The Ericsson Gun.

The *Naval and Military Gazette* gives an account of the arrival at the Royal Woolwich Arsenal of Captain Ericsson's new steel gun, intended for firing projectiles and torpedoes under water. It now lies at the inspection branch of the Royal Gun Factories, from whence, after some preliminary tests, it will be sent on board ship, probably at Portsmouth, for trial at sea. No less than forty tons of steel are used in the construction of the gun, which is 30 feet long and has a bore of 16⅛ inches.

It is a breechloader, and closes at the breech by an arrangement of a very simple and effective character. The vent, which is axial, is sealed, and said to be effectual in preventing the escape of powder gases. The projectile measures 25 ft., which is only 5 ft. less than the gun, and is gauged to pass freely along the bore, which is unrifled.

It is hollow, and, notwithstanding its great length, weighs only one ton. The proposal is to fit the gun in the bow of a ship, 9 feet under the water line, so as to fire straight ahead from the cutwater. A diaphragm of India rubber is fixed over the muzzle to exclude the water, but is blown away at the first puff of the discharge. A charge of 20 pounds of powder is all that is thought necessary for propulsion, and this being placed behind the projectile, the breech is closed, and the gun is ready for firing.

It is asserted that a range of 300 yards under water may be relied on, but it is considered doubtful whether the shot can overcome the resistance of the water and retain an effective striking power for half the distance. The inventor, however, has tried his device, and he says he ought to know.

To preserve the lateral position and uniform depth of his submarine missile, he has weighted it to the gravity of water, and, while he keeps one side under by the preponderance of weight, he has a steering plate on the upper side which opens only after leaving the mouth of the gun, and acts as a rudder in keeping the projectile in its course.

The Fossil Wood of the West.

An interesting paper has been communicated to one of the California scientific societies on the fossil wood which is found in different localities throughout the State.

This silicified wood is stated to be a variety of quartz; the wood fiber is gradually replaced by quartz, leaving the form of the wood intact, so much so that sections cut and placed under a microscope show the characteristic grain of the wood, by which the genera may often be determined, and sometimes the species. In what is known as the petrified forest in Colorado, where are stumps of trees several feet in height and some twelve or fifteen feet in diameter, one stump seemed to have been fossilized while in a charred state, and from it fossil charcoal was obtained. Many of the specimens of wood are encrusted with layers of crystallized chalcedony of an opalescent tint, so beautiful that sections have been mounted and worn as jewelry. In Wyoming there have been found sections of trees 20 inches in diameter and several feet in length, like hollow tubes, with the interior surface entirely studded with pure quartz crystals, presenting a most beautiful appearance.

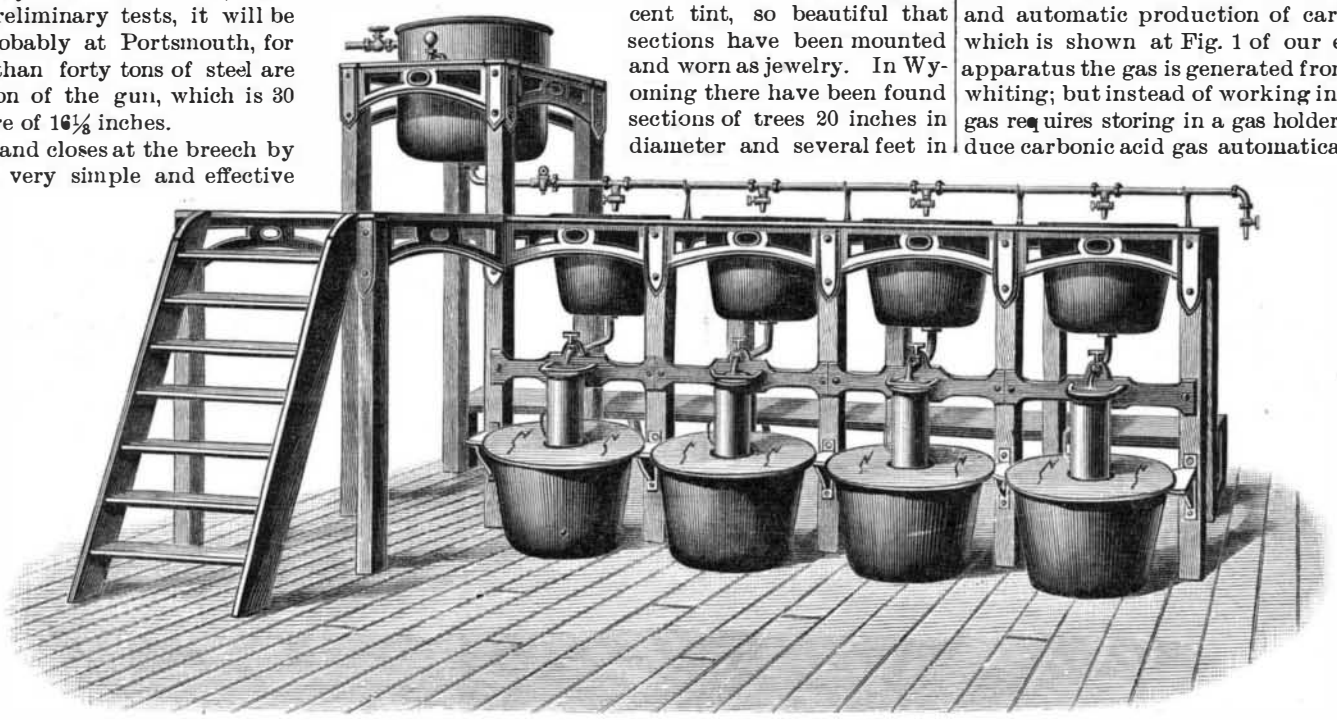

Fig. 2.—AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

Earth in the Stable.

Nothing will purify and keep a stable so free from odors as the free use of dry earth, and every one keeping horses or cattle will find it pays to keep a heap of it at hand, to be used daily. A few shovelfuls of earth scattered over the floor after cleaning will render the air of the apartments pure and wholesome. The value of the season's manure pile may be largely increased by the free use of such absorbents. The strength of the gases and liquids absorbed is retained, and is the very essence of good manure.

AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

The late brewing exhibition in London has introduced us to some more of Mr. Favarger's specialties, which we illustrate. These consist, first, of a double generator on Mondollot's system for the continuous and automatic production of carbonic acid gas, and which is shown at Fig. 1 of our engravings. In this apparatus the gas is generated from carbonic acid and whiting; but instead of working in such a way that the gas requires storing in a gas holder, the generators produce carbonic acid gas automatically, without the aid of a gasholder, and in exactly the quantity required by pumps of any description, that may be working from them. The machine consists of two separate and distinct generators, each one made to work independently of the other, but yet both connected by the same pipe to the pumps. This arrangement enables the generators to be worked alternately, so as to give time to renew the materials in each as they become exhausted. This plan has the advantage of preventing a stoppage of the works, even though one of the generators should meet with some unforeseen accident, for the other would always be ready.

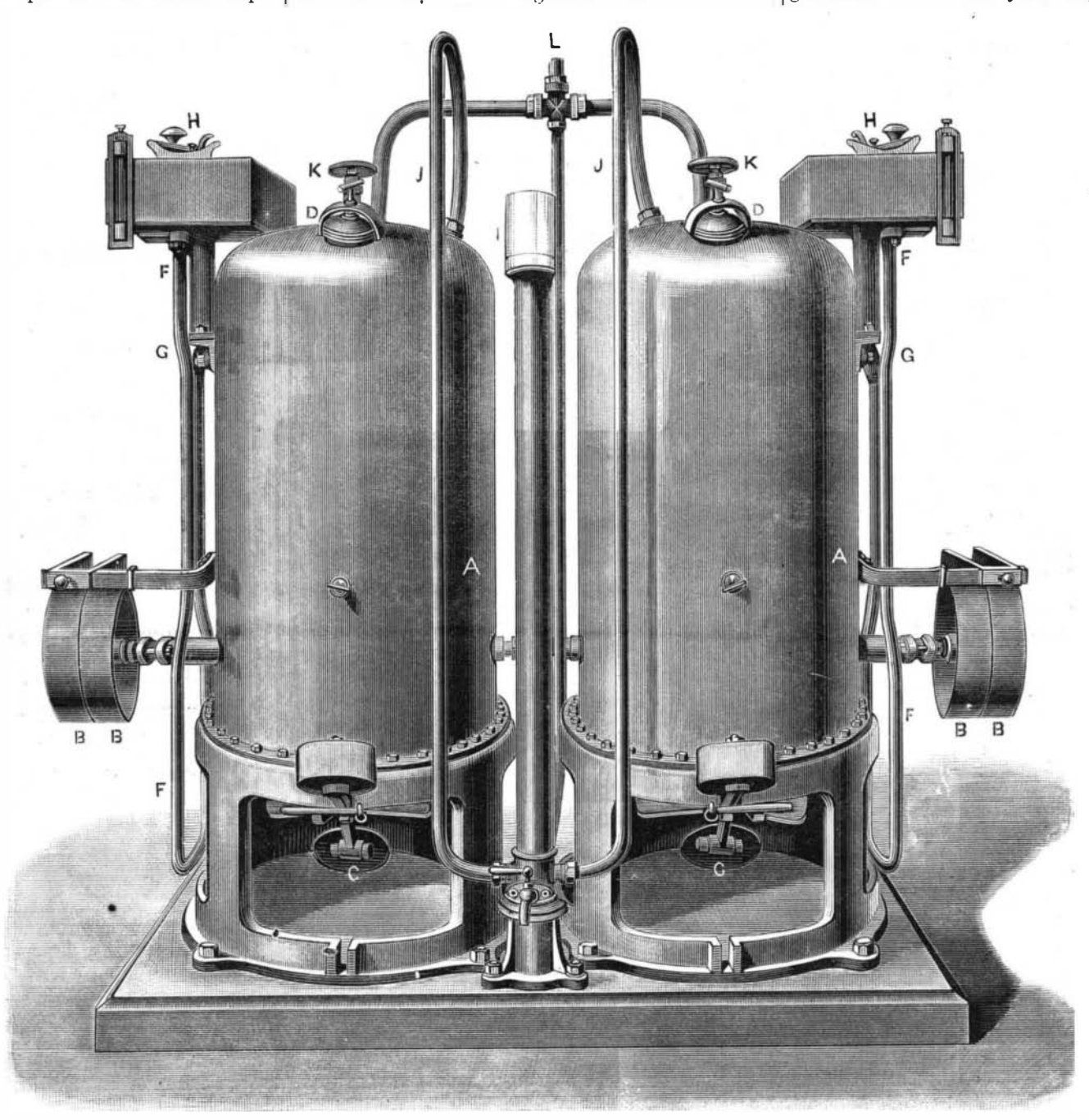

Fig. 1.—AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

In Fig. 1, A A are the generators, which are made of copper and lined with lead. B B are fast and loose pulleys that drive screw-shaped fans inside the generator. C C are sluice valves for emptying the materials. D D are manholes for putting in the whiting. E E are leaden boxes containing sulphuric acid, which flows down the loops, F F, and by spouts, at G G, into the generator. H H are plug taps to stop the flow of acid. J J are two S-shaped tubes connecting each generator with the safety column, with the open glass top, I. K K are taps which command the pipes, L L, leading to the purifiers, and thence to the pump.

In operating with this machine a given weight of whiting and a given quantity of water are introduced through the opening, D. The box, E, is filled with sulphuric acid, which flows down the loop, H H, and into the generator by the spout at G. While the cap is still off the manhole, D, the fans are put in motion, and the acid tap, H, is opened. The acid then flows in freely, and, coming in contact with the whiting, creates carbonic acid gas, which drives the air out through the opening, D. When the air is quite blown out, the tap, H, is shut, and the cap put on the opening, D. As soon as this opening is securely screwed up, the tap, H, is opened, but no generation of gas will take place, for a curious action here occurs. As the first drop of acid

falls from the spout, at G, and reaches the whiting, it creates a volume of carbonic acid gas. The gas tries to get away, but its only way of exit is down the very pipe, F, through which the sulphuric acid has just been admitted, so that it makes a back pressure, and keeps the acid in check. The L tap is then opened, and the pumps are set in motion. As soon as they draw the gas away from the generator, the slight pressure is diminished, and room made for another drop of acid to fall on the whiting, This, again, makes back pressure, and keeps out the sulphuric acid until the next stroke of the pump, when again it flows. This flow and checking of the acid takes place as long as the pumps are in motion. As soon as they stop, the last drop of acid makes a slight pressure, and the acid is again checked, without closing the acid tap.

The action of the safety valve, I, is clear and its action simple. If the pressure in the generator gets too high, it blows off the water; and if the pumps drawing from the generator make a vacuum, the water is drawn in, clearly showing the operator that something must be wrong. In practice, the water in the safety valve only varies about an inch in height, proving how perfect and accurate is the working of the generator. When the materials are exhausted, which is seen by the level of the acid in the box getting low, the other generator is set in motion, and the spent one emptied and refilled ready for use. Thus far the machine appeals to manufacturers as being perfect in principle and in action, but its more substantial point is that, owing to its making good use of every particle of sulphuric acid, it effects an important economy of material, which has been certified to by users of these machines. The second specialty we have to notice is Mr. Favarger's new sirup plant, which is shown at Fig. 2 of our engravings.

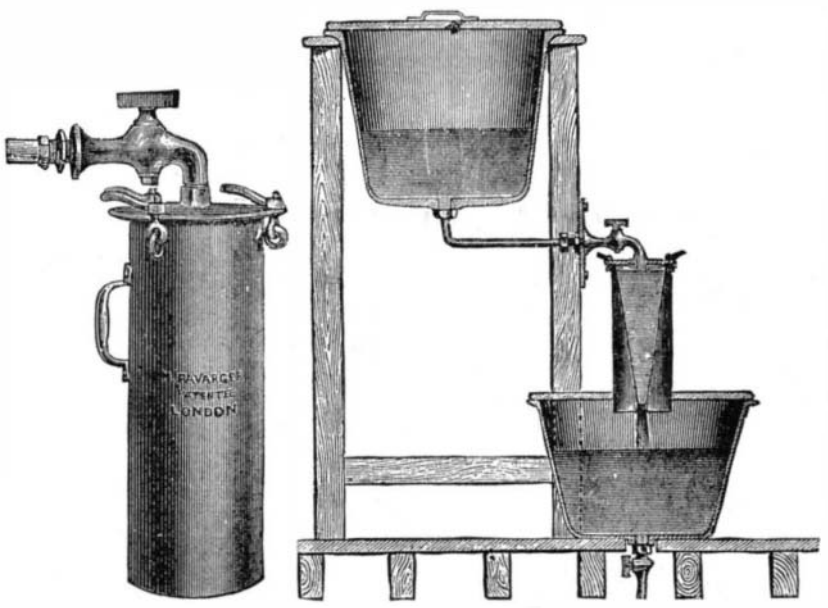

FIG. 3. FIG. 4.

AERATED WATER MACHINERY AND AUXILIARY APPARATUS.

The apparatus consists of a timber and iron framework, which supports a steam jacketed pan and a series of enameled iron coolers. The cavity pan is reached by a platform and steps; and the sugar, after being boiled in it, is conveyed to the coolers by a large tube. There it is flavored, and then run through Mr. Favarger's filters to the coolers below, thence being carried by tin pipes to the bottling machines underneath. In the filter—which, owing to the rapidity of its action, Mr. Favarger has given the name of the "Lightning"—the usual filter bag is used, but, by an ingenious arrangement, the weight of the sirup to be filtered is utilized to get additional pressure, and so to facilitate and improve the filtration. Fig. 3 is an outside view of the filter, while Fig. 4 shows it attached to an upper cooler.

The filter bag is attached to a ring at the top of a tinned copper tube, which is connected to the cooler as shown. The filter bag is secured by a clamp between the cover and the tube, so as to make a water-tight joint, and thus, when the sirup is allowed to flow from the upper vessel, the whole of the weight of the liquid is brought to bear on the filter bag, and thus gives perfect filtration. The great advantage of this simple contrivance is not only that it gives very rapid filtration, but that it enables the operator to mix with the sirup charcoal, magnesia, or any other substance, and thus pass the liquid through a layer of filtering medium that would absolutely stop it if any ordinary filter bag were used. The sirup is not exposed to the air during or after filtration, and is thus protected from impurities. In addition, it does not come in contact with the metallic portions of the filter.—*Iron.*

Manual Surgery for Pianoforte Players.

The method of liberating the ring finger of musicians by dividing the accessory tendons of the extensor communis digitorum muscle, as described in our issue of August 8, 1885, is attracting increasing attention. The weakness of the third or ring finger is due to two accessory tendons connecting its motive muscle with those of the second and little fingers.

In consequence of this connection, the ring finger is incapable of free and independent motion. Every one has probably noticed his own inability to raise his ring finger any distance above the plane of the hand when the neighboring digits are not similarly elevated, and, if a musician, has found it a great inconvenience. Occasionally these tendons are found to be present only in one hand, which is usually the right, and in rare cases they are entirely absent. The restriction which they impose upon the motion of the ring finger can be somewhat lessened by incessant practice, but can never be entirely overcome. It is a continual disadvantage, both in music and in other arts.

To free the ring finger by dividing the binding tendons is not a new suggestion, but it has only been during the past year that the operation has come into any prominence. Dr. Wm. S. Forbes, of Philadelphia, has given the subject particular attention. The operation, as practiced by him, is very simple, but should only be undertaken by one well acquainted with the anatomy of the hand. A narrow, pointed bistoury is inserted into an incision less than one-sixteenth of an inch in length made through the skin and fascia, just below the carpal articulation of the metacarpal bone of the third finger, and above the radial accessory tendon of the hand, parallel with the extensor muscle. The blade of the bistoury is kept horizontal, and the handle is somewhat depressed. In this position the blade is moved beneath the accessory tendon, and so far down the hand as to be a little above and between the knuckles of the third and middle fingers. The instrument is now turned with its edge toward the skin. The middle finger being strongly flexed, and the accessory tendon made taut by extending the ring finger, a gentle sawing motion of the blade severs the tendon at once. The bistoury is turned flat again, and withdrawn through the incision. The tendon on the opposite side of the extensor muscle, that is, between the third and little fingers, is divided in a similar manner.

As stated before, not a quarter of a drachm of blood is spent by the operation. Each incision is covered by a piece of adhesive plaster, and a figure-of-eight bandage carried around the wrist and hand. Two days after the operation, the patient is required to exercise on the piano in order to prevent the tendons from reuniting. A slight swelling remains for perhaps a week, at the end of which time the liberation is complete, and the ring finger can be elevated an inch further above the plane of the hand. Dr. Forbes writes us that up to December 15, 1885, he had performed the operation upon fifty-two patients, and that in all cases the result was perfectly satisfactory.

The operation has raised a great deal of opposition among more conservative musicians, who maintain that partial freedom bought by years of constant exercise is preferable to perfect liberation gained by a few minutes' surgery. Others, again, contend that the method is unnatural, and tends to interfere with the designs of Creation. But this is an objection which we need scarcely argue. Such a question should give rise to no partisanship. If the method be good, it should be accepted. If it does not prove efficient, the suggestion has done no injury. The favorable experience of so large a number of patients is certainly a strong argument in its favor. All of these people testify that the freedom resulting from the operation is most gratifying, and that they have experienced no loss of power in any other direction.

The discussion has also been taken up with much interest on the other side of the water. One of the most celebrated English surgeons, Dr. Noble Smith, has repeated the operation with perfectly satisfactory results. He recommends, however, that it be performed only by an experienced operator, and in cases where the accessory tendons are well defined. He regards the risks of the operation as infinitesimal, but very properly adds that the patient should, nevertheless, be warned that no wound can be made without some danger.

In the Long Evenings.

True independence consists in the possession and improvement of resources within one's own self. There is a sense in which *self-sufficiency* is a laudable trait of character. It is far different from self-assertion, which may be Ishmaelitish, turning the hand against every man. And it is just as far removed from that weak dependence upon others which leads one to look for aid at all times, and for constant society and companionship in occupation and in amusement. Social intercourse and conversation are a part, and a very large part, of all our lives. Both improvement and pleasure depend upon our well-selected friendships. Still, he is a poor companion for others who can do nothing for himself. He who has nothing in him has nothing to impart to his friends. He has no capital to go upon in the social exchange which promotes the intelligent life of man.

The long winter evenings are now at hand. The caterers for amusement are preparing their bills of fare. The attractions of society are presenting themselves, and plans are everywhere forming for the round of entertainments. But we have something more to do in this world than the passive employment of being amused. Among all benefactors of the race of man, those well deserve the gratitude of human kind who minister to the independent intellectual formation of character. The book, the magazine, and the journal are benefits which, by their very abundance, seem to be underrated, and are certainly not utilized to anything like their full advantage. It is a flattering and common assumption that Americans are a reading people; but when the results of their reading are looked for, it is somewhat humiliating to discover how superficial is much of the knowledge gained by it.

It is not to be supposed that a newspaper article, or that dissertations in all the newspapers, will make a reality out of this semblance of knowledge. But every man can act for himself. Any man or woman can determine that leisure shall be well spent, and that time shall be found for the culture of the mind. Under favoring circumstances, we can get help from others. But he is best served who serves himself. He only is independent who can vary his social intercourse by the society of books. Reading is a pleasure within the reach of all save the few who cannot read, and those few could find no better employment than learning. It is the best of occupations, and is, withal, the cheapest. In the winter arrangements, a liberal space for reading should be set apart, and something like a regular plan determined on. Yet even desultory reading is better than none. The young, especially, should acquire a habit which will make their homes pleasant, and save them from some temptations to folly, or worse. Of all house furnishing, books pay the best profit. And of all evening entertainments, they furnish that which is the safest to go to bed upon. There follows no morning dullness or headache, no rebuke of conscience, and no beggarly account of empty pockets.—*Philadelphia Ledger.*

Colored Lights for Tableaux.

For winter evening amusements, colored fires are desirable for increasing the scenic effects of tableau exhibitions. A correspondent inquires of the *Western Druggist* if the ingredients which they had previously published were appropriate for inside illuminations, as, for example, at private theatricals, etc. To which the editor replies: No, with one or two exceptions. Colored fires for inside illuminations, or "tableau lights," should contain no ingredients emitting disagreeable or suffocating vapors, nor should they be compounded of too combustible materials, on account of danger from fire.

The following are said to be very satisfactory:

Red.

Shellac	1 oz.	Strontium nitrate	3 oz.

Mix.

Or the following:

Lycopodium	1 oz.	Sacchar. lacti.	4 oz.
Strontium nitrate	1 "	Potassium nitrate	12 "

Mix.

Green.

Barium nitrate	9 oz.	Potass. chlorate	4 oz.
Sacchar. lactis	2 "		

Mix.

Yellow.

Sodium oxalate	2¼ oz.	Potass. nitrate	2¾ oz.
Shellac	2¼ "	" chlorate	2¾ "

Mix.

Blue.

Shellac	2 oz.	Copper am. sulph.	5 oz.
Potass. chlorate	4 "		

Mix.

White.

Stearine	1 oz.	Potass. nitrate	4 oz.
Barium carbonate	1 "	" chlorate	12 "
Sacchar. lactis	4 "		

Mix.

In preparing the above, it is essential to observe: 1. That all the ingredients be dry. 2. That each ingredient be reduced to a moderately fine powder, separately 3. That they be mixed very carefully with a spatula upon a piece of paper. 4. That the finished powders be preserved in small paper boxes or cylinders holding not more than four ounces each.

When shellac and stearine are employed, it has been recommended that they be first fused, and the other ingredients be then incorporated in the fused mass when cold, then to be powdered.

LIEUTENANT GREELY believes that there is an ocean 1,500 miles in diameter round about the pole, that never freezes, and conjectures that the Pole itself is the center of an ice-capped land covered with ice from 1,000 to 4,000 feet thick. These conclusions are rejected by prominent Arctic authorities in England.