RECENT PROGRESS IN ELECTRICITY.—THE PHELPS SYSTEM OF TELEGRAPHING FROM A RAILWAY TRAIN WHILE IN MOTION.

The public prints give us almost daily accounts of railway collisions in one section of the country or another. Every effort has been made to avert these. The general introduction of the telegraph has unquestionably done much in this direction. But in thick weather the operators at the railway stations could scarcely be looked to to guard points of the road beyond their ken, and the railway switchman or signalman, like his even Christian in other walks of life, is fallible. If railway signalmen could be found who required neither sleep nor rest, who were not subject to fits and spasms, nor spirituous excesses, and, above all, having eyes to pierce a fog, then railroad travel would, indeed, be divested of its greatest terrors. But, taking human nature as we find it, we learn that so grave a responsibility as the care of human life should never be thrust upon the shoulders of a single man. The "block" system recently introduced would, it was believed, prove a reliable means of preventing accidents on the rail, and it is but fair to say that it has made an excellent record. But that it is not, under all conditions and circumstances, to be relied upon there is abundant evidence. Only last week it failed to prevent a collision between two freight trains at New Brunswick, N. J., on the line of the Pennsylvania Railroad, in which two lives were lost and property to the value of half a million dollars destroyed. It was, of course, only by mere chance that these trains were not carrying passengers.

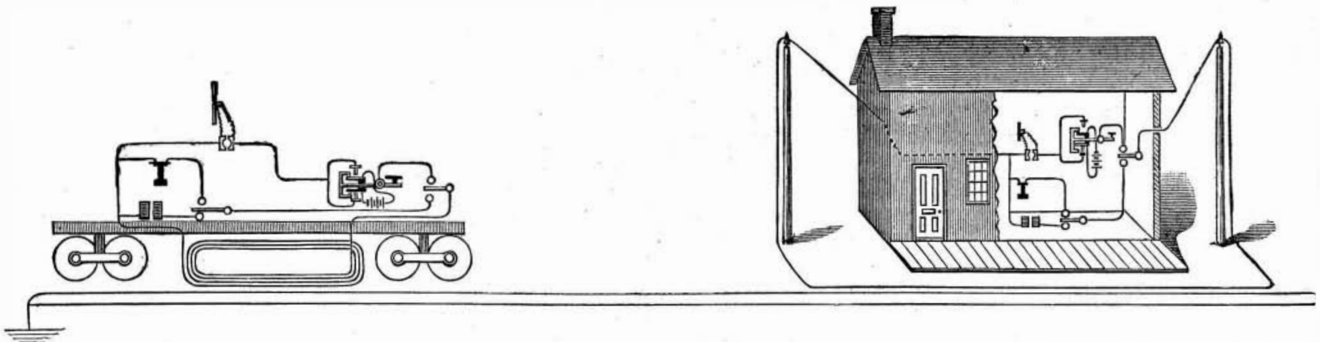

Fig. 1.—ELECTRICAL ARRANGEMENT FOR SENDING AND RECEIVING MESSAGES BY INDUCTION BETWEEN A RAILWAY STATION AND A MOVING CAR.

From this it may be inferred how pressing is the demand for some system in which the safety of the traveling public is not made to rely upon an unthinking and not always reliable automaton, or, still worse, upon the action of an overworked and irresponsible employe, whose perception of colors may be defective. Many able electricians have believed the solution of this problem to lie within the domain of electrical science; and those who have followed the drift of recent electrical endeavor are aware of the number of contrivances, all looking toward the same goal, that have made their appearance. The general principle on which all these have been based was electrical communication between all trains while *en route* and the train dispatcher. Most of these systems have shown a certain degree of efficiency when tested under favorable conditions, but the best of them were subject to interruptions, and this, from the very nature of the work they were called upon to perform, rendered them more or less uncertain, owing to the fact that they relied upon a direct contact with the conductor, either by wire, wheel, or brush.

Mr. Lucius J. Phelps now comes forward with a practical system of train signaling which does not rely upon contact at all, the electrical induction coil upon the moving train being distant from the conductor lying between the track at least seven inches.

Mr. Phelps would seem to belong to that class of men who have made America famous for mechanical ingenuity. These men never accept anything as a fact in natural law without first demonstrating it to their individual satisfaction. They rarely follow where the crowd leads unless the goal is really in sight, and when they do strike out into new paths, and continue their investigations, they may confidently be looked for at the finish.

While others were looking for an efficient system of intercommunication between moving trains and the train-dispatcher by an electrical circuit closed by contact, Mr. Phelps sought it by means of a utilization of that bugbear of underground telegraphy, "electrical induction," and he found it.

We herewith illustrate his system, and the reader will, perhaps, be surprised that such a valuable service may be performed by so simple a contrivance, for it is little more than the utilization of the principle of induction by means of the ordinary telegraph apparatus in a modified form. It is designed not only to keep the train dispatcher apprised of the condition and whereabouts of every train on his division, but also to enable him to acquaint every conductor of a moving train with the movements of the trains immediately before and behind him. This results in making seven intelligent men responsible for the safety of every train—the train dispatcher of the division on which the train is running, the conductor and his operator, the conductor and operator of the train in front, and the conductor and operator of the train behind. Of course this system will perform its most important duty during thick and foggy weather and at night. But even during the day, when running through tunnels or around curves, it cannot fail, if adopted, to be of invaluable service; and the absurd and slovenly practice of sending a brakeman down the track in foggy weather to flag or signal a coming train would happily be discontinued.

There are other uses to which this system can be put: the sending and receiving of dispatches from and to the passengers on a through train, for it operates like any other telegraph system. This part of its work, however, sinks into insignificance beside its real and proper function of averting disaster.

Just how the idea of utilizing the induction principle came to suggest itself to the mind of the inventor is interesting.

For some time past, especially since the burying of electrical wires and mains was seen to be imperative, a host of electricians have been devoting themselves to the study of induced currents and the consequent retardation. While a world-wide discussion as to the cause of this and similar phenomena was engrossing the minds of his confreres, Mr. Phelps, with admirable sagacity, bethought himself of making some use of what all were trying to guard against; and before he had gone very far with his investigations, he discovered that what made underground electrical transmission uncertain and costly was the one thing needed to make station and train intercommunication practicable.

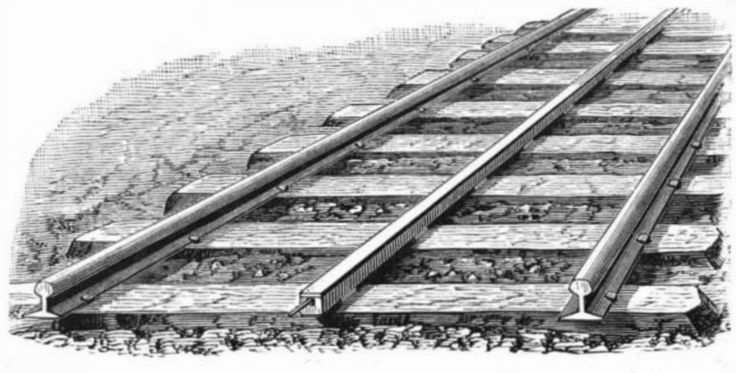

Fig. 2.—THE TRACK TELEGRAPH WIRE.

In order to understand Mr. Phelps' invention it is necessary for the general reader to bring to mind a familiar example of electrical induction. "If two wires are extended parallel, near but not touching each other, and we send a current through one, a momentary current is excited in the other wire, opposite in direction to that flowing in the first."

This phenomenon forms the basis of Mr. Phelps' invention. He arranges a telegraph wire in the center of the railway track; attaches another wire to the bottom of the railway car, with which wire he connects a telegraph sounder located within the car. Whenever an electrical signal is sent through the track telegraph wire, it produces by induction a corresponding current in the wire attached to the car, and this current works the sounder, thus delivering the message. It matters not how fast the train may be moving, if the wire on the bottom of the car is brought within a short distance of the telegraph or track wire, any strong electric impulses, such as telegraph signals, that are passing along the track wire will be taken up by induction by the car wire, and delivered by the sounder, and, *vice versa*, when the operator on the moving car operates the lever of his telegraph instrument, and sends electrical impulses or messages through the wire that hangs below the floor of the car, these impulses will be taken up by induction by the track wire, and conveyed to the sounding instrument of the railway station. The diagram, Fig. 2, shows the electrical arrangements for this purpose.

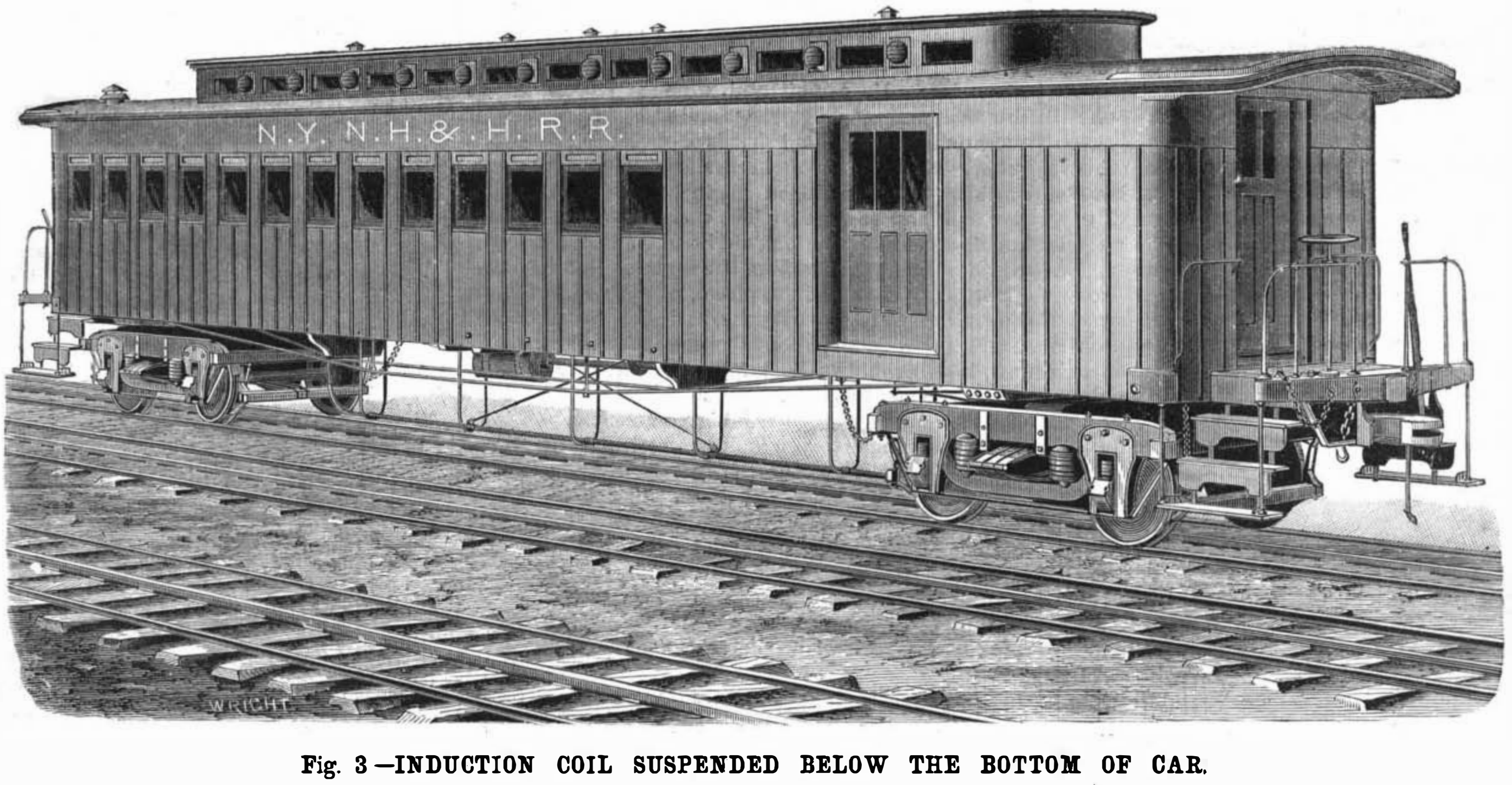

Fig. 3—INDUCTION COIL SUSPENDED BELOW THE BOTTOM OF CAR.

We will now briefly describe the actual construction of apparatus used by Mr. Phelps on the New York, New Haven, and Hartford Railway, over a section of that road twelve miles in extent.

The conductor or track wire, whence the induced current originates, is placed by Mr. Phelps at a point equidistant from the rails over which the cars pass. This conductor, a No. 12 American gauge insulated wire, is incased in a wooden box, two inches square, having a groove in the top, three-eighths of an inch square, as shown in Fig. 2. Over the wire is nailed the box covering, having as a protection for its joints a strip of galvanized wire. The wooden box containing the conductor does not rest directly upon the ties of the track, but on blocks of wood, four inches long, two inches wide, and thicker or thinner according as the ties are higher or lower in the center. The ties on a railroad being rough-hewn, the placing and fitting of these blocks requires care; and in order to facilitate the work of placing them, Mr. Phelps has designed an apparatus which, manned by four men, will fit and lay two miles of these in a day's work, and with such nicety that the top of the box containing the conductor will be a trifle below the same plane as that in which the top of the rails lie. At points where branch or other roads cross the main line, the box containing the conductor is brought up to within an inch or two of the intersecting rails, and the conductor, forsaking its wooden protector for an India rubber one, passes under the interfering rail, and coming up on the opposite side again enters its box, being guarded for a short distance by India rubber tubing.

Where a high-road crosses the track, the conductor passes into an iron pipe, which in turn is sunk into the wooden roadway and below its surface level. At points where the track is being repaired the ties are removed, by slipping them from under the little blocks.

The electrical arrangements on the car are as follows: Running the entire length of the car between the forward and rear trucks is the induction coil. There is a two inch gas pipe, which is suspended so as to hang seven inches above the track conductor, that rests upon the ties. Within this suspended gas pipe is a 1¼ inch rubber hose, which in turn contains ninety convolutions of No. 14 copper wire, insulated with paraffine. This copper wire extends round and round through the suspended gas pipe and up along the upper part of the car, and forms a circuit a mile and a half long.

The pulsations which pass over the track wire when taken up by the induction coil suspended below the car are received or materialized by an ingeniously made polarized relay instrument invented by Mr. Phelps, the general form of which will be seen in Fig. 4. We will not attempt here to describe its exact construction. It will be sufficient to say that its distinctive characteristic is its successful operation under the influence of very delicate electrical impulses, the readiness with which it may be adjusted, its nonliability to get out of adjustment when once set at work. The hammering and jarring of the car when traveling over the road does not interfere with the certain and regular operation of this remarkable relay receiver. From this instrument the received impulses are conveyed to an ordinary telegraph sounder, worked by battery, and thus the delicate movement of the receiving relay is translated into loud sounds, so loud if desired as to be heard in every part of a long railway car, above the rumble and roar of the train.

The new electrical apparatus, as now in use on the N. Y., N. H. & H. R. R., is located in one corner of the baggage car. It is represented in Fig. 5. Only a small battery of twelve cells is employed. An ordinary Morse telegraph key, sounder, battery, and Phelps instrument constitute the outfit.

The Phelps Induction Telegraph Company have set up their plant on a section of the New York, New Haven, and Hartford Railroad connecting the Harlem River with New Rochelle Junction—a line about twelve miles long. Of this length about three miles are trestlework. It crosses two rivers by draw-bridges; one of which requires 110 feet of cable, and the other 175 feet. In order that the test should be a thorough one, the wire is carried 26 times under the track in the manner already described, and there are 47 places where the public highway crosses the track, and hence where iron tubing must be used for the track line. At the beginning of the line, viz., at the Harlem River station, the wire is returned upon two side tracks, while at the end of the line it is supported for a distance of half a mile upon poles in the ordinary manner. There are twelve stations on this section, and hence, if we except length, all the conditions are present which might be looked for in the average railroad.

Private trials of the apparatus established on this line have been made almost daily for nearly a month back, and the results must have been very pleasing, not only to Mr. Phelps, the inventor, but also to the company which has been organized to use his patents. The inventor has had the satisfaction of practically demonstrating all that he has ever promised for his system. The train with ten invited guests left the Grand Central railway station in the N. Y. & N. H. R. R. at 3:02 P. M., and was soon at the Harlem River, the southern terminus of the experimental line. Telegraphic communication is constantly maintained between the train, running at times about 40 miles an hour, and a main office in the line representing the train dispatcher's office.

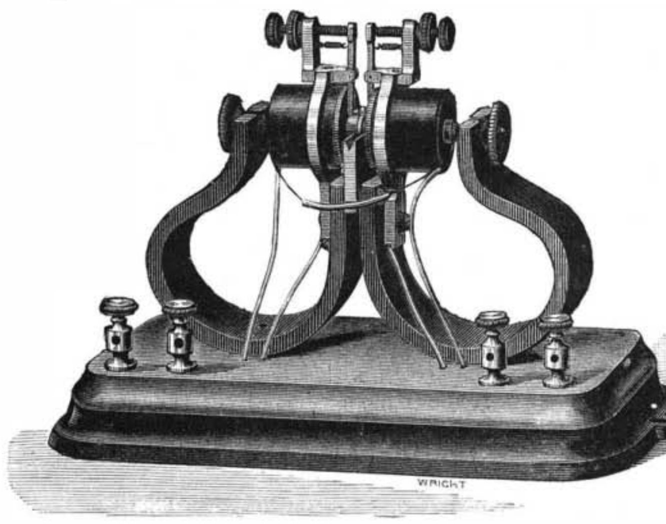

Fig. 4.—PHELPS' NEW RECEIVING RELAY.

The facility with which messages can be sent backward and forward over a line constantly increasing or lessening may be said to differ in no respect from that usually experienced in any well appointed telegraph office, and there is absolutely nothing, save the noise of the flying wheels and the shaking of the car, to indicate that any unusual means of telegraphic intercommunication is being tried.

The many and various commands usually coming from a train dispatcher's office are sent and received; and in order to demonstrate that the time necessary to send a message by this system is neither longer nor shorter, but precisely the same as that required to transact business between stationary offices, the time of some of the messages is appended, and referred to a watch that was made to correspond with the one at the permanent station. The warning signal from the dispatcher's office that the train ahead is wrecked is often received only a few seconds after it is sent, and the train is brought to a standstill at once. Then the conductor is notified that the track is clear, and to increase his speed, and so on.

The Phelps Induction Telegraph Company has frequently invited to witness these experiments those who have expressed a disbelief in the success of any and all systems with a view of intercommunication between trains *en route* and the dispatcher's office. The skeptics now, since they have seen a practical demonstration of the system, are likely to prove its warmest supporters.

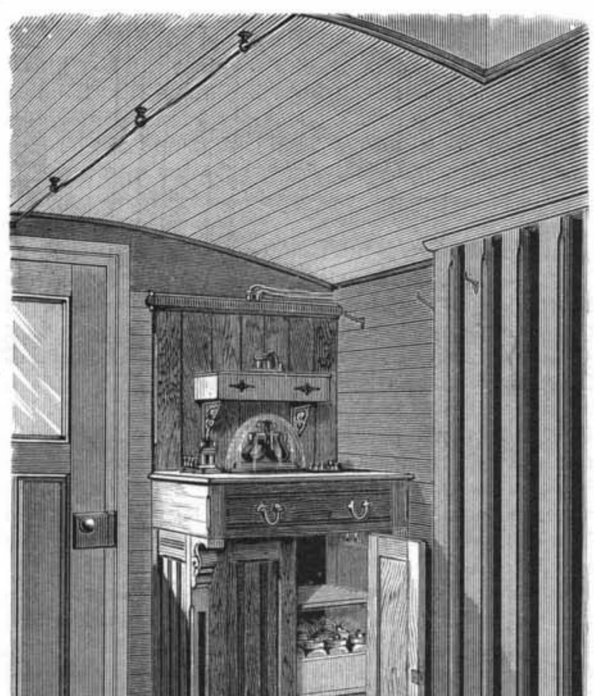

Fig. 5.—THE NEW RAILWAY CAR TELEGRAPH APPARATUS.

That part of the apparatus which very justly attracts the most attention from the electricians is the instrument which Mr. Phelps has devised for receiving. In the arrangement for transmitting, the terminals of the coil are brought to the ordinary telegraph instrument, and, by means of the back contact of the instrument, to a very delicate polarized relay. This relay, a very important part of the apparatus, is intended, of course, to serve a certain purpose. In its capacity of receiving instrument it responds instantly to every reversal of the polarity of the current over the conductor running along the ties below. The sounder in ordinary use is employed, being worked, as usual, by the relay. One of the five cells of the battery is employed to operate the sounder, and the balance in the transmission of messages. The current goes through the front contact to the key, traverses the labyrinthine coils, and operates the "buzzer," this serving to break the current quickly. The humming that ensues is made up of the characters of the Morse alphabet, and at the terminal station is interpreted through a telephone receiver.

The noise of the train, which some scientific skeptics have insisted would prevent the reading of the telegraphic signals as they come over the wire, does not in actual practice interfere with the reception of messages; and it is readily apparent that whatever defects may possibly appear in the future, there never will be any trouble whatever in hearing the signals, as they come out clear and distinct, being readily understood from the furthest end of the car.

It should be explained that this twelve mile section traversed, viz., from the Harlem River to New Rochelle, had been made as near as possible to represent a section of any road. There are culverts to be crossed, and ditches and elevations, and running streams.

On all well organized lines of railway a train dispatcher has charge of a certain section, usually a hundred miles long, and the system is considered as approaching nearest to perfection where the dispatcher is oftenest apprised of the position and condition of every train in his section.

In the trials on this line the dispatcher is kept momentarily apprised of the movements of the train. This system the Phelps Induction Telegraph Company claims to be able to maintain on any railroad, and their frequent experiments prove that they can support the claim in actual practice.

A curious and interesting phenomenon was observed by Mr. Phelps while recently experimenting on this line, and is here given as he himself described it: "About a mile distant from the Harlem River station there is a trestle, the up-track of which is undergoing repairs, and the wire, for that reason, was taken over to the down-track and carried across the trestle on insulators below and to one side of the center track, so that as the car carrying the coil of wire passes down the track the parallel wires upon the car are fully *four feet* from the conductor below. Out of pure curiosity Mr. Phelps directed his assistant at the terminal station to listen at the telephone while the car was crossing the trestle. When he reached the station, his assistant, much to his surprise, told him that he had read the words distinctly, and repeated the message which Mr. Phelps had sent off while the train was on the trestle."

During an official trial, a few weeks since, the following telegrams—perhaps the first ever sent to and from a moving train—passed between the inventor of the system and the conductor of the train, the one at a terminal station, the other on the road:

ON THE ROAD, MOVING AT THE RATE OF 40 MILES AN HOUR,
January 27, 1885.

TO LUCIUS J. PHELPS, Harlem River:

Accept congratulations from the employes of the N. Y., N. H. & H. R. R. upon success in your great undertaking.

(Signed) H. A. CONLY,
Conductor on Train No. 15.

January 27, 1885.

TO H. A. CONLY, *Conductor Train No.* 15:

Your message of congratulations received. Accept thanks. This is the wedding day of the Electric Telegraph and the Limited Express—the two rapid means by which the world moves to-day. The man who neglects to use them both gets behind.

(Signed) L. J. PHELPS.

The future possibilities of these new inventions of Mr. Phelps appear to be very great. Just how far the system can be extended and applied it is impossible to foretell. But this appears to be certain: the risks of disaster on railways will, by this means, be greatly reduced from this time onward.

ACCORDING to some of our medical journals the use of mullein as a palliative for the cough of phthisis seems to be meeting with favor in various quarters. The customary form of administration has been a milk decoction of the plant. More recently the smoking of the leaves has been recommended as a more agreeable and effective method of administration.

Practical Method of Transferring and Coloring Photographs on Glass.

Mr. W. M. Ashman, in the *Photographic News*, gives the following interesting details about the art of transferring and coloring photographs on glass, which has within a recent period been introduced under various names as the ivorytype, the Romantype, etc.

The mounted photograph is removed from the card by immersing in water until the paste sufficiently softens to permit the print to be carefully removed without injury. Remove all paste from the back of the unmounted print, and trim a little smaller than the size of the glass to be used; rub the albumen side gently with a piece of linen rag dipped in benzoline as supplied at the oilman's, plunge into warm water, and after two changes blot on a clean towel; place the albumen side upward on a hard flat surface (a piece of plate glass), and apply the mounting solution or paste all over it.

Mounting solution is composed of:

French gelatine	20 grains,
Water	1 ounce,

to which is added an alcoholic solution of salicylic acid five drops; this requires warming up a little before using.

For mounting paste, use French gelatine, 20 grains, dissolved in water, one ounce; to this add an equal volume of ordinary starch paste and a similar quantity of Kingsford's Oswego blancmange, and twenty drops of an alcoholic solution of salicylic acid as an antiseptic; heat the above ingredients over a water bath for a few minutes, stirring the whole time; when cold, it is ready for use. To a previously clean convex glass apply some of the same mountant as used on the print all over the inside surface, then lower the print, albumenized side down, gradually on to the inside of convex glass. It does not require any great amount of skill to do this without blisters or creases; but, if such should occur, it may be easily withdrawn and mounted afresh. Well squeegeeing, to remove excess of paste, is the next operation, after which it may be placed on end to dry spontaneously, which will take from six to twelve hours according to the temperature. To make a squeegee, procure a strip of rubber composition about one-eighth of an inch in thickness, cut one edge to fit the bevel of large plates, place a strip of wood on either side, and screw all together, leaving about one inch out on the beveled side. No squeegee will be found necessary when small plates are used, any excess being more easily removed by the fingers.

When the photograph is quite dry, place it on a cushion, and rub the paper away with fine glass paper, working gently in a circular direction, the object being to get the photograph as thin as possible, and thereby more easily permeated in the next operation; but care must be taken not to grind off all the paper.

There are several substances suitable for rendering the prints transparent, but the writer has found as good as any a mixture of:

Canada balsam	5 ounces.
Solid paraffine	2 "
White wax	2 "

Melt at as low a temperature as possible, then place the picture therein, keeping the composition in a molten condition either in a slow oven or on a water bath. If a high temperature be maintained, the print will lose its whiteness, and, when painted, will appear somewhat bilious. At the end of an hour the picture should be examined, when, if it is quite transparent, it may be removed, and when cool enough the excess wiped off. If, on the contrary, opaque patches are still visible, it should be allowed to get cold, then rubbed down a little more with glass paper, and again put into the wax composition, allowing it to remain until the marks disappear. When cold, rub off all excess, and proceed with the painting.

The writer was shown some pictures treated as above, but the painting was performed with a shilling box of water colors, and though so little had been done, it was really surprising what a pretty effect it had. To overcome the difficulty of putting water color on such a repellent surface, a friend said he had used shellac dissolved in borax as a medium to mix the colors; he then found no difficulty in working in any way he pleased on the print, while, for the back glass, water answers equally as well as on colors; but this class of picture seems to lend itself particularly to oil colors.

Having prepared the photograph, the next thing will be to describe, as concisely as possible, the operation of coloring. The glass supporting the photograph should be laid on the retouching desk, concave side upward, and the most important points noted. These comprise such things as the eyes, lips, high lights, hair, flowers, jewelry and small details, etc., for they must be all colored on the back of the photograph. It is recommended that the beginner paint in the hair, flowers, and jewelry, before attempting the eyes, for they will be found more difficult than any other part of the process. Mix a little each of Naples yellow, Indian yellow, and poppy oil for very light golden hair; burnt sienna and poppy oil for brown hair; and black, Vandyke brown, and poppy oil for very dark hair. Linseed and boiled oil may be used for the purpose instead of poppy oil; but the latter will be found to answer every purpose.

Having applied the paint to the hair, turn the glass round to see the effect; also whether the whole surface has been covered or not. Should it have been satisfactorily performed, the lips and cheeks may be done next. They should be painted with a mixture of vermilion and carmine in the following manner: Run a line of color along the surface with a brush well charged with color, softening it off with a dry brush; while working with this color, put a spot in each nostril, to warm up the heavy shadows in the photograph—also in the corner of the eyes, and any other part of the picture requiring that mixture. It will be well to again examine the picture from the front.

All being satisfactory, the eyes may be next attempted. Paint the pupil with pure black, and the light spot in the iris with Chinese white. Mix a little blue with the Chinese white for the white of the eye. When quite dry, paint the iris with a mixture of ultramarine and poppy oil for deep blue eyes; mix black, white, and ultramarine for gray eyes; and for dark brown eyes use Vandyke brown with black, using poppy oil in each case. If the colors are not strong enough, they may be strengthened; but the first must be allowed to get quite dry before the second application, otherwise a muddy effect will be produced.

Eyebrows, mustaches, and whiskers are colored by laying on the color sparingly, and softening off with a dry brush. There should be just enough color laid on to do this nicely, because too much will look harsh, and not enough tends to flatten the picture.

Paint the jewelry in solid color, using, for gold, Indian yellow, Naples yellow, and vermilion; for silver, use Chinese white and black.

Lace should be touched up, the lights with Chinese white laid on thickly, and the shadows with gray composed of black and white. When the colors are dry, attach the second glass by means of gummed paper. Mix Chinese white with all the colors to render them opaque, and apply them roughly over the surface, no part of which should be left uncovered. The flesh color is composed of Naples yellow, vermilion, carmine, and Chinese white, thickly laid over the flesh parts, deepening the cheeks, if necessary, with vermilion, the shadows with a slight admixture of ultramarine, according to the subject. Dresses will in many cases be left to the taste of the operator; and in painting them it must be borne in mind the sort of background that is intended, for harmony must prevail where large surfaces—such as backgrounds and dresses—are treated. Otherwise, however nicely the flesh and other details may have been executed, if the larger surfaces do not agree, the result must be considered a failure (loud, in fact). Any work put on, if found afterward to be unsatisfactory, may be easily removed with rectified spirits of turpentine on a piece of linen rag, and the same substance will be found useful for cleaning the brushes, finishing them in a little methylated spirit.

The principal tubes of color required will be Chinese white, black, Vandyke brown, chrome No. 1, burnt sienna, Naples yellow, ultramarine, Indian yellow, carmine, vermilion, also a bottle of poppy oil; brushes and palette, turpentine, and methylated spirit.

Coating Metals.

Galvanized iron is not usually submitted to the galvanic battery; it is iron coated with melted zinc, just as iron is coated with melted tin to produce tin plate. Sheet or plate iron can be put into all the forms that galvanized iron can be made to assume, for the galvanizing, or coating with zinc, does not change the radical characteristics of the iron. The object of the coating by zinc is only to preserve the iron from oxidation by the atmosphere, acids, clear water, and water containing acids and salts. For some purposes—art ornamentation principally—a coating of zinc is precipitated on iron by oxide of zinc in sulphuric acid deposited in the usual way by electricity.

But ordinary zinc coating is produced in a much simpler way, and it is not confined to unmanufactured sheets, or even to thin iron; castings, forgings, rods, chains, and many manufactured articles are zinc coated by immersion in a bath. The material to be coated is chemically cleaned by a bath of sulphuric and nitric acids and water in proportions of one by measure of each of the acids and four by measure of the water. A previous dipping in strong lye, if the article is greasy, may improve the process. If the articles cleaned are not to be immediately coated, they should be mechanically cleaned in a tumbling barrel or scoured with sand and water.

The coating proper is simply a dipping, or lying for a minute or two, in a melted bath of zinc covered with powdered charcoal. The article is rapped with a mallet, or if small, like rivets or chains, is thrown against a sheet iron screen, to separate loosely clinging particles of zinc, and the work is done.

Thin brass articles, as kerosene lamp trimmings and the parts of chandeliers and lamp brackets, have a glossy varnish on them that is not japanned, nor is it a lacquer; it is really as durable as either, and is much cheaper. Without it these polished brass articles would soon become green with oxide and defaced with blotches. This invisible varnish is simply bleached shellac dissolved in alcohol; but the alcohol is burned off, leaving only the film of the gum. For lamp tops, as an instance, a boy takes a bunch of them strung on wire, dips them in a tank of shellac varnish, swings them out, and touches them to a gas flame. Instantly all is ablaze, and after waving the bunch back and forth half a minute, the blue flame burns out and the job is completed.

Laying Down a Rule of Life.

A thoughtful writer in the *Herald of Health* observes: "It really seems sometimes as if hygienic science were all wrong, and as if late hours, much hard work done under the gaslight, and the smallest amount of fresh air were the way to be healthy, if not wealthy and wise. Who lives under more unhealthy conditions than our legislators or the leading counsel learned in the law? But our statesmen are in a green old age at 75, and lawyers are quite boyish at 60; so, too, are actors and actresses." Our contemporary then goes on to say: "Sanitary guides should tell us the meaning of these things."

"So far as we may presume to respond to this appeal," replies a physician in the same useful journal, "we must be allowed to point out, first, that there is a fallacy in the inference that because members of Congress, busy counsel, and, perhaps, actors and actresses, live on in spite of the adverse influences of surroundings which are held to be injurious to health, therefore the surroundings of their lives cannot be as injurious as they are supposed to be. One of the earliest exploits in the applied science of statistics as brought to bear upon sanitary questions was the drawing of an inference that, because the London night men, who slept as they might by day, and spent the hours of darkness in emptying cesspools, were able, as a class, to claim a very low rate of mortality, their mode of life and the work in which they were engaged could not be unhealthy. A good deal of excitement, we remember, was produced by this delivery some forty years ago. It was forgotten that another point of view was possible, and that, in truth, none but the inured could live under such conditions! So it is with members of Congress, busy counsel, and actors and actresses. The weakly and sensitive retire or die, or have the wit not to enter into a way of life which must obviously prove unsuitable. At the same time, we are quite prepared to meet our contemporary half way in his argument, though the inference with which he opens the debate is obviously faulty. We think a great deal of unpractical nonsense is talked and written on the conditions of health, and we are quite sensible of the fact that regimen and dieting may be carried too far. Practitioners and those who set themselves up as apostles of sanitary science are too prone to measure other people's corn by their own bushel. For example, a physician or surgeon may himself have been a too free liver—it is easier to preach than to practice—and he may have become a vegetarian just in the nick of time or with great advantage to his health; but this is certainly no reason why he should spend the remainder of his days in trying to persuade others that vegetarianism is good or necessary for them also. Again, a medical man may have a miserably weak digestive faculty, and need to avoid certain dishes which other folk can take, not only with impunity, but with benefit; but that is no reason why he should go about abusing and interdicting the things that disagree with him, while they agree perfectly well with the majority of mankind. By pushing dieting to the verge of starvation, we are simply pretending to cure, not curing; we impose on ourselves and on those who confide in our practice."

Sorrel's Millstone Cement.

The millstone cement discovered by Sorrel, the French chemist, some years ago, and since quite extensively used, is made in the following manner: The oxychloride of magnesium is the basis of an artificial burrstone, and is formed by adding a solution of chloride of magnesium, of the proper strength and in the proper proportions, to the oxide of magnesium, obtained by calcining magnesite. The magnesite is burnt by ordinary lime kilns at a dark cherry-red heat. The result is protoxide of magnesium, which is next ground to fine powder between horizontal millstones, making cement which is perfectly white. This "cement" is then mixed with ground or powdered burrstone in proper proportions.

When applied in repairing, filling the joints, cavities, and seams in French burr and other mill stones, it is wetted with chloride of magnesium, which converts the oxide of magnesium into the oxychloride. The now semi-plastic mixture is rammed or tamped into the holes required to be filled, where it hardens. The chemical result is due to the combination of the chloride with the oxide of magnesium, and this covering each particle of the ground burrstone with a thin film causes the mass to adhere together with such solidity that, when made into blocks or stones, it is capable of resisting a crushing weight of more than 20,000 pounds to the square inch.