial grounds, advantages which may render it, for a number of obvious reasons, an invention of no ordinary importance.





Metaline, for such is the name of the body under consideration, is a dark colored soft material resembling, though not necessarily containing, plumbago in certain forms. The basis is a white and brittle alloy, to which, when ground into an impalpable powder, is added the other components in quantities in direct proportion to the degree of hardness desired. The mixture completed, the substance, still in a dry powder, is placed in suitable molds, in which, under a pressure of hundreds of tuns per square inch, it is made into small cylinders, one of which is shown in Fig. 1. The remainder of our engravings represent the various modes in which the metaline is applied. The general plan, as shown in Fig. 2, is to bore into the inner periphery of the box a series of shallow cavities, into which little plugs of metaline are fitted. The two parts of the bearing are brought together, set upon end, and a reamer, forced down through the opening, pares off the projecting and irregular portions of the plugs, leaving the interior surface perfectly true and smooth.

In Fig. 3 is represented a bearing, part of which is cut away to show the manner of introducing the metaline, in section. At A, in the same figure, is a collar, which revolves with the shaft and of course rubs against the edge of the box; the manner of providing against friction by a similar arrangement of metaline disks, as already described, is here indicated, the plugs being inserted directly in the sides of the collar. Fig. 4 shows how the metaline is applied in cases where the inner periphery of the bearing is inaccessible. A collar, Fig. 5, of suitable size, is made and fitted with disks as represented, and inserted in the bearing, which is suitably enlarged to receive it. This proceeding is applicable to very small shafts, as mill spindles, etc. In certain cases where it might be preferable to avoid altering the bearing, the shaft is slotted and the metaline forced in under strong pressure, in the positions depicted in Fig. 6. Lastly, Fig. 7 represents a step for a mill spindle or any upright swiftly rotating shaft, notably of the kind used in supporting the cutter heads in woodworking machinery. Here a conical cup of brass is fitted with plugs as shown, and secured in a suitable cavity in the heavier portion. The mode of application must necessarily vary greatly with the construction of the machine, and other attending circumstances; and we may add that many varieties are made, to adapt the material to different speeds, pressures, weights, etc.

At the workshops of the company in this city, various kinds of experimental machines are now in motion, and, among others, there is a mill spindle, rotated at the rate of 8,000 revolutions per minute. The shaft is of steel, and the bearing is of similar metal, fitted as closely as can be done. Metaline is introduced in slots in the shaft. We examined the apparatus carefully and could detect no heating. Four sewing machines are also continuously running at full speed, the needle bars of some at the rate of 1,200 revolutions per minute. No oil or other lubricant but metaline is in use, and there is clearly no cutting or heating. A five horse power Baxter engine we also found running, at the rate of about 150 revolutions, without a drop of oil, and we were informed that it had been in daily use since May 1. Our attention was also called to the countershafting in the machine shop, the journals of which had been cut down to a length equal to one diameter of the shaft, as shown in our engravings, Figs. 2 and 3; and such indeed was the case with all the journals to which the metaline had been applied. We need not point out the saving of expense and material thus effected. Since January, 1870, the substance has been in use on a slotting machine, in the works of Todd & Rafferty, of Paterson, N. J. It has never been renewed, and according to the engineer, the bearing always cut with oil. The pins of the drawbridges of the Central Railroad of New Jersey, over the Passaic and Hackensack rivers, were fitted with metaline three years ago, and, as we are informed, now exhibit no signs of wear. Specimens of brasses and also of shafting shown to us, which ran for a continuous period with the lubricant, appeared to be perfectly smooth and polished like a mirror; while judging from our examination of machinery which had been in actual motion for several months, there seemed to be no working up of the substance; and so far from there being any dirt in the bearings, the revolving shafts barely soiled a white handkerchief.

Lack of space forbids our entering in greater detail into the applications of this invention. Doubtless the simple assertion that to all appearances it both obviates the use of oil and completely prevents the wearing away of rubbing parts, will at once suggest to the reader its infinitude of adaptations. It is the invention of Dr. Stuart Gwynne, and was devised some three years ago, when it was introduced in the localities above noted and in various other places in this country and in England, and was also made the subject of a commendatory report, now before us, of Chief Engineer Clark Fisher, United States Navy, to the Secretary of the Navy. By direction of the latter official, certain gunboats were to be fitted up for trial; but the burning of the company's factory, together with difficulties between interested parties, resulted in the temporary withdrawal of metaline from the market. At the present time it is again offered to the public in improved form, and is manufactured by the American Metaline Company, No. 61 Warren street, in this city. Our readers can examine the experimental machinery for themselves at the above mentioned address, or may obtain further information by letter.

COATINGS of lead oxide and salts on pottery are apt to dissolve off in acid liquids, thereby threatening the health of those who use them. Several successive coatings with a solution of sodic silicate and the exposure to a bright red heat in a furnace, prevent the trouble.