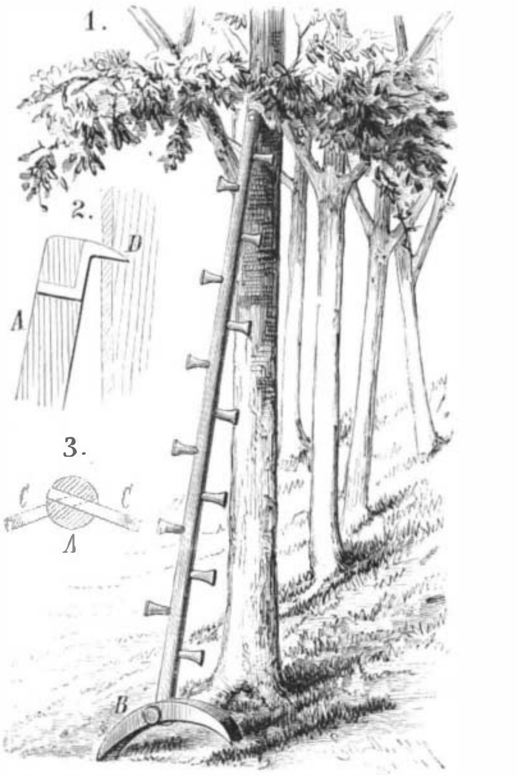
Solder for Aluminum.

Col. Wm. Frishmuth, of Philadelphia, Pa., says: The following receipts to solder aluminum have been tried by me and found practical. Take 10 parts silver, 10 parts copper, 20 parts aluminum, 60 parts tin, 30 parts zinc. The above solder is excellent for chains, etc., and can be used for the blowpipe operations. For a solder with the common solder iron, take either 95 parts of tin, 5 parts of bismuth; or 97 parts of tin and 3 parts of bismuth; or 98 parts of tin and 2 parts of bismuth; also 99 parts of tin and 1 part of bismuth; the fuse to use in all cases is either paraffine, stearine, vase line, balsam copaiba, benzine. Articles so soldered must be cleaned well before soldering, and the parts to be soldered must be heated to just enough to make solder adhere to the parts to be soldered. These alloys of solders, as above stated, can be changed to suit the operator.

POLE LADDER.

Pivoted to the lower end of the pole is a segmentally curved base piece, the concave edge of which faces downward; this permits of the ladder being inclined toward the object against which it rests. Projecting from the pole are outwardly inclined rings arranged alternately on opposite sides of the pole. On the upper end of the pole is a prong, D, that may be driven into the object against which the end of the ladder rests; but the main object of the prong is to aid in climbing the sides of a building, and to hook over a limb of a tree, which the pin just reaches, to support the ladder while picking the fruit. The curved base piece at all



JAYNE'S POLE LADDER.

times adjusts itself to the formation of the ground, giving the ladder a good, firm bearing.

This invention has been patented by Mr. John Jayne, of Forkston, Pa.

Post Mortem Diffusion of Arsenic.

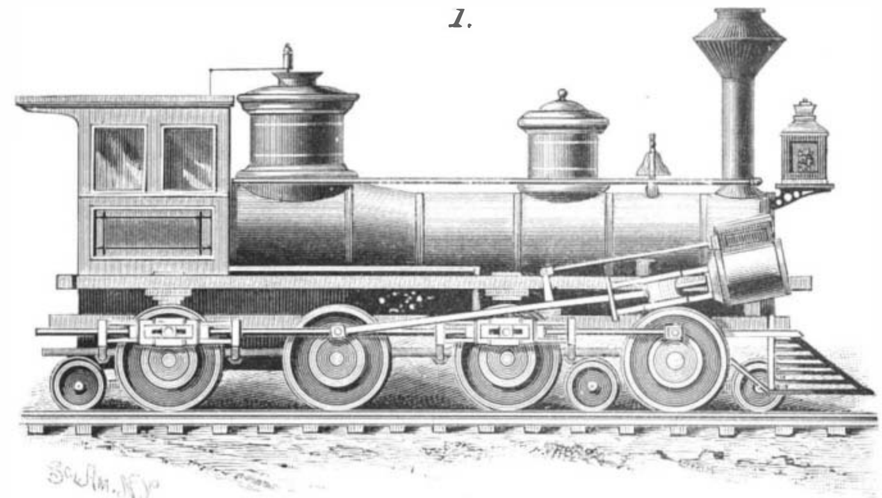
Drs. Vaughan and Dawson, of the University of Michigan, have recently conducted some important experiments with the view of ascertaining if arsenious acid injected into the mouth or rectum after death would diffuse through the body. These observers not only found that such was the case, but that the diffusion was very extensive. The results of their investigations have, says the *Lancet*, a very important bearing on the question of arsenical poisoning. In the first place, it can no longer be contended that, because arsenic is found in quantity in the fluids and tissues of the body, therefore death was due to its administration; and in the second, a certain amount of immunity is given to the would-be murderer, inasmuch as there is the possibility of covering a homicidal act by using arsenic with the ostensible purpose of preserving or embalming the body. We say possibility, for such a procedure would almost to a certainty be defeated in its aim. At any rate, there would be no chance of success if the post mortem examination were conducted within a short time of death, when there would be the usual signs of inflammatory action in the alimentary canal; and again, in the face of other circumstantial evidence, the fact of the accused having resorted to such a particular mode of preserving the body would rather tend to confirm suspicion than to remove it.

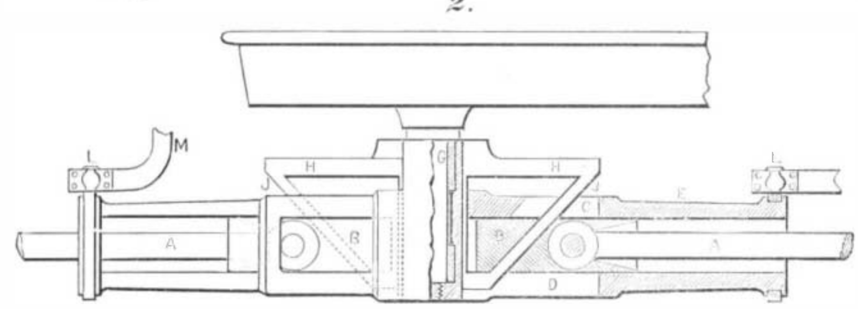
That arsenic contained in soil may be dissolved in water and conveyed into the body has long been known. The researches of Drs. Vaughan and Dawson show what appears *a priori* as probable. During decomposition the relative humidity of different parts of the body, and of these with surrounding media, is constantly changing. Interstitial currents are passing through the tissues by osmotic action, and this liquid diffusion is naturally increased by the presence of crystalloid substances in solution; nor does it cease until the dialysis ends in an equilibrium of attraction which one fluid has for another, or presumably until post mortem disintegration is complete.

AN IMPROVED LOCOMOTIVE.

The accompanying illustrations represent a locomotive, recently patented by Mr. Gabriel Fretel, of Porto Real, Province de Rio Janeiro, Brazil, designed to be used on railroads having steep grades and sharp curves. The connecting rods are provided with devices for automatically lengthening or shortening them when the locomotive runs on curves, thus permitting of coupling a considerable number of driving wheels; this is accomplished by boxes mounted on the crank pins of the middle wheels of each frame, which are adapted to slide in the direction of the length of the pins. Fig. 1 is a perspective view of a locomotive embodying these principles; Fig. 2 is a plan view of the joint; and Fig. 3 is a plan view of the locomotive supporting frame and the truck frames.

The platforms of the locomotive and tender (the latter is not shown in the engravings) are supplied with pivots, V', for supporting them on four frames, A, in the middle of which the pivots are arranged. These frames are supported by pivots on trucks formed of the platform, B, supported by springs from the axle boxes. On the bottom of the box is a frame, B^2, in which are journaled the shafts carrying the small guide wheels, E, the load being so distributed as to rest entirely on the axle, C, and not on the guide wheels. The axle under each pivot is provided with fixed wheels, and is so arranged that it can slide laterally in its bearings. The cylinders are united by connecting rods, L, with the crank pins, L', on those wheels that are mounted on the axles between the wheels under the pivots, V', so that motion is transmitted by rigid connecting rods. The motion is then transmitted to the other wheels by extensible connecting rods. The automatic lengthening and shortening of the connecting rods can be accomplished in various ways, one of which is shown in Figs. 2 and 3. A sleeve, G, Fig. 2, is mounted on the crank pin in such a way that the pin can revolve within the sleeve, on which are triangular frames, H, on diametrically opposite sides. The shank, J, of the frame passes through a diagonal slot in the sliding block, B, sliding longitudinally in a box, E, mounted loosely on the sleeve and which slides in the direction of the length of the sleeve. The box is formed with slots, D, through which the diagonal shank of the frame passes. The connecting bars, A, are pivoted to the sliding blocks, and the outer ends of the boxes are pivoted by ball and socket joints to the bent ends of the shafts, U, Fig. 3.





FRETEL'S IMPROVED LOCOMOTIVE.

When the locomotive runs on a curve the wheels will be about in the position shown in Fig. 3; the wheels of each platform remaining on the track in the usual manner, but the middle axle slides outward toward the rail having the longer radius. Looking at the locomotive from the front, the right hand connecting rod, M, Fig. 3, extending from the front to the rear wheels, will have to be lengthened, and the left hand rod will have to be shortened. As the axle moves to the right in relation to the platform, the sleeves and their frames will move in the same direction. In the right hand wheel the inclined arms of the frames press against the sides of the slots in the sliding boxes and move them toward the ends of the frames, which, turning on the ball and socket joints, lengthens the right hand connecting rod. At the left hand end of the axle the frame, acting on opposite sides of the grooves, will draw the sliding blocks toward the middle, thereby shortening the connecting rod. We have not space to describe in detail the other methods by which these results may be accomplished. The locomotive can be built with a single platform, or with two or more platforms pivoted to each other, and the platforms can be made of greater or less length, according to the curves on the road. By coupling several driving wheels the traction is increased—a point of great importance in locomotives running on mountain railways.

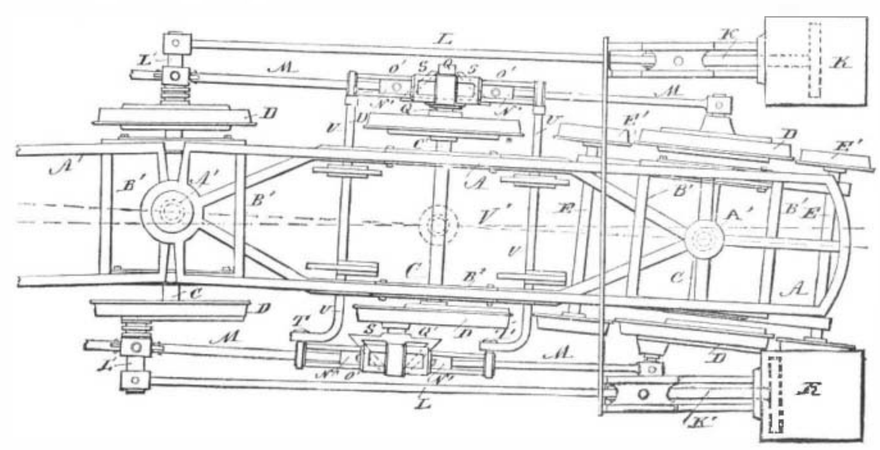


Fig. 3.—FRETEL'S IMPROVED LOCOMOTIVE.

SOUTH of Long Island, beneath the Atlantic, are the remnants of a vast marsh. In clear water roots of trees can be seen from a boat, and in stormy weather masses of decayed wood and peat are thrown upon the shore.

An Ingenious Rat Trap.

A correspondent of the *Industrial World* describes a trap of his own contrivance as follows: This trap consists of a sheet iron pipe with a sort of rim on both ends and a strong two-bushel sack tied firmly around one end. Every hole is stopped in the corn crib but one, which opens into a feed box on the other side of the partition. Then the pipe is placed in the feed box and fitted, the open end firmly over the hole, allowing the sack to hang over the edge of the box into the manger. The trap is prepared, the door of the crib is left open, and the rats permitted to have their own way for an hour or so. Then the door is shut and a noise made to frighten the rats. Having but one means of escape, they rush into the pipe and down into the sack. This correspondent caught twenty-seven rats the first time he tried his trap.

Speaking between New York and Boston.

For some time past the American Bell Telephone Company, in connection with the Southern New England Telephone Company and the Metropolitan Telephone Company, of this city, have engaged in constructing in as perfect a manner as possible an experimental telephone line between this city and Boston, a distance of 225 miles. The experiments, we learn, have been highly successful, so much so that it is said to be easier to talk from New York to Boston on this new line than on the short circuits of the local lines in this city.

The improvement consists in using a metallic wire circuit, the two wires being twisted close to each other, but separated by an insulating material. Certain improved forms of transmitters are also used. By means of the double wire all extraneous sounds due to induced currents are eliminated, and as a consequence the sound of the voice comes out clear and distinct.

A few days ago Supt. Baker, of the Southern New England Company, at New Haven, Conn., stated that in a very short time the line would be thrown open to public use, and when that was done a person in New York could talk just as easily to his friend in Boston as to any one on the short lines in this city. He had talked to his wife at Stony Creek from New Haven, and they could hear each other just as distinctly as if they were both talking in New Haven.

In view of these improvements, it would seem as if it would be possible at no distant day to put New York in ready telephonic communication with all the principal cities in this country, and the wonder is that such service has not already been extended.

Pneumatic Street Railway.

There has just been completed at the Risdon Iron Works, San Francisco, an experimental car to be run with compressed air by a new system, a trial of which was made recently. The subject is one of great interest, more especially as the system will be tried where close comparisons can be made between it and both cable and horse car as to relative economy. In the new plan there is a storage and charging pipe which carries the air below the surface of the road bed all along the route, contiguous to the track. Through a system of valves attached to this pipe, closely set together within the track, the pipe may be tapped and the receivers replenished at any and all points on the route. In this way the system is so arranged that the car is never removed from its source of supply, and has no determined distance to travel with each charge, so that it may have a minimum capacity as to storage room and pressure of air instead of the maximum, as when the length of the journey to the charge is absolute and fixed.

Compressed air motors have been run a definite distance without replenishing, as from end to end of a route and back, and suggestions have been made to run from station to station, using a pipe connection between, but in all cases provision has had to be made for carrying the heaviest possible load of passengers under the most adverse circumstances likely to occur, such as those arising from very frequent stoppages, bad condition of the track, accidental delays, etc. The definite points could not be passed without refilling the receivers, and either the engineer had to go or the motor itself had to be taken to the station off from the main line in the act of refilling, this system of operation leading to all the difficulties which have heretofore surrounded the use of compressed air as a motive power for street roads. No practical system has been put in use so far by which the motor could be resupplied with air at any and all points on the route.

The motor which has just been tried is constructed as an open car, after the style of the cable road dummies, and the air receivers are placed under the seats. From these receivers, which are connected by a pipe, a hose connection is made which terminates in a metal nozzle, in the end of which is fitted a valve to make connection with the service pipe, as described hereafter.

The main service pipe is placed underground, near the track, and is large enough to have in itself storage capacity sufficient to insure that the drawing off of each charge for the motors will not greatly decrease the pressure. It is thought that a pipe of five or six inches diameter will do for roads running cars five minutes apart, while it should never be less than four inches in diameter.

This main pipe is provided with right angled branches, say every 300 feet more or less, which lead to the center of the track and terminate in valvular outlets. The nozzle connected with the reservoir on the cars fits into this valvular outlet, so that air comes from the main pipe into the reservoirs when wanted. The valvular connection is peculiar and the action is automatic. When the nozzle is put in, the air can flow; when withdrawn, the valve in the outlet closes. This is an important feature, and the details are quite ingenious. Of course other devices than this may be used, but a practical trial has demonstrated the utility of the plan adopted. It may be desirable, too, to place reservoirs at the outlets so a great volume of air may be immediately at hand to draw from, and a quick operation in replenishing the receivers affected. Air compressors may be placed at one end of the line only, or at both ends, as circumstances dictate. The air engines connect in the ordinary manner with the driving wheels on the cars.

The system of operating is as follows: The storage and supply pipe being filled with air, say at a pressure of 100 pounds per inch, the motor's receivers are filled therefrom at the depot at full pressure. On starting out as it proceeds on its trip, the air is used on the motors either at full pressure direct from the receivers or reduced to say 30 pounds by passing it through reducing valves. It is expected that the new cars can run on the Howard and Mission Street routes, where they are expected to be placed, at a pressure of 30 pounds, but this can be increased at will by means of suitable mechanism. When the conductor strikes the bell for a passenger to get on or off, the engineer stops at just where the next valve of the supply pipe is located or within a few feet thereof. These valves are placed at street crossings generally. The engineer then takes down his feeding nozzle and inserts it into the hole in the street, and connects. The air rushes through the nozzle and fills the reservoirs until the bell sounds to start, when the nozzle is taken up and replaced on its stand. The engineer need not wait to get the first few pounds of pressure, but may start with such pressure as he has obtained. In this way no unnecessary delay occurs.

The car or motor need not be required to travel over six or eight blocks, or even a less distance, where stops are frequent. The valves may be placed at crossings or even every hundred feet if necessary. It is desirable to be able to refill the receiver at every stop, to have great pressure when starting. Several suggestions have been made to operate street railroads with compressed air carried near the track, but none have included within their scope the system here proposed, which is the invention of Mr. George Pardy of this city. In this system the maximum weight of the load and contingencies of the trip do not control, but have only the effect of limiting the distance the motor will be capable of traveling without having recourse to the supply pipe, constantly at hand. In fact, those stoppages which are of necessity caused by taking or leaving passengers are the only ones necessary to make, it being calculated that these will be ample in most cases to give the required opportunity to replenish the receiver.

In running on this system they get over the great loss of power required to move a cable. On the cable roads 68 per cent of the power is necessary to drive cable alone without counting cars or passengers. Then again it is different from steam dummies or locomotives in this: there is only one central fire for the compressing machinery, instead of separate fires, boilers, etc., for each machine. They expect to utilize 50 per cent of the useful effect of the compressed air. One engine supplies all the cars. These cars are expected to go up a grade of one in fifteen.

The experimental trial of the system already made proved very satisfactory to the promoters. The car ran with 100 pounds pressure for three-quarters of a mile one trip, and seven-eighths of a mile the second trip. The car weighed about 3½ tons and the passengers 2½ tons. The highest speed attained was 16 miles per hour, and the car went up a grade of one in thirty-seven at 8 miles per hour. The connecting valve worked satisfactorily. It is probable that this system will be adopted by the Howard and Mission Street car lines.—*Min. and Sci. Press.*

Gelatino-Chloride of Silver Emulsion.

Although somewhat slower than a bromide emulsion, the chloride possesses greater scope for positive printing than can be attained with the bromide.

Mr. A. L. Henderson, of London, England, recently handed us the following formula for a chloride emulsion, which, judging from the specimen pictures, is very practical and useful:

Hard gelatine	80 grains.
Water	1½ ounces.
Nitrate of silver	75 grains.
Water	½ drachm.

The gelatine and silver are dissolved separately, then mixed, the silver solution being warmed and gently poured into the gelatine.

To this is next added (stirring the silver solution all the time):

Dry sodium chloride	21 grains.
Potassium citrate	21 "
Dissolved in water	½ drachm.

which is warmed.

The emulsion is poured into a dish and allowed to set.

The jelly-like emulsion is now cut into strips and washed in the usual way: cold water should be used, as the emulsion is very thin. The wash should be carried on under a yellow light.

After washing, the emulsion is melted by heat, and to it are added:

Salicylic acid	3 grains.
Dissolved in alcohol	2 drachms.

Also—

Chrome alum	1 grain.

Dissolved in a small quantity of warm water.

After the emulsion is filtered the plates are coated with it in the usual way. The film is extremely thin, on account of the watery composition of the emulsion. If more contrast is wanted, the emulsion should be made thicker by the addition of gelatine.

As it will not keep well, only small batches should be made at a time, enough to cover the plates to be coated.

Opal plates coated with the emulsion are printed behind a negative in a frame in the same manner as with ordinary silver paper; the picture will appear on the surface in the same way. The exposure varies with the density of the negative, and may readily be ascertained by exposing a piece of paper coated with the same emulsion behind the negative. After printing, the plate is first well washed, and is next toned with the ordinary chloride of gold and borax toning bath; it is again well washed, and fixed for 10 or 15 minutes in a hypo bath of 21 per cent strength; is washed well and soaked again for a few minutes in an alum bath, washed, and dried.

Wire Rope Transmission for Pumping.

A recent issue of the transactions of the *Societe de l'Industrie Minerale* contains the description of two small pumping plants at the Segur pit of the Montchanin colliery and the Orleans shaft of the Brassac colliery, France. Both are interesting examples of the employment of wire rope transmission for driving underground pumps by surface machinery. At the Segur shaft the hoisting engine is used for pumping at night, but, especially during sinking, additional pumping is necessary, and this is done in the following way: An engine on the surface, 130 meters (426·5 feet) from the shaft, making 40 revolutions, drives a sheave making 360 revolutions a minute, the speed of the 12 millimeter (0·47 inch) rope being 22 6 meters (71·4 feet). The duty is 0·3 cubic meter (10·6 cubic feet) of water per minute from a depth of 135 meters (442·9 feet). The pumps are two single-acting plunger pumps, 200 millimeters (7·87 inches) in diameter, and 500 millimeters (19·7 inches) stroke, making 10·8 strokes a minute, and requiring theoretically 10·5 horse power. The wire rope is kept taut by a sliding counter-weight arrangement making a tension of 255 kilogrammes (562·1 pounds). The average life of the rope is 1,900 working hours, during which 34,000 cubic meters (1,200,000 cubic feet) of water are raised.

At the Orleans shaft the pumps were used to sink from a depth of 264 meters (866·2 feet) to a depth of 325 meters (1,066·3 feet). They were driven by an old horizontal 350 by 1,000 millimeter (13·8 by 39·4 inch) engine, making 60 revolutions, driving the main sheave from which the rope was conducted into the shaft to two old Letestu pumps, 200 millimeters in diameter (7·9 inches), and with 660 millimeter (26 inch) stroke. Making 16 strokes, they were capable of lifting 0 5 cubic meter (17·7 cubic feet) of water. The rope was conducted underground over three sheaves, two of them gearing down to the speed of the pumps, while the third was used for the suspension of the weight to keep the rope taut. The sheave on the surface makes 200 revolutions, and the pump sheaves 312, the speed of the rope being 20 meters (65 6 feet). One rope lasted 73 days, a second 81 days, the total length being 590 meters (1,935·8 feet) and its diameter 13 millimeters (0·51 inch). The wear of the ropes in both cases seems excessive.

Soap for Removing Stains.

It has been for long a great desideratum to obtain an article really possessing the frequently rather contradictory properties and qualities demanded of such an article. Many productions have indeed been well pushed for the purposes in question, but the effective articles are few and far between. Only too often the much vaunted "stain soap" consists of nothing else than coconut soap, and does not contain a trace of either ox gall, turpentine, or any other ingredient suitable for increasing the detergent powers of a soap. A favorite trick, according to *Moniteur de la Teinture*, employed by unscrupulous demonstrators of the efficacy of the article in which they deal, is removing a stain which they make on a piece of cotton cloth with a brush charged with gas tar. If, however, the tar used be examined, it will be found that it has been well mixed beforehand with strong acid, and so can be removed almost as well without soap.

A good stain removing soap ought always to smell rather strongly of turpentine or similar compounds. In the glove cleaning trade the quality of the soap specially prepared is of the highest importance, and much attention is paid to this article by careful operators. There is no reason whatever why a special article for removing accidental stains, which do occasionally occur in even the best managed works, should not be prepared in every bleach, dye, and print works, especially as there is often the necessary skilled chemical superintendence ready at hand in the person of the works' chemist. We give the two best formulæ known, with full directions for preparing the soap satisfactorily. Take 22 pounds of the best white soap and reduce it to thin shavings. Place it in a boiler, together with

Water	8·8 lb.
Ox gall	13·25 lb.

Cover up and allow to remain at rest all night. In the morning heat up gently, and regulate it so that the soap may dissolve without stirring. When the whole is homogeneous and flows smoothly, part of the water having been vaporized, add

Turpentine	0·55 lb.
Benzine, best clear	0·44 lb.

and mix well. While still in the state of fusion color with green ultramarine, and ammonia, pour into moulds, and stand for a few days before using. The product will be found to act admirably, and the yield is very good indeed. The second method we shall give is rather more difficult to carry out than the former one, as it requires a little skill in soap boiling to prevent the soap coming out unevenly on stirring, and the introduction of the ox gall requires to be done carefully. Take of

Coconut oil	27·5 lb.
Tallow	2·2 lb.
Soapstone (talc)	4·4 lb.
Caustic soda, sp. gr 1·349 lb	15·4 lb.
Ox gall	6 lb.
Turpentine	0·3 lb.
Benzine	0·1 lb.
Brilliant green	0·1 lb.
Ultramarine green	0·05 lb.

Melt the fat, add the stone and color, cool to 20° C., and then add the solution of soda. When all is well united and mixed, add very gradually the gall, continuing the agitation without stopping for some time after all has been added. Should any separation take place, cover the boiler up for a few seconds, and if this does not help, fire up again, and continue stirring. Lastly, add the turpentine and benzine. Pour into moulds, and stand before using. This preparation, when properly applied with a brush, will remove the most refractory stains without injury to the cloth.

Coral Fishing.

Coral fishing is largely followed in Algeria, 40,000 to 45,000 pounds of coral, valued at about £38,000, being the yearly production; La Calle is the center of this industry, and there are employed annually 160 boats and 1,300 men. The coral is obtained by means of a wooden apparatus in the shape of a cross, having in its center a leaden slug or stone for ballast. Nets, the meshes of which are loose, are hung on the bars of the cross and dragged at the bottom of the sea, and among the nooks and crevices of the rocks. These nets, winding about the coraline plant, break up or tear off its branches, which adhere to the meshes. The apparatus is drawn up by the fisherman whenever he thinks it sufficiently laden. There is also a net which is provided with large iron nails, having thus great force to break the coral, but this apparatus is forbidden to be used.