which includes nearly all the decorative pottery used in the country. It is true that manufacturers in this vicinity are making great efforts to produce as finely decorated porcelain as can be obtained from abroad. and their progress has been satisfactorily rapid; but it needed only a casual examination of the exceptionally fine display of American porcelain at the American Institute Fair of last year to show that artistic taste and skill were even more lacking than the ability of the manufacturer to reproduce the delicate or rich colors of the foreign ware. There can be no question but that we have in this country every variety of clay necessary for the production of all kinds of pottery from earthen ware to porcelain. Indiana kaolin is claimed to be superior in composition and perfect whiteness to any European clay. We are producing large quantities of common ware, which, although it requires skilled labor, does not enlist the artistic element. We would produce fine ware if the artistic ability which abundantly exists in the country could be properly brought into play.

But, as we have endeavored to point out above, a large percentage of that ability among the women who, by their inherent delicacy, natural refinement of taste, and physical circumstances are far better suited to its exercise in ceramic art industry than are men, is being frittered away aimlessly and uselessly. Perhaps worse than this, for they are filling their homes with objects which falsely educate the eye and mind, and lead the rising generation to form its first standard of taste upon vicious principles. At the same time they are neglecting the cultivation of a field which urgently needs laborers. Women who are competent to decorate pottery finely will find their services in ample demand, and their means of livelihood secure against chances of fortune. Whether the art be followed for this reason or as an amusement only, it is refining and educating, and its influence is always beneficial, and this cannot be said of "potichomanie," "decalcomanie," or "keramics."

## THE MANUFACTURE OF DAUBS.

Art degraded to a trade, the *Tribune* calls it, but that is an insult to honest industry. It is because the daubs are made to be sold for what they are not that the business of making and mounting imitation works of art is objectionable. The daubs, known to the trade as "buckeyes," are turned out by the thousand, some shops in this city being able to produce them at the rate of a hundred a day. About nine tenths of them are copies of landscapes. The "artists" need only so much skill as will enable them to handle a common paint brush or to manage a stencil plate. In many of the shops the most of the work is done by boys and girls earning from fifty cents to a dollar a day. The maturer workmen paint by the piece, getting from fifty cents to two dollars for each painting.

They paint entirely by rule, using paints and canvas prepared by the manufacturers. The canvas costs about eight cents a square yard. Poor artists are employed by the day to touch up the pictures, which are varnished to hide their more glaring faults, and then flashingly mounted in imitation gilt frames. The entire cost of paintings and frames is about one fifth the cost of good frames; yet when new they appear very attractive to the inexperienced, especially when displayed under gas light in auction rooms. Placarded as choice collections of American and foreign artists, daubs, which can be bought of the manufacturers at the rate of $50 a dozen, often sell for $20 or $30 a piece.

The largest manufactory of such paintings in the city occupies the whole of a three story building. The most of the pictures go out of the city. The owner said to the *Tribune* reporter: "I get orders from all parts of the country now, and can fill an order for a hundred pictures with a few hours' notice." The prices of this maker range from $30 to $100 a dozen, frames included, most of these pictures being 36x22 inches, a size convenient for the economical cutting of canvas. At a rival shop the prices ranged from $40 to $150 a dozen. Another manufacturer of "buckeyes" of a smaller size sells them for $16 a dozen.

The swindling devices adopted by dealers in these fraudulent pictures are those of mock auctioneers everywhere; and the manufacturers abet the swindle by signing their daubs with the names of popular painters ingeniously misspelled, or with initials wanting. It is a common trick of hawkers of these pictures to profess to be artists in distress and willing to leave valuable pictures as security for a small loan; or they are about to leave the city to fulfill a profitable engagement, and would be glad to sell at a great sacrifice to raise the money needed for the journey. A gentleman who took a painting as security for a loan of $80, the other day, discovered soon after that the regular price of the picture "by the dozen" was fifty cents a piece!

## THE SCIENTIFIC APPLICATIONS OF PHOTOGRAPHY.

In a recent article we briefly reviewed late progress in astronomical photography. In the present we propose to point out some of the latest and most curious applications of photography to scientific investigation, besides its special adaptations to many useful purposes, many of which have been recently explained by M. Radau.

With the magnificent panoramic views of sketches of landscape which it is now possible to produce by photography every one is familiar. Apart from the value of these as works of art, they have practical applications to topographical uses, to which reference will be made further on. A curious feature of photographic representations of archæological objects is that the careful study of the picture is often the means of revealing facts hitherto unnoticed. For example, on a photograph of the Acropolis, at Athens, Baron Gros discovered, by the aid of a lens, a curious carving on one of the stones which formed part of the ruin. The engraving represented a lion devouring a serpent, the design evidently dating from an ancient Egyptian epoch. Another odd circumstance is that photography sometimes reveals things totally invisible to the eye. Inscriptions on ancient manuscripts have thus been brought to light. The ink, containing peroxide of iron, had faded so that it was no longer visible, but it had affected the photogenic power of the surface, so that in the photographic print the characters once more appeared in their original blackness.

Geodesy and military topography now find an important aid in photographic views. The picture being produced by lenses is made to conform to geometrical rules, and represents a central perspective much more exactly than could be produced by means of measuring instruments. A number of such photographs of a given locality, taken from different stations, allow of the determination of both the relative situation and the location of objects, and thus charts may be accurately constructed without the necessity of making actual surveys.

It has been proposed in this way to map new regions, such as the interior of Africa, photographs being taken of large expanses of country from commanding eminences, thus avoiding a large amount of arduous personal labor. Military maps are not only now reproduced in large numbers by photography, but they are supplemented by numerous views of the district plotted, so that an army in strange territory is thus afforded minute information, not only of the general physical characteristics of the region, but of its minute peculiarities.

There is probably no more important application of photography to scientific uses than as an auxiliary to meteorological work. Photographic registering apparatus operating automatically produces curves, which show by simple inspection all the phenomena incident to climate. If, for example, it is necessary to register the indications of a barometer or thermometer, a clockwork movement unwinds in rear of the instrument, which is suitably illuminated, a band of sensitized paper, on which the varying heights of the mercury are recorded.

Atmospheric pressure is registered in this way by the aid of an ordinary barometer, suspended so that the shadow of the mercury meniscus and the divisions of a scale traced on the tube are projected simultaneously on the sensitized leaf. To record the movements of a thermometer the beam of light is caused to pass, not through the vacant space above the mercury, but through a small air bubble introduced in the mercurial column, and which thus serves as an index. The addition of a wet bulb thermometer allows of the production of two thermometric curves, which separate as the air becomes drier, or approach when more moisture is present. The relative humidity of the atmosphere may also be registered by means of a hair hygrometer, the needle of which travels across the slit through which the beam of light passes.

In order to record the fluctuations of terrestrial magnetism, movable magnetized bars are used, each having attached to it a small mirror which, when at rest, forms the prolongation of a fixed mirror. The beams of light which the two mirrors reflect through a slit describe on the sensitized paper a black spot, which becomes a line as the paper moves. The least oscillation of the bars causes the separation from this line of the trace produced by the movable mirror, and in this way all the movements of the magnetized bar are registered. It will easily be understood how arrangements analogous to the above will allow of an exact representation of all the physical or physiological phenomena which are manifested by visible movements. M. Stein, for example, proposes thus to record the level of tides, now commonly marked by a pencil fixed to a vertical rod attached to a float. M. Neumeyer, of Berlin, has constructed an ingenious apparatus for studying submarine currents and determining the temperature of the sea bottom. A copper cylindrical box, which is attached to the sounding line, contains a thermometer and a magnetic needle, which are illuminated by Geissler tubes filled with rarefied nitrogen, through which electric sparks are passed. This light suffices to mark in less than three minutes, on sensitized paper, the image of a mercury column and the position of the magnetized needle. A sort of vane or rudder attached to the box serves to maintain the "lubber's point" of the compass in the direction of the current.

Dr. Forel has adopted the same means of investigation to the examination of the causes which produce periodical variations in the transparency of the water of Lake Leman. This water is more transparent in winter than in summer, and in order to determine the extent of this variation, it became necessary to obtain precise numerical data. One method used consisted in placing at the bottom of the lake a box, in which was adjusted under glass a sheet of sensitized paper. This was left for two days exposed to the solar rays which passed through the water. Half of the paper was covered by a screen, so that the degree of coloration could be determined by comparison. On removing the sheet the color was fixed by hypo solution, and it was then compared with a scale of shades determined in advance. In this way it was found, for example, that in February, at the depth of 160 feet, a coloration represented by 20 was obtained, while during July no effect was visible at the same depth. The limit of obscurity was thus found to be 160 feet in summer and 320 feet in winter. This was verified by noting the depth at which a white disk attached to a sounding line ceased to be visible. M. Forel reached the conclusion that the cause of the variation in the transparence was the presence of organic matters in the water, which distributed themselves differently in summer and winter.

The study of the solar spectrum and other luminous spectra has been greatly advanced by the intervention of photography, which has been the means of recognizing dark lines or spaces in the ultra violet region, the rays of which produce scarcely any impression on the retina. A large number of such lines have been thus determined by Rutherford, Draper, and Mascart. Similarly Vogel has made some new discoveries with regard to the obscure rays in the red region. He has found that it is sufficient to mix with collodion coloring matters which absorb the red rays to render it sensitive to the action of such rays, so that the special designation of "chemical rays" applied to those of the violet and ultra violet region may be considered as obsolete, all the spectral colors being capable of affecting a photographic plate properly prepared.

Photography renders important aid in physical investigations. Bunsen and Roscoe, by the aid of sensitized paper, have measured the changing intensity of solar radiations. Dr. Stein has photographed zigzag lightning. The indented image of the manometric gas flame produced on the rotating mirror has been photographed. Instead of ordinary illuminating gas cyanogen is now employed, on account of the superior photogenic power of the flame. The rapid oscillations of tense cords and the beatings of the human pulse have also been photographed. The applications of photography to medical studies are numerous and valuable. Without mentioning the faithful reproduction of anatomical preparations, which is facilitated by the injection of colored liquids, it is possible to send the investigating ray into the depths of the living body. To the ophthalmoscope, which reveals the inner eye, the laryngoscope, which shows the interior of the throat, the otoscope, which explores the ear, may be added the sensitized plate on which the image of the impaired organs may be fixed. By the aid of photomicrography, images of microscopic objects, the rapid alteration in which fatigues and baffles the eye, may be permanently caught. Dr. Duchenne, of Boulogne, has made a complete series of photographs of muscles under the influence of various passions (the electric current being used to produce the necessary contractions), which have been of great assistance to Mr. Darwin in his study of the expression of emotions in man and brutes.

Perhaps most curious of all the applications of photography is its possible adaptation to the discovery of disease. Vogel mentions a case where the face of a sitter appeared in the portrait covered with spots, although none were visible on the skin. On the day following that on which the picture was taken, an eruption did appear, and the person afterwards died of varioloid. The feeble yellow of the incipient pustules had evidently affected the sensitized surface, and the disease had shown itself to the camera before it had been recognized by the doctors. Lastly, we may mention Dr. Oedtmann's suggestion of the value of collections of family photographs in the study of anthropology. He has already begun the collection of large numbers of portraits, and from these he proposes to investigate what modifications selection may exercise on the hereditary transmission of personal characteristics.

## Torpedo Inventions Wanted Abroad.

Inventors will do well to remember that now is the time to bring out military inventions, and especially devices relating to torpedoes and torpedo defense. The Russo-Turkish war afforded very little opportunity for the testing of the efficacy of torpedoes in actual combat, though the blocking of the Russian harbors on the Black Sea by their agency against the Turkish fleet added some new proof of their value as a means of keeping off an enemy. The difficulty between Russia and England is, however, so far from adjustment that both powers are busily arming. Recent intelligence reports the Russians as building 100 new torpedo boats, and that the English are giving out large contracts for the same kind of craft and for immense numbers of torpedo sinkers. Inventors who have ideas on the subject should now get them into practical form, and after obtaining the necessary protection take steps to lay them before the English or Russian authorities. The English government receives and examines inventions of this kind, on their being submitted to the Admiralty.

WORK is being pushed upon the Gilbert Elevated Railroad, in this city, with great vigor, and the cars are to run next month. The iron work is covered with a soft drab color quite agreeable to the eye, and in good contrast to the dark somber colors often used upon iron bridges, etc. The contract for supplying paints for the Gilbert road has been awarded to the H. W. Johns Manufacturing Company, and is said to be the largest contract ever made for any single structure in this country.

MANY alloys of tin and other metals, which are rendered harder by additions of antimony, copper, etc., do not, when struck, emit a clear sound. M. Lilliman, says *Les Mondes*, finds that this may be remedied by dipping the metal for about a minute in a bath of paraffin or oil heated to a temperature of 122° Fah. This operation is said to augment the hardness of the alloy.