### VERTICAL DOUBLE SPINDLE HOLLOW CHISEL MORTISING MACHINE.

The illustration shows an entirely new and novel machine, designed particularly for door mortising and other work where there are a number of pieces in duplication. It is especially useful for the best class of hard wood doors, such as are used in railroad and street cars. The machine will do its work rapidly, two door stiles at the same time, they being exact duplicates right and left, so as to frame up absolutely square.

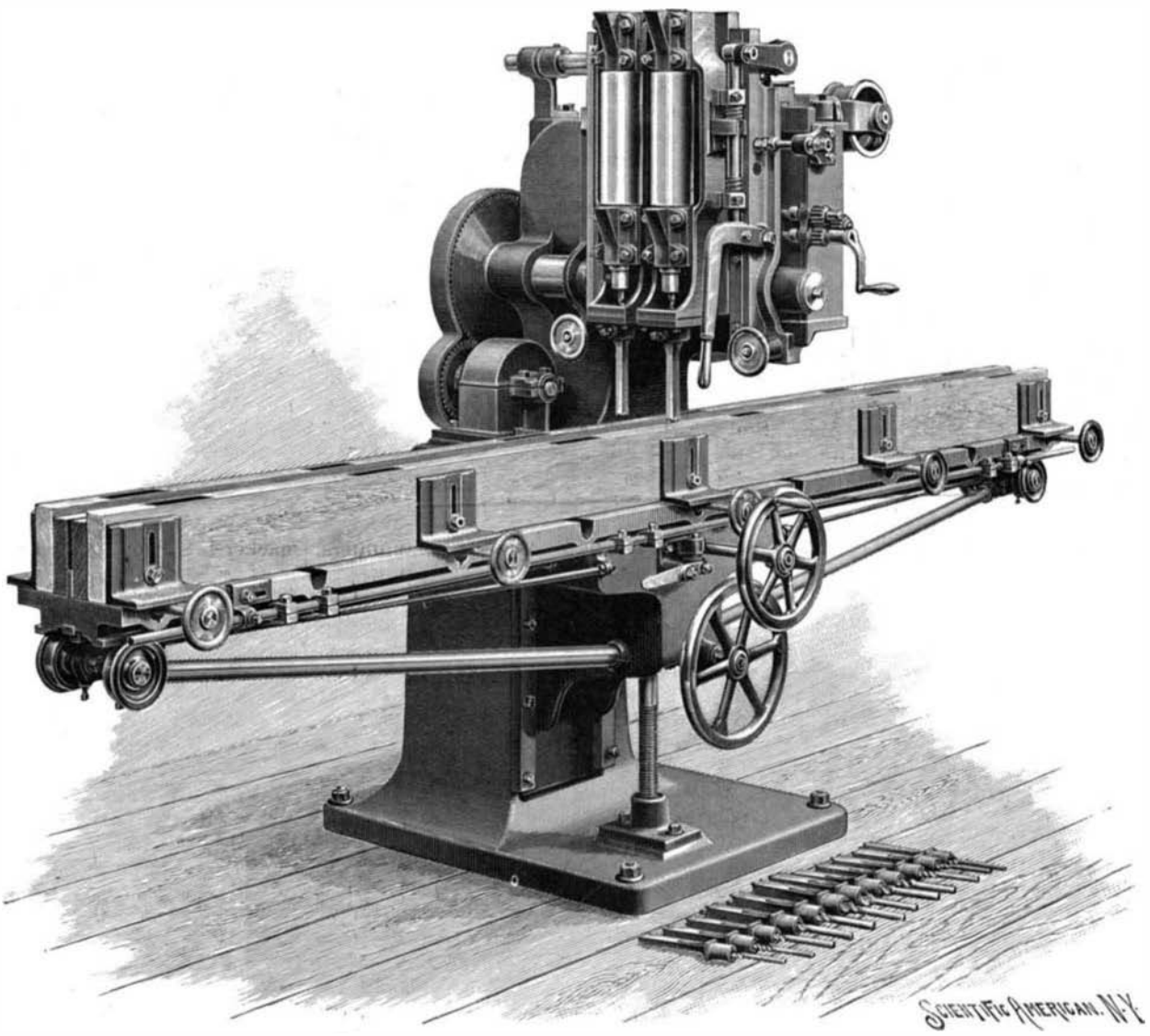
There are two hollow chisels instead of one, being in perfect alignment with each other. The stroke of the chisel bars can be regulated for depth of mortise and can be increased or decreased at will or stopped at any point of the stroke, the greatest stroke being 6½ inches. They operate automatically. They can also be adjusted to cut to the same depth in case of one chisel being shorter or longer than its mate. The chisels have quick return, and will make thirty-five strokes per minute, increasing in number as the strokes are shortened.

Each spindle carriage is provided with a strong clamp, so that when set it can be securely held in position. They are also counterweighted. The chisel has a range across the material of 2 inches for each. All gear wheels are machine cut, those of small diameter being made from steel forgings.

The table is of iron, 10 feet long, and planed true. It has a vertical adjustment of 14 inches and a horizontal movement of 10 feet. It is provided with a suitable number of quick-acting clamps, which clamp both pieces at the same time, also an ample number of stops, so that when set up no laying out of the work will be necessary.

The range of the mortising is from ¼ inch to 1¼ inch. In mortises from ½ inch up it will make a blind mortise in a pair of 12 inch stiles, 6½ inches deep, or will mortise through a pair of stiles 6 inches wide.

The machine is provided with two chisels and augers, each ¼ inch, ⅜ inch, ½ inch, ⅝ inch, ¾ inch, 1 inch, and 1¼ inch. Also countershaft, which is placed overhead, and suitable steel forged wrenches. The tight and loose pulleys are 12 inches diameter, 5 inches face, and should make 800 revolutions per minute. Weight, 3,600 pounds. This machine is manufactured by Messrs. Berry & Orton, Arch and 22d Streets, Philadelphia, Pa.




VERTICAL DOUBLE SPINDLE HOLLOW CHISEL MORTISING MACHINE.

### The War Bicycle.

An interesting paper on the importance of the bicycle for military purposes has been prepared recently by Col. A. R. Saville, the professor of military tactics at Royal Military College at Sandhurst. The author's prominent position lends unusual importance to these opinions. Col. Saville says:

"The speed and staying power of cyclists qualify them for employment in all the duties pertaining to messengers, orderlies, or dispatch bearers, both in peace and war. The establishment of relay posts of cyclists on any long line on which messages have to be sent would insure very rapid transmission. The speed and noiseless progress of bicycles fit them as a means of communication between the fractions of an outpost force, both by night and day, and between outposts and the main body.

"The same qualifications, and the inconspicuous character of the riders, make them eligible as scouts or reconnoiterers in any inclosed and cultivated country where the operations are mainly confined to roads. Cyclists, being infantry, can dismount and go wherever infantry can go, and thus a small body of wheelmen has nothing to fear from an equal body of horsemen similarly engaged in scouting.

"Cyclists are well qualified to act as escorts for convoys. The men would not be tempted to mount the wagons, and the convoy could move faster than if the escort were composed of infantry, and the cyclists could reconnoiter widely to the front or flanks. As an escort for guns they would prove efficient, for all such infantry duties can be more quickly done by wheelmen.

"The power of carrying intrenching tools or materials for demolitions, added to the speed and silence, enables sudden raids to be made for offensive purposes.

"In the case of a force detached or otherwise, cyclists would in most cases be able to perform the scouting duties for the information and protection of the force. Probably under all the circumstances, they might not be able to perform all the duties as well as the cavalry, but there can be no doubt that they could reconnoiter more widely and rapidly than unmounted infantry."

The first test in war of the military bicycle has yet to be made, but the advocates of the wheel have no fear of its upsetting their theories.

### A Large Railway Pier.

The great railway pier of the Southern Pacific Company at Santa Monica, Cal., is one of the most remarkable constructions of its kind in the world. Santa Monica is the terminus of the Southern Pacific road and the place of call of all the steamers of the company. The cargoes of great numbers of vessels are loaded and unloaded at this point, and the equipments of the great pier are very complete and efficient. The pier is 1,500 feet in length and has a maximum width of 130½ feet. In its construction some 5,200 piles of Oregon pine have been used, about 3,675,000 feet of lumber and 200 tons of iron. The cost of building the pier and grading the approach to it has been $500,000.

A notable feature of the pier are the huge coal bunkers built along the east side of the pier. The bunkers are 816 feet in length, 36 feet wide and 36 feet high and have a capacity of 10,000 tons. They are divided into four compartments and are provided with 51 chutes. A track runs beneath these on which cars may be run and quickly filled. At the end of the pier is a huge boiler works, with some thirty iron buckets which work automatically, and this contrivance makes it possible to coal a ship in one-third the ordinary time. The end of the pier is provided with another depot building 384 feet long and a freight house 68 feet long. Both of these are two-story buildings provided with sleeping accommodations and a restaurant for those on duty. The remainder of the building is but one story high and is used as an open freight shed. The pier is gridironed with tracks. The supply of lines is large, moor buoys are fixed at frequent intervals and a powerful steam tug is in constant use. The pier is also provided with telephone lines and there are a number of faucets and fire hose arranged along the wharf against a time of need. The equipments make it possible to handle cargoes of as many vessels as can be moored along the pier.

### The Hydrophone.

The principal object of this simple apparatus is to give warning to a port or fleet of the approach of a torpedo boat, even if the latter is totally submerged and, therefore, quite invisible. As described in the London Times, it consists essentially of two parts, one submerged in the sea at a proper distance from the port or fleet to be warned, and at a depth sufficient to escape the surface agitation. This part may be described as an iron bell jar, which, on being plunged mouth downward into the water, retains a volume of air in the upper portion or bottom, where a copper box, protecting the sensitive organ of the apparatus, is fixed. The organ in question is merely a very delicate vibratory contact, which makes and breaks an electric circuit connecting the submerged bell with the indicator or second part of the hydrophone, situated on shore or on board one of the ships of the fleet. The contact is formed by a flat horizontal spring fixed at one end and loaded at the other by a heavy piece of brass, having on its upper surface a small platinum stud. A fine platinum needle, kept upright by a vertical guide, rests its lower end loosely on the platinum stud. The needle and the stud are connected in the electric circuit through the guide and spring, and when the needle dances on the stud the circuit is made and broken. An electric current from the ship or shore battery is always flowing through the circuit—that is to say, between the submerged bell and the indicator. Now, the propeller of a torpedo boat or of a torpedo sets up vibrations in the water, and these, reaching the submerged bell, agitate the trembling contact, so that the needle dances on the stud and interrupts the current. The consequence is that the indicator begins to work and announces the submarine disturbance. This part of the hydrophone consists essentially of an electromagnet through which the current passes, with an armature free to oscillate when the current is rapidly made and broken—that is to say, when the current becomes intermittent. The motions of this armature can be seen by an observer if he chooses to watch, but actual observation is not required, for the indicator itself gives the alarm. This takes place when the swing of the armature carries it within the attraction of a magnetic contact piece fixed near it. The armature is then drawn to the contact piece and held fast there. The swinging armature and the contact piece are connected in the circuit of a local battery, and, when they meet, the current flows to ring an electric bell or light an electric lamp. The torpedo boat thus announces its own arrival on the scene in spite of itself, and precautions can be taken against it.

The whole apparatus is beautifully worked out and comparatively inexpensive. Moreover, it is sufficiently sensitive to announce the passage of steamers a mile distant from the bell. Obviously such an instrument might also be used for submarine signaling, for a ship by stopping and starting her propeller could send a message in the Morse code and the shore could respond by flashing the electric lamp. In the case of another ship the response might be made by her propeller.—Proceedings of the United States Naval Institute.

THE director of the Lick Observatory, Dr. E. S. Holden, has been made a commander of the order of the Ernestine house of Saxony, in consideration of his services to science. The order, which was founded in 1690, is given by the combined duchies of Altenburg, Meiningen, and Coburg and Gotha, and is the only order conferred by them.

THE highest mountain ascents are those credited to Mr. W. H. Johnson, of the Indian Survey, between 1860 and 1865, in Cashmere. In 1865 he climbed three peaks of the Kuen Lun, one of which, according to the measurement of the Indian Survey, is 23,800 feet high.

### Strindberg on the Inferiority of Woman.

Woman is inferior to man—so at least says an interesting article by Strindberg in the Revue Blanche for January last, which attracted much attention in France. The author of "Pere" does not arrive at this conclusion by an exclusive analysis of woman's mental qualities; to a great extent he relies upon her structural and anatomical weaknesses. To begin with, her blood is not to be compared with man's, for it resembles that of the child and of the embryo; her spine, too, approaches theirs in formation, being longer and affording more evidence of that caudal appendage which is supposed to have been a distinguishing feature of the hairy ancestor of the human race. Woman's skull is closely akin to that of the child and the negro, and the gray matter of the brain is not so dense in the female as in the male. On the other hand, her nerves are much stronger, whence the capacity for supporting physical pain with comparative stoicism—a capacity which she shares with the savage, whose nervous system is somewhat similar. In connection with the inferiority of women, Strindberg propounds a strikingly novel theory. In the burial places of the Stone and Iron Ages have been found two different kinds of skulls, one brachyocephalous, the other dolichocephalous. It is opined that the first, an inferior type, are female; the second, a superior type, male. The women, he declares, evidently belonged to a lower race, the men of which had been exterminated, their wives and daughters having been seized by the conquerors. Men, then, are the descendants of the higher, women of the lower race. In France, for instance, the women are the descendants of the Celts, whom the Romans conquered, and from among whom they took their wives, as they had previously done in the case of the Sabines.

The motives which cause so many men in the present day to deny the inferiority of women Strindberg deals with at great length. Among them he places intense sexual desire, obscuring the faculty of thinking in many ordinary natures; a feeling for women which inspires adoration much as religion does; an intense tenderness and veneration for her, born of the recollection of early days spent in a mother's arms; and the idea that a quantity of masculine vices are not found in woman (who has other and greater ones of her own), whence a psychoptical delusion which causes him to consider her as more perfect than himself. The weakness of individual men is also a powerful factor, as, for instance, in "M. Edouard Rod," who declares himself inferior to woman—and with reason, maliciously remarks Strindberg. The so-called higher qualities of woman do not bear a very searching analysis. Her impressionability, of which we hear much, is merely that of the child; her hysterical and passionate outbursts when thwarted are the true equivalents of a child's screams and kicks when it is refused something it wants. Rarely does a woman possess the power of keeping her attention fixed on one subject for any considerable time; hence it is seldom that she entirely masters anything. Of sequence of ideas in a woman's mind there is little, doubtless the cause of her perpetual unpunctuality and inability to organize her occupations so as not to do two things at the same time. No woman can make a good cup of coffee; it is an impossibility, requiring as it does attention, exactitude, and a nice sense of time. Crime, even, demonstrates feminine inferiority, for there is generally no reflection or calculation of the probability of discovery in crimes committed by women. On this point it has often been said that, morally, men must be inferior, as statistics show a larger percentage of male criminals. Statistics can be twisted to any purpose.

In the conclusion of his article Strindberg, after expressing his absolute disbelief in the great queens of history, such as Elizabeth of England—whom contemporary historians, he says, magnified—goes on to reaffirm that woman is merely the complement of man. As his alter ego she may be invaluable, but alone she is useless. All feminine efforts toward independence must end badly. Feminine emancipation is a chimera, a dream from which there will be a sad awakening. Woman, if she wants equality, must drag man down to her level, for she can never attain to his. The complete success of the emancipation movement would mean a struggle against the laws of nature. What, asks Strindberg, is the cause of this unreasoning fury against man? for is it not he who, after all, has bestowed upon woman the benefits of culture, the right of holding property, and numberless other privileges? Man, not woman, has produced civilization. A bad feature of modern legislation is its tendency to rob the wage earner and father of the family of his daily bread in order to benefit the emancipated female, generally childless. That this will become a burning question in the future there can be little doubt. Already there are many men kept out of employment by women. Who will maintain that it is a good thing for a single woman to monopolize a position which might maintain a family? And why, asks Strindberg, does woman raise complaints about her lot? When young she has every opportunity of finding an honorable and noble independence as wife and mother, a position in which she can contemplate the future with confidence and equanimity. Is not this more than most men can hope for? Necessarily there must be some sacrifices, and it is against these that the crowd of so-called emancipated women, who are devoid of any feeling of duty toward humanity, raise their raucous voice; itself a proof of their unworthiness and unfitness for taking any part in the direction of the great social system.—Pall Mall Gazette.

### Destroying Derelicts.

The unusually severe and frequent storms of the past month have caused a vast amount of destruction among ships at sea and many vessels have been wrecked on or near our coast. In view of this fact, the government has recently detailed the dynamite gunboat Vesuvius to systematically destroy these derelicts, which are a menace to navigation. The work is one of the utmost importance. The Vesuvius has been first employed in removing the wrecks in and about New York Harbor. After this work has been accomplished she will be sent up the coast as far as Cape Ann to attack the derelicts in that region. It is intended for her to next make way with the wrecks along the coast as far down as Cape Hatteras, and it is probable that she will then be sent to cruise in southern waters on the same mission.

The method followed in destroying these wrecks is very simple and effective. Large packages of gun-cotton or other high explosive are placed upon the wreck and connected by wire with an electric battery on board the Vesuvius. When all is ready the wrecking party retreat to a safe distance and discharge the torpedo by merely touching a button.

At times, however, the position of the wreck calls for considerable ingenuity. In one case, where the wreck had sunk so that only the tops of the masts were visible above the water, the work was accomplished by lowering torpedoes to the deck of the wreck and destroying only the masts and the rigging. Afterward the masts were cut into kindling wood to prevent them from doing any mischief.

Mention has been made in the columns of the Scientific American of the valuable service rendered to navigators by the records of the positions of derelicts which are published monthly by the Hydrographic Office of the United States Navy Department. The United States is the only country which publishes this unique report, and these records have come to be highly valued by mariners. These charts are freely distributed, so that the mariners of all nations may profit by them.

### Science Notes.

New Substitute for Gold.—The Journal de l' Horlogerie claims that a new alloy which it describes is a remarkable substitute for gold. It is composed of 94 parts of copper to 6 of antimony. The copper is melted and the antimony is then added. After the two metals have been perfectly fused together, a little magnesium and carbonate of lime is added to increase the density of the material. The product can be drawn out, wrought, and soldered just like gold, which it almost exactly resembles when polished. It preserves its color, it is said, even when exposed to the action of ammoniacal salts or nitrous vapors. The cost of making it is about twenty-five cents a pound avoirdupois.

New Process of Extracting Gold.—According to the Technical World, a new process of extracting gold from auriferous ores has been devised by Mr. C. Lorsen. He electrolyzes a solution of bromide of potassium and thereby obtains an alkaline solution, which contains hypobromide and bromate, which is capable of dissolving gold. The ore is treated with an excess of this solution by rotating cylinders. The solution is then filtered, the gold precipitated by passage over a mixture of iron and coal, and the solution, which now contains bromide of potassium mainly, is once more electrolyzed, and again used for extraction.

New Process of Converting Salt Water into Fresh.—According to the Revue Scientifique, Mr. Pfister, an Austrian engineer, has discovered a curious property of the trunks of trees—that of retaining the salt of sea water that has filtered through the trunk in the direction of the fibers. Mr. Pfister utilizes this property for obtaining potable water for the use of ships' crews. The apparatus, which has been patented, consists of a pump, which sucks up the seawater into a reservoir and then forces it into the filter formed by the tree trunk. As soon as the pressure reaches from 1·5 to 2·5 atmospheres, the water is seen (at the end of from one to three minutes, according to the kind of wood used) to make its exit from the other extremity of the trunk, at first in drops and then in fine streams. The water thus filtered is potable, having been freed from every particle of saline taste. The tree trunk measures 15 feet in length by from 5 to 6 inches in diameter.

Notes on Aluminum.—According to the Moniteur Scientifique, half the aluminum manufactured at present is used up in the iron industry. The remainder is largely used in refining nickel and copper. When added to these metals, the reduction of the last traces of oxide is completed, the metals become more perfectly fluid, and, after cooling, can be easily worked. Any alumina formed in this action is completely insoluble in the nickel or copper, and rises to the surface and thus eliminates itself. The action of aluminum in steel is referred to by the same journal. Rammelsberg found that all the aluminum was used up in deoxidizing not a trace being found in the ingot obtained. At first it was thought that aluminum lowered the melting point of steel 200° to 300° C., and that its presence caused the great fluidity of the steel. Now the ingots are shown to contain no aluminum. The oxide of iron dissolved in steel renders it less fluid and more brittle, and this causes it to give off carbon dioxide, hydrogen, and nitrogen.

The following is proposed by Mr. B. J. Roman as a solder for use with aluminum or aluminum alloys: Silver, nickel, aluminum, tin, and zinc are mixed in the following proportions: Silver, 2 per cent; nickel, 5 per cent; aluminum, 9 per cent; tin, 34 per cent; zinc, 50 per cent. No flux is necessary, and an ordinary soldering iron or tool can be used, though one of aluminum is said to be preferable.

According to Dingler's Polytechnisches Journal, Mr. F. Andrews, after numerous experiments upon alloys of aluminum, has found that one composed of from 92 to 96 per cent of the latter metal and 4 to 8 per cent of nickel is particularly valuable, since it possesses greater hardness than the pure metal without being brittle. It is well adapted for the manufacture of small articles of jewelry, etc. The alloys of aluminum, copper, and nickel are remarkable by their beautiful color, the ease with which they may be polished, and their hardness. In order to restore their metallic aspect, it suffices to immerse them for a few seconds in a 10 per cent solution of caustic soda, wash them, and then immerse them in a mixture composed of 3 parts of nitric acid and 2 of sulphuric.

The Ageing of Liquors by Cold.—Mr. Raoul Pictet, the eminent French chemist, claims that he has discovered a method of ageing liquors artificially. His process consists in gradually cooling the liquor, brandy, for example, to 200° C. below zero, and then gradually bringing it up again to the normal temperature. According to the Revue des Revues, a frigoric laboratory in which this new discovery is to be applied is upon the point of being established in Paris.

Amalgamation of Battery Zinc.—The Elektrochemische Zeitschrift, in a recent number, makes known a process of amalgamating battery zincs which is due to Mr. Oppermann, and which is said to give excellent results. A nearly saturated solution of mercuric sulphate in water is prepared, and to it is added the quantity of sulphuric acid necessary to make the solution perfect. This solution is then mixed with oxalic acid until a grayish mass of the consistency of cream is obtained. To this a little sal ammoniac is added. The zinc is coated with this mixture and then vigorously rubbed. It has been found that zinc thus amalgamated resists acids and salts much better than when amalgamated by the ordinary process. If the zinc is not to be used at once, it should be dried before being put away.

### A Community Without Vaccination.

Dr. Kerr, writing from Rabat, on the westerly shore of Morocco, states some facts that will serve to remind the anti-vaccinationists of England of the condition of their own country before the grand discovery of Jenner. Smallpox makes fearful havoc among the Moors, with whom Dr. Kerr has lived seven years. During an epidemic at Rabat over one thousand persons died from that disease in the course of two months. Rabat is a town on the Atlantic seaboard of Morocco having a population of 26,000. Of the condition of the town during the epidemic Dr. Kerr writes the following: "Often we felt it sickening when going through the streets to see young men and boys sitting at shop doors, flour mills, etc., covered with smallpox eruption, in every way facilitating the spread of the disease. Every one thinks that it is impossible for him to escape smallpox; hence no precautions are taken. It is painfully sad to see so many people who have lost the sight of one eye, while many are blind altogether. One day not long ago I paid a passing visit to a douar or collection of tents outside the city, and it was touching to see the mothers bring their children asking me to put the medicine in their arms to prevent the infection. I vaccinated all the children in the village, and although they were surrounded by smallpox, none took it."

These conditions, given by Dr. Kerr as to the Africa of to-day, are a simple repetition of what existed in England and Europe before Jenner's great boon to mankind was made possible.—Journal of the American Medical Association.

### Tennant's Paint for Ships' Bottoms.

The paint consists of 8 pounds of resin, 1½ of "Cologne brown dry color," 15 ounces of shellac, 25 gills of spirits of wine, 6 gills of benzine, ¼ gill of toluene, and 10 drops of pyridine. As a finishing coat, a mixture of paraffin wax and white lead "boiled together" is applied hot.