Some Results of New Inventions.

T. F. O'Rourke, President of the Hat Finishers' Association, asserts in a late address that "some districts have suffered from the introduction of improved machinery." He adds that "it is not desirable to oppose machinery, . . . yet many shops are putting in machines which, with the assistance of the boy system prevailing in Philadelphia, will work great injury to us."

The readjustment of laborers consequent on the perpetual invention of improved machines is a source of perpetual disturbance everywhere, and always has been in civilized societies. So are changes of fashion—as when shoe buckles went out, a large body of buckle makers were brought to destitution. Both, however, are only a part of the general social movement, which is incessant and endless. No fixed status is possible in a universe of evolution. The only way the individual can keep his place is by evoluting also and enlarging his range of industry. The workman must be flexible and quick to learn new things. He must cease to think of stopping the flood of novelties and learn to swim in it. Business men of all kinds are troubled by the same instability of affairs. He who will not change is submerged, he who changes with the times gains by the time's changes. It is hard and requires activity, but there is no other way.

New machines cannot be prevented; nor should they be, since they enrich the world and have made the workingman's progress to be what it is already. He never had a fraction of his present comfort till steam machinery began to do his work for him. House, clothing, good food, education, clubs, newspapers, all his advances are the result of modern machinery. It is the Atlas which carries the world's welfare on its shoulders; every bit of work it does is so much lifted from the strain and drudgery of the laborer as well as of the rest of us. By cheapening production it increases consumption, which calls for more labor, which new labor is easier than before the machine went to work. Think of the toil of the old-fashioned farmer in harvest, compared with that of him who now sits on his reaper and binder in comparative ease all day! The workman who learns to understand new machinery rapidly and helps to work it is the man of his time, and this should be the model and ambition of all. The times reward the nimble and quick-witted—which all should make haste to become. And the duty to do so is laid upon them by nature, not by society. Society cannot prevent men from thinking out improvements which nature puts into their heads. And therefore the workman must keep himself right with nature, as indeed he is learning to do.—*The Social Economist.*

A Versatile Gunboat.

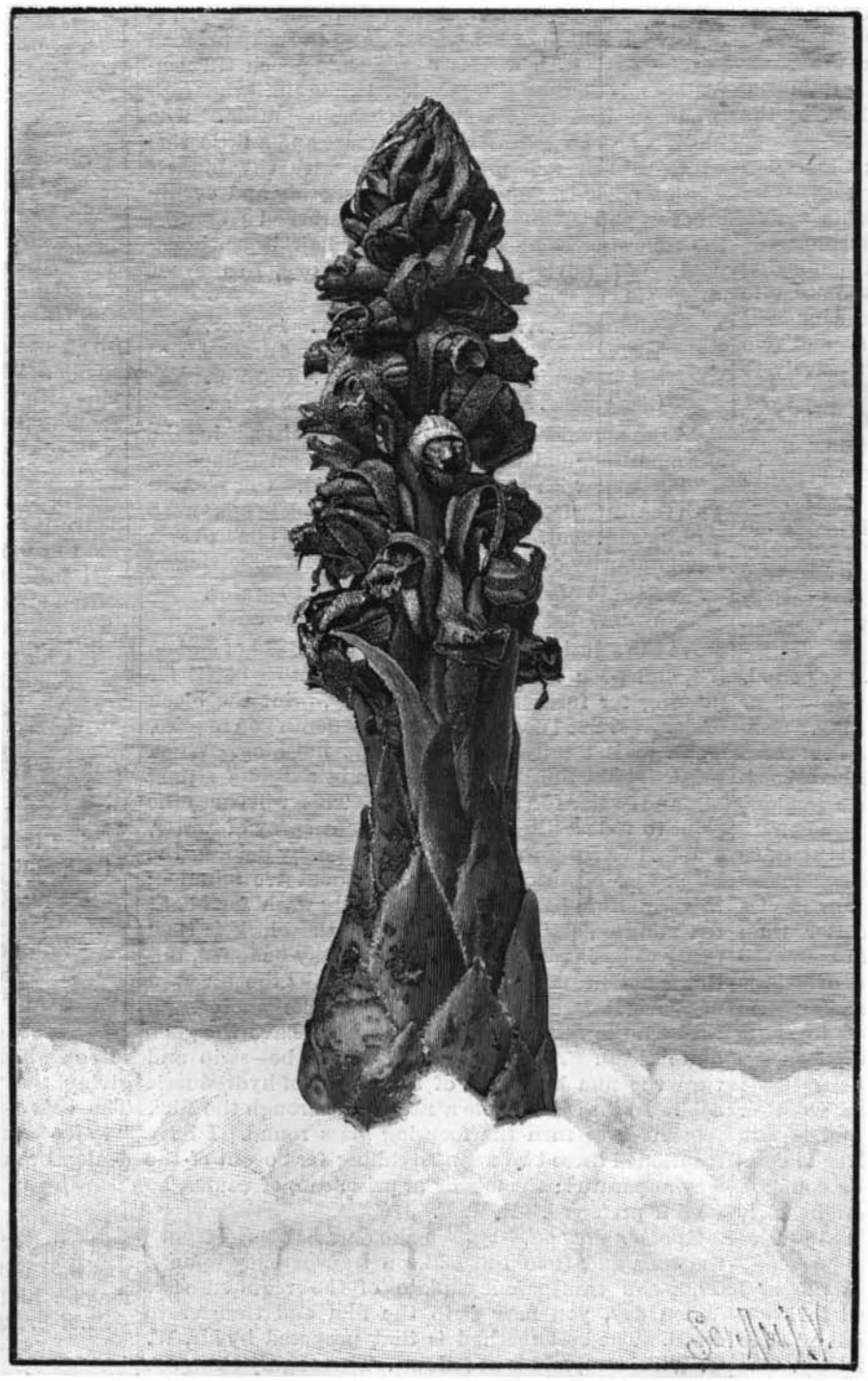
A new gunboat, the Svensksund, has been added to the Swedish navy. It has been built by the Kockum Engineering Works, of Malmo. Her dimensions are: Length, 120 feet; breadth, 21 feet; draught, 9 feet. The armament consists of four Nordenfelt guns and torpedoes. The vessel will, however, be more useful in time of peace than in war, as, first, she is a powerful ice breaker, fitted with water tanks for sinking to the desired depth; secondly, she is furnished with heavy gear for towing or hauling off stranded vessels; thirdly, she is equipped as a fire steamer, having ten large suction hoses and a centrifugal pump capable of delivering 22,000 cubic feet of water per hour; fourthly, she is fitted with condensers furnishing 800 gallons of water per hour; and fifthly, she is equipped as a torpedo repairing vessel. The engines with which this combined ice breaker, tugboat, fire engine, water supplier, torpedo repairing shop, and man-of-war is equipped are of 150 indicated horse power, giving the vessel a speed of 12¾ knots.

The Highest Electric Central Station.

Pontresina, a locality of the Grisons Canton, Rhætia, situated at an altitude of 6,000 feet above the level of the sea, in a vale running parallel with the Inn Valley, on the road leading to the celebrated Bernina Mountain and Pass, is understood to claim the possession of the highest electric central station. The motive power for generating the current is furnished by a torrential stream of the same name, the cascade of which is of immense advantage to the district. The inhabitants of this sequestered nook, who exhibit greater evidence of business aptitude than one might expect from simple mountaineers, have formed themselves into a—not exactly a limited company, but into a kind of Lancashire co-operative society, to the end that each lowly shepherd's hut is supplied with electric light and power almost for the mere asking. The water falls from a height of 430 feet, producing a cascade, the utilization of which to the extent of 300 liters only yields a source of energy giving theoretically, without loss, 520 horse power.

THE SNOW PLANT OF THE SIERRAS.

We present herewith, from a photograph taken by Mr. Taber, of San Francisco, a figure of the California snow plant (*Sarcodes sanguinea*, Torr.), so called because it thrusts its stem up through the snow to a height of nine or ten inches, and flowers when no other vegetation is to be seen. This curious plant, which belongs to the order Ericaceæ, is allied to the *pine drops* (*Pterospora*), but has much larger flowers, an elongated style and wingless seeds. There is but one species (the one here figured), which is an erect herbaceous parasite, with succulent, scale-like leaves, and a long raceme of pendulous flowers. The whole plant is of a blood-red color.



THE SNOW PLANT OF THE SIERRAS. (SARCODES SANGUINEA, TORR.)

A Simple Process for Coloring Photos.

The following is a process by which colored photographs can be made without any knowledge of drawing or painting.

Take any unmounted photographic print which it is desired to color, and place it on a pane of glass, the face toward the glass. In this way the image will be seen through the back of the paper.

With an ordinary pencil mark on the back of the print a rough tracing of the outlines of the photograph, marking the places where the colors must afterward be applied. When this tracing has been made, remove the photograph, lay it on blotting paper, and apply the colors to the back of the print. The colors should be spread on in flat tints, it not being necessary to use demi-tints. For example, a flesh tint is put on the face, and black or brown on the hair; if the picture is a landscape, the trees are colored dark green, the sky part blue. It is important to use strong colors, which will show through the paper better. After this operation is finished, and when the colors are dry, the photograph is rendered transparent, as follows:

First prepare the following solution:

Essence of petroleum or benzine	10 parts.
White vaseline	1 "

The vaseline is dissolved in the liquid, and then the mixture is ready for use. Then the photograph, which has been colored previously, is placed on some sheets of white paper, and the back of the picture is saturated first, pouring the solution on it, and rubbing with the finger to cause the mixture to penetrate, first the color and then the paper. The print is then turned face upward, and this side is saturated in the same way.

After this operation the paper becomes oily and transparent, and the color begins to show through.

It is left to soak thus for an hour or two, then both faces are rubbed with linen until no oily spots can be seen, when the proof is placed on white paper.

The operation is then completed, and the proof has only to be pasted on cardboard, the same as other photographs. But, as the paper is still saturated with vaseline, water paste will not answer, and some kind of varnish will have to be used.

This process of painting, which can be used by any one, gives very beautiful effects.

Colors which are thus applied to the back of a photograph give it a tone of admirable freshness, and the vaseline mixture brings the image out. Besides, as the colors have the thickness of the paper to pass through, they are greatly softened, and thus approach nature. The variations of the tints will be seen, by transparency, when looking at the picture.

As to the colors, any that are at hand can be used, whether water colors or oil colors. The essential point is to choose the most strong colors, rose, green, etc., and to put on only a very thin layer, as otherwise the vaseline cannot pass through it. If oil colors are at hand they will be better, and the result obtained will be much prettier, for they are more striking, and the vaseline passes through them better. Pastels or colored crayons can be used, but oil colors are greatly to be preferred to any others.

If it is desired to save, and not to color, the photograph, its outline can be traced off on ordinary white paper, and the colors applied to the white paper as before described. Then it is only necessary to paste it on the mount behind the photograph, care being taken to render the latter transparent, and the two must be so placed that their outlines will agree. The effect obtained is the same, and gives very pretty results, not showing in the least how they are done.

Fractional Currency Scrip.

A movement in favor of the issue of fractional currency is in progress. Business men who conduct a large business by mail are much annoyed by the want of some mailable form of currency. Silver coins are too heavy and bulky for transmission by mail, and are far from safe, as any one who handles the letter can ascertain their presence. Postage stamps have come into extensive use for the transmission of small amounts, and this has become, in many cases, a positive annoyance, owing to their accumulation on the hands of merchants. They are also bought at post offices which, under the law, obtain no credit for selling them. We believe that, from these points of view alone, the reintroduction of "fractional currency" would be an excellent enactment on the part of the government.

A Large Glove Industry.

At Grenoble, France, it is said that 1,200,000 dozen pairs of gloves are manufactured annually. This represents a value of $7,000,000 to $7,200,000, and gives employment to 25,000 workpeople of both sexes. There are 4,000 men and 21,000 women residing in a rayon of 38 miles around Grenoble who live by this work. Glove making, then, is interesting from a social point of view, as it is one of the few callings open to female labor in which they can earn respectable wages without abandoning husbands, homes, and little ones. The writer adds that out of the $7,200,000 worth of gloves made in that region at least $3,000,000 are distributed in wages among an almost infinite number of families. *New York Recorder.*

Morocco Manufacturing.

Though so much has been learned in respect of the methods of manufacturing glazed kid, there seems to be room for the acquisition of more knowledge. An acquaintance with the chemistry of various drugs used in the process is essential. Chemical purity is an absoulute necessity in the production of high quality stock.

In regard to the strength of the tanning chemicals primarily used in the chrome tannage, there is this to be said: Muriatic acid should have an inherent strength of 21 to 22°; yet quantities of a debilitated variety, registering only 16 to 17° test, are disposed of. This ingredient is used as well with the combination as with the chrome tannage, but in the latter performs the major part of chemical action. In connection with the chrome and hypo. it creates a gas, producing a glutinous substance in the chrome tannage. Oil of vitriol standard is 66°; below that it is generally vended as sulphuric acid and so billed. This quality stands from 60 to 64° test. Water, not thoroughly eliminated, is the cause of the depreciation in quality. Oil of vitriol is used for plumping heavy leather as well as all morocco tannages. Muriatic acid will perform the same function, but it requires longer time to attain the result. Oil of vitriol is worth, ex store, 1½c. by the carboy.

White sugar of lead is now little used; the cheap variety rules at 20c. per pound, being improperly crystallized. Damp weather prevailing during its manufacture is one cause of inferiority, diminishing the quality and marring its appearance. In employing the lower qualities, one-third more must be used to accomplish the same result, and even then the inherent strength is lacking. Makers of bridle, saddle and rein leather use white sugar of lead very extensively to bleach or whiten their product.

Borax crystals in barrels sell at 12c., the cheaper grades vending as low as 8¾ to 10c., conditional upon the proper removal of the impurities. These crystals, while generally used only in the chrome tannage, are occasionally worked in the combination process. In powdered condition its dissolution in water is naturally almost instantaneous. And as the crystals are very solid, the saving in time by using the powdered variety is important. Borax crystals are used both to soften water and cleanse the skins.

Imported Chinese nutgalls are worth 21c. per pound. In casks they are sold at from 20 to 23c.; ground or finely powdered makes the best black coloring. Copperas and sulphate of copper, combined with these nutgalls, produce wonderful results by greatly intensifying the brilliancy of the jet black. Some tanners, and also dyers, use ammonia for the same purpose.

Hyposulphite of soda in cheaper grades sells at 2¾ to 3c.; fine grades bring 3¾c. The value is dependent on the amount of soluble sulphur contained; low grades having only 25 per cent are really no better than Glauber salts. Hypo. is used somewhat in combination, but largely in chrome tannage. Hypo. of soda is used to strengthen the fabric and at the same time soften it. Hypo. is also popularly supposed to make the finished leather impervious to water when on the foot.

Glycerine, chemically pure, should stand 30° test. "B," or Baume, is temperatured at 60°, and is pure white and of good body. Nitrate of silver is commonly used in an analysis of quality. The common quality sells simply as glycerine, but is off in color, displaying a yellowish cast. Glycerine is used to render the leather pliable.

Sulphate of iron or green dry copperas is the best to use. It sells at one cent per pound, and in lower grades at one-half off ruling price, and contains 35 to 40 per cent of water, quite an expensive economy. The best quality is of brighter hue and the crystals more perfectly formed. This sulphate creates the desirable intense black color, and is used in all tannages.

Sulphate of copper, or blue vitriol, in its pure state, contains 25 per cent of metallic copper. The common appears whiter and will be permeated with iron and other impurities in proportions of from 40 to 60 per cent. This sulphate is used for the same purpose and as an addition to sulphate of iron. Ex store this sells at $4.30 for the best and $3.75 for lower qualities.

Logwood comes in five grades, and of course the most expensive gives the best results. It is excellent for blacking the skin and is particularly efficacious when used with nutgalls, as is also sulphate of copper. Logwood is popular with all tannages.

Campeachy logwood, if coarse cut, takes longer to boil, but is purer and the sap is more thoroughly extracted. Sappy wood creates a resin on the surface of the skin, which is difficult to eradicate. Best quality is on sale at 2c. per pound.

Bichromate of potash is powerful in its effect, and alone would burn and destroy the fiber of leather and rot it; fine hyposulphite of soda neutralizes its strength and keeps the whole cool. It is from the bichromate of potash that the chrome tannage derives its name. It is in the form of large four-sided prisms, orange red in hue, devoid of odor, and to the tongue imparts a bitter, disagreeable taste. The bichromate, while soluble in 10 parts of water, is insoluble in alcohol. With alum there are the ground and lump varieties. Common alum contains only 17 per cent of alumina. Pure sulphate of alum contains 58 per cent of pure alumina and is devoid of both acid and iron, which is extraneous; the cheaper grades are possessed of both. Too much acid is likely to destroy the color and create a harshness in texture.

Sig: this ingredient, which is really human urine, has recently been largely substituted by a chemical compound, which has the same effect and dispenses with the unpleasant handling of the original substance. Sig is used to assist the mordant or bottom, and permit the color to more readily adhere thereto. Sulphate of alumina is another ingredient used in both the combination and chrome tannages, many manufacturers believing that its incorporation results in an improvement to the leather.—*Shoe and Leather Reporter.*

Photographing on Wood, using Dry Plates.

Gelatine, 2 drachms; white curd soap, 2 drachms; water, 16 ounces. Soak gelatine for some hours, then dissolve in a bath of hot water. Add the soap in small shavings, stir with a glass rod or slate pencil till completely mixed, then add powdered alum until the froth produced disappears; strain through muslin. The block is now coated with this mixture and a little zinc white, rubbed well into the wood, with the thinnest coating possible, and finished off smoothly and evenly all over, and left to dry. It is then brushed over with the following composition, a camel hair brush being used. It is advisable to use a wide one, to prevent streaks in the finished block:

Albumen	1 ounce.
Water	6 drachms.
Sal ammoniac	18 grains.
Citric acid	5 grains.

Beat the albumen to froth and allow to settle, using the clean portion, add the water, then the sal ammoniac, mixing well with rod; finally the acid. One coating with the brush from end to end of the block in one sweep is quite sufficient. When the block is dry pour over a small quantity of silver solution, made by dissolving

Nitrate of silver	50 grains.
Water, distilled	1 ounce.

Move the solution over the surface by the aid of a glass rod, and pour off the surplus into another bottle for filtering for further use. When dry, print the block under a reversed negative to just the depth you require, as there is hardly any loss in the finishing. When printed, hold the block face down in a dish of strong salt and water for three minutes. This will cause the print to fade a little. Wash under a spray of water, and fix in a saturated solution of hypo. by holding the block face down on the bath for about five minutes; this will bring back all detail; finally wash for about ten minutes, stand on end to dry; the block is then ready to be engraved. The picture may be toned, but this is not necessary. In order to make the reversed negative it is only needful to take the photograph through the film, care being taken to have the glass quite clean. Another method would be—strip and turn the film by means of a solution of hydrofluoric acid. In case you make a negative through the film, remember to turn the focusing glass round. I have mentioned these two ways as calling for no out of the way apparatus; the mirror or prism can, of course, be used if preferred.—R. K. F.

Another Method.—First make a negative from your drawing, and from this make a transparency upon a Thomas's transparency plate of the required size. When dry, you may strip the film and transfer to wood. The best method is that proposed by Mr. W. T. Wilkinson, and is as follows: Thoroughly clean the *back and edges* of your plate, level it, and coat the film side with thick, plain collodion, allow to set for one hour, place in cold water until the film no longer appears greasy when lifted, then immerse (in *an ebonite dish*) in dilute *hydrofluoric* acid (1 of acid to 20 of water), and allow to remain until the corners of the film can be lifted away from the glass. Do not hurry it, wash under tap for a few seconds, put the plate into clean water (film up), and detach from plate, leaving film floating upon water. Coat your wood face with gelatine solution (gelatine, one ounce; water, twenty ounces; chrome alum, five grains; and filtered), let it dry and slide it under film, adjust in position and lift from water, cover the film with tracing cloth and squeegee down. When dry it is ready for use. It will dry quickly after immersion in methylated spirit.

Another.—For photographing on wood, Wilkinson recommends the following: Make a solution of chloride of ammonium 10 grains in 1 ounce of water, to this add the white of one egg and stir well, then add sufficient zinc white to make a thickish paste. Take the wood block and free it from grease by rubbing with a soft rag dipped in spirits of wine, and apply the paste in as thin a layer as possible, rubbing with the ball of the hand, and stand it on end to dry. Dip the prepared surface in a 60 grain nitrate of silver solution for two minutes, and blot off lightly with filter paper. It is as well to coat the edges of the block with tallow, to prevent the silver solution and fixing solution from touching the wood. When dry, expose under a reversed negative, and just dip the exposed surface in a weak hypo. solution to fix the image, blot off, and rapidly remove any hypo. by blowing a stream of water across the surface; blot off, rinse in methylated spirit and stand on end to dry. The best plates to use are the special photo-mechanical plates supplied by Mawson & Swan or J. D. England. These are slow plates, giving great density with clearness in the shadows and clear lines. For the former use the following developer, as recommended by the makers of the plate:

A.—Pyrogallic acid	60 grains.
Meta-bisulphide of potash	60 "
Bromide of ammonium	60 "
Water	20 ounces.
B.—Ammonia (liquid)	2½ drachms.
Water	20 ounces.

Equal parts of each.

For England's plates use: Hydroquinone, 150 grains; sodium sulphite, 1 ounce; bromide of potash, 20 grains; water to 20 ounces. With equal parts of carbonate of soda, 2 ounces; carbonate of potash, 2 ounces; water to 20 ounces.—*Photography.*

White Ink for Marking Lantern Slides.

W. Edison can use ordinary Chinese white for marking his lantern slides, or the following solution can be employed for writing on the film:

Iodide of potassium	10 parts.
Water	30 "
Iodine	1 "
Gum arabic	1 "

Use an ordinary pen, writing on the dark portions of the film. The solution converts the silver into silver iodide, thus producing white letters on a black or dark ground.—SIGMA DELTA.

I have made a white ink that answers very well, by grinding zinc white (oxide of zinc) with water till quite smooth, and adding a little clean gum arabic, enough to give it a body and bind it. Try 4 parts of picked gum to 120 parts of water, adding enough zinc to give good brilliant white. I send a bit of black paper written upon with ink made as described.—R. K. F.

The following is an excellent formula:

Chinese white	1 ounce.
Isinglass	2 drachms.
Alcohol	1 "
Water	q. s.

Soak the isinglass in a little water until soft, then heat on a water bath until dissolved. When thoroughly dissolved mix into a paste with the Chinese white, well stirring it around with a piece of stick. When well mixed, add water in small quantities, well stirring at each addition, and trying it with a clean steel pen until it writes satisfactorily, then add the alcohol; or use:

Sulphate of baryta	1 ounce.
Isinglass	2 drachms.
Water	q. s.

Mix as above. The worst of all white inks is that they rub off when touched. This can only be prevented by giving the writing a protective coating of varnish. The best to use for the purpose is that known as "water varnish;" it can be bought at most photo. dealers or made by boiling:

Shellac	16 ounces.
Borax	3 "
Water	3 pints.

together until dissolved. When thoroughly dissolved may be thinned with water if too thick.—WIDE ANGLE.—*Photography.*

Great Power and Light Weight.

Speaking at the annual meeting of the Aeronautical Society, a few days ago, Mr. Hiram Maxim vouchsafed some particulars with regard to the motor which he has designed to actuate his flying machine, that afford some clew to the care and thought he has devoted to the problem, and which indicate that he has in one direction at least made a great advance on the efforts of previous workers in this field. The steam engine which he is employing is so highly developed and carefully designed that he assured his audience he could obtain a brake horse power for each 10 pounds of weight of engine, boiler, and condenser. This, as Sir James Douglas remarked, is a remarkable attainment, and means nothing more nor less than the equivalent to the strength of a full-grown man being exerted by a piece of mechanism weighing but 1½ pounds at most.

IN a memoir to the Academie des Sciences, M. Blondlot has given the results of his researches on the velocity of propagation of electrical waves. Using Hertz's method, he has obtained waves varying from 8·94 meters in length to 35·36 meters; twelve different wave lengths in all being experimented with. The results are very concordant, giving a mean velocity of propagation of 297,690 kilometers per second, which is practically the same as the velocity of light, and the ratio of the electro-magnetic and electro-static units.