the hoisting apparatus by counterweights. In order to prevent the bridges from binding, they are provided with long legs which slide in angle guides attached to steel stanchions. The mechanism which operates the lifts is placed entirely below them in order to allow an unencumbered floor when the top of the lift is flush with the stage. Each bridge has an independent electric motor with drums and cables. Each motor is of 7½ horse power and is of a four-pole inclosed type, the motor being shunt wound. The motors make 520 revolutions per minute. The speed is reduced to the ratio of 104 to 1 through a worm and worm wheel, the worm wheel being geared to a shaft which carries two winding drums which make five revolutions per minute. Upon these drums are wound steel wire ropes which pass over guide pulleys and are connected at four places on the legs of the lift near each corner. The speed of lifting corresponding to the full speed of the motor is 16 feet per minute, but this can be reduced to 6 feet per minute, as desired. Equalizing devices are provided so that the tension on the ropes is rendered uniform. The movement of the lift is controlled by a combined starting and reversing switch which is operated from below the level of the stage from a position by which the operation of the machinery can be observed. Hand gear is provided for working each lift, in case the electric power should fail. Devices are fitted for holding the lifts stationary in case the ropes should break. Very often as many as thirty people would have to be carried on it, or a "tally-ho," as shown in our engraving.

Automatic switches are provided for cutting off the current in case the operator should be derelict in his duty, so that the drums cannot overwind. Appliances are also provided for stopping the bridges at a certain fixed place. The lifts have been tested thoroughly and they have worked with smoothness and without jarring. The new installation may be regarded as a most important advance in stage mechanism, and the subject is so interesting that we publish additional illustrations showing the working of the bridges in greater detail in the current number of the SUPPLEMENT.

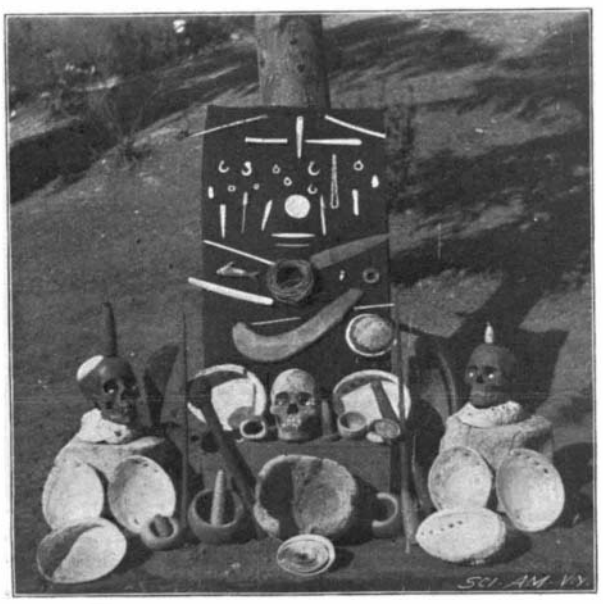
THE WIND-SWEPT ISLAND OF SAN NICOLAS.

BY PROF. C. F. HOLDER.

About seventy miles off the coast of Southern California lies the island of San Nicolas—a veritable desert, wind-swept to such a degree that one might well imagine that the furies are guarding the island. San Nicolas, which is twelve miles long and four or five wide, has no harbors, the anchorage being merely a lee under the low hills; the fact that the wind blows directly offshore making it possible for vessels to anchor here at certain seasons.

On this island, which has been the central point of a romance and tragedy of much interest, deserted and alone, Maria Better Than Nothing, the wild woman of San Nicolas, lived twenty years—long enough to forget her people and even her language. The story is as follows:

For centuries the island was inhabited by a race of hardy mariners who have left their monuments in large shell heaps and mounds that cover many acres. Less than one hundred years ago, the Franciscan fathers determined to take the natives away from the inhospitable island and provide them with homes around the various missions, where they could also be comfortably converted. With this object in view, a vessel was sent to the island, and after much difficulty the Indians, now reduced to about one hundred, were collected, taken aboard, and deserting thousands of implements which their ancestors had used for centuries. When the vessel was about to sail, one of the women discovered that her child had been left behind. But it was blowing a gale and the vessel could not hold, so the captain sailed away, whereupon the frantic mother dashed into the sea and swam back to the shore, making her way successfully through the surf. The captain of the vessel promised to return for the woman, but soon after his vessel was wrecked, and no attempt was made to rescue the poor Indian woman until twenty years after, when a priest determined to make an effort to learn whether she was alive. He enlisted the services of an otter hunter and several Indians, who in a small schooner, known as "Better Than Nothing," set sail for San Nicolas.



IMPLEMENTS FOUND ON SAN NICOLAS ISLAND.

They landed on the island, and very soon found evidence that some one was living there, but avoiding them. To make the search perfect, the men formed a line across the island at certain distances apart, which resulted in the discovery of the wild woman. She was sitting by a brush hut in a cañon, about which was a windbreak of whalebones and various material. She smiled and spoke to the Indians in a language they did not understand, but they fell on their faces before her as though to worship her. She offered them food and readily consented to go with them, and was taken aboard the schooner with a tame otter. She was dressed in the skins of birds, over which was a garment of sealskin. She was named Better Than Nothing, after the vessel, and by signs succeeded in telling some Indians on the mainland something of her history. At first she had mourned the loss of her friends; then the dogs killed her baby, and she wished to die and was sick for a long time.

She was taken to Santa Barbara, where Indians from all about were brought to her to see if they could understand her language; but without avail. She lived with different families at Santa Barbara, but civilization proved disastrous to her, and in less than three months she died. Her remarkable dress of feathers was sent to Rome as a curiosity, and the remains of the unfortunate woman found a resting place in the sanctified ground of the mission.

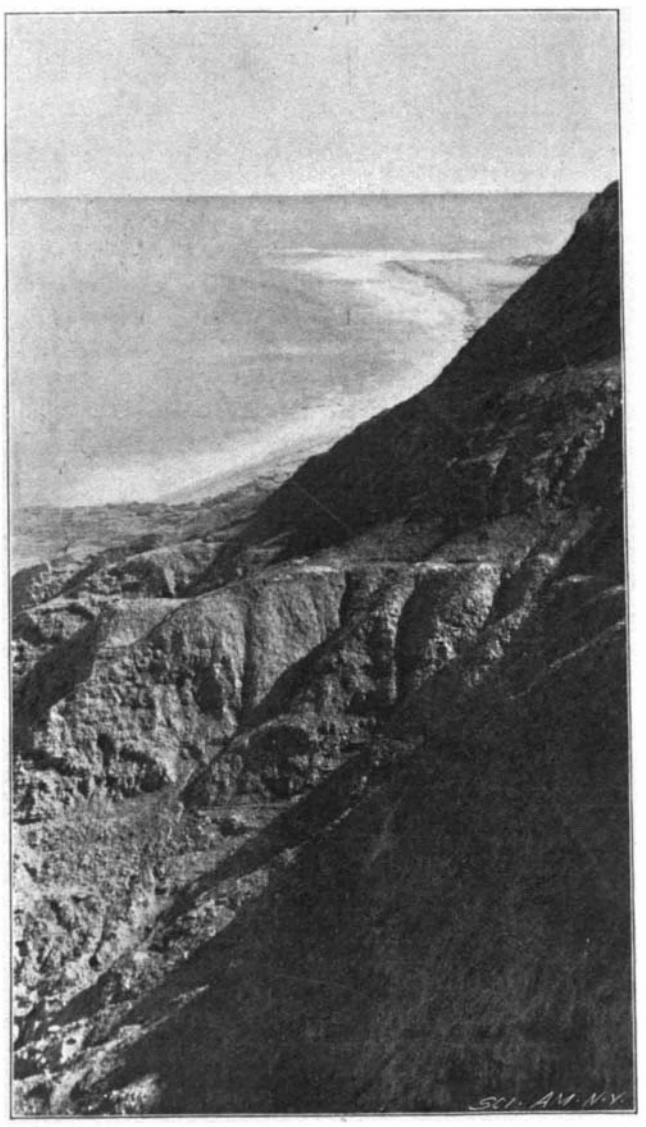
San Nicolas has proved a veritable treasure house for the archæologist, and tons of stone implements have been taken from various mounds on the island. One of the most remarkable shell mounds in the world is found here, being it is said nearly a mile long and ten feet in average height. On its wind-swept surface innumerable objects have been found, exposed during previous hurricanes, with the bodies of Indians facing each other, having been buried in a sitting position with hands clasped over the head. With many remains were buried such personal effects as mortars, ollas, flutes, jewel boxes, charms, flint spearheads, and almost every article needed by a hunting and fishing people, all formed from shell, bone or wood. Fishing lines were made of kelp; sinkers of stone with a groove worn around or a hole in the center; the hook was of elegant design and bore the barb upon the outside.

One of the greatest curiosities on San Nicolas, after all, is the wind. It tosses the sand dunes into the air like wraiths and keeps them continually moving and shifting. It has buried a stone house and so threatened another that the lone herder on the island often deserts it for shelter among the rocks near the sea-lion rookeries, fearing that it will be blown into the sea. For two successive years the writer as guest of Commodore Burnham, of the Santa Catalina Yacht Club, made the attempt to reach this inhospitable island. The first time the yacht was blown away; the second the party was able to land, but owing to the terrific wind was glad to leave. Approaching the island presented a flat and barren appearance, and the yacht finally came to under the lee of strange cliffs that rise from the sea, while to the north a long spit of sand extends to the east. In some places the cliff is worn by the combined forces of water and wind into marvelous shapes and is everywhere difficult of ascent. Some sailors have a superstition that the strange wind that blows from the island is from the souls of the natives, who resent this intrusion and the robbing of their graves.

The yacht's party soon had an experience with the wind. A black fog cloud came sweeping down over the island and the wind blew a hurricane, dissipating the fog and blowing until two o'clock in the morning. The landing was made in a heavy sea—a dangerous operation. The single inhabitant, a French herder, was standing on the sands, looking a typical Robinson Crusoe. He had a big hat strapped on under his chin, an old-fashioned shot gun over his shoulder, a cane in his other hand. Two half-breed shepherd dogs crouched near him. He evidenced no desire to hear from the outer world; his one wish was for beans, which, unfortunately, could not be gratified. He had a small fortune at hand in the antiquities which he could pick up, but he was undoubtedly loath to despoil the graves, though not averse to pointing out the skeletons which had been uncovered here and there. Everywhere the wonderful evidences of the wind were apparent. In one cañon the writer photographed a section that seemed to have almost been carved by Titanic hands. There were great faces, impossible forms of animals, delicate lacelike tracery, all creating a weird effect.

Reaching the summit after a hard climb over cliffs of yellow, blue, white, green and other shades a mesa was found, almost perfectly level, extending for five or six miles. Not an object broke the level that appeared to be

STONE FOREST, SAN NICOLAS ISLAND.



SAN NICOLAS ISLAND LOOKING EAST.

covered with small polished pebbles, arranged in windrows, that in the gale were blown about and raised into the air with the sand cyclone that accompanied them. For several miles the barren mesa, from which strange cañons reached down to the sea in every direction, was followed. One object of the visit was to locate the spot where Maria Better Than Nothing lived; but it was evident that the isle of winds was ever changing; named after St. Nicholas, it should be mild and gentle, but the reality is a veritable fury. The island seemed to be in the grasp of innumerable sand glaciers, which instead of moving down moved up and were ever shifting in the wind. The cañon in which the so-called wild woman is supposed to have lived is visible. A more deserted spot it is difficult to imagine—a river of sand winding up from the distant sea and covering everything. Here and there rise strange tree-like shapes that resemble the trunk of spectral trees, and which but add to the weirdness of the scene.

Everywhere were evidences of former occupation. Some of the party dug into the mounds, where curious stone slabs marked perhaps the graves of the ancestors of the wild woman. Pearl fishhooks, bone pipes and a flint spearhead were found, standing possibly just where they had been left; and tons of implements have been taken from the surface of the sand dunes.

In one cañon a remarkable drapery of sandstone is being worn out by the wind. In others caves were found, one with strange hieroglyphics painted on the stone. Everything here tells of desolation and death; the sands strewn with the bones of a lost race, the deep cañons filling up with the deadly sand that conceals the remains of unnumbered people who lived here in the past.

The wind does not always blow at San Nicolas. The summer is the season of winds; in winter days and weeks follow when the island is at peace and the sand dunes seem sleeping. But fierce winter storms come suddenly, and the island is not in good favor among the navigators of the Pacific.

SHELL MOUND, SAN NICOLAS ISLAND.

Color Photography for Amateurs.

M. Leon Vidal, the eminent French physicist, whose work in color photography is well known, has recently presented to the Photographic Club, of Paris, a new method of working which is of great value to amateurs. He states that he has been frequently asked whether it was possible, by a comparatively easy process, to obtain positives on glass in natural colors, these being especially interesting for lantern slide projections. M. Vidal has devised a method which has the advantage of simplicity, and is easily within reach of amateurs.

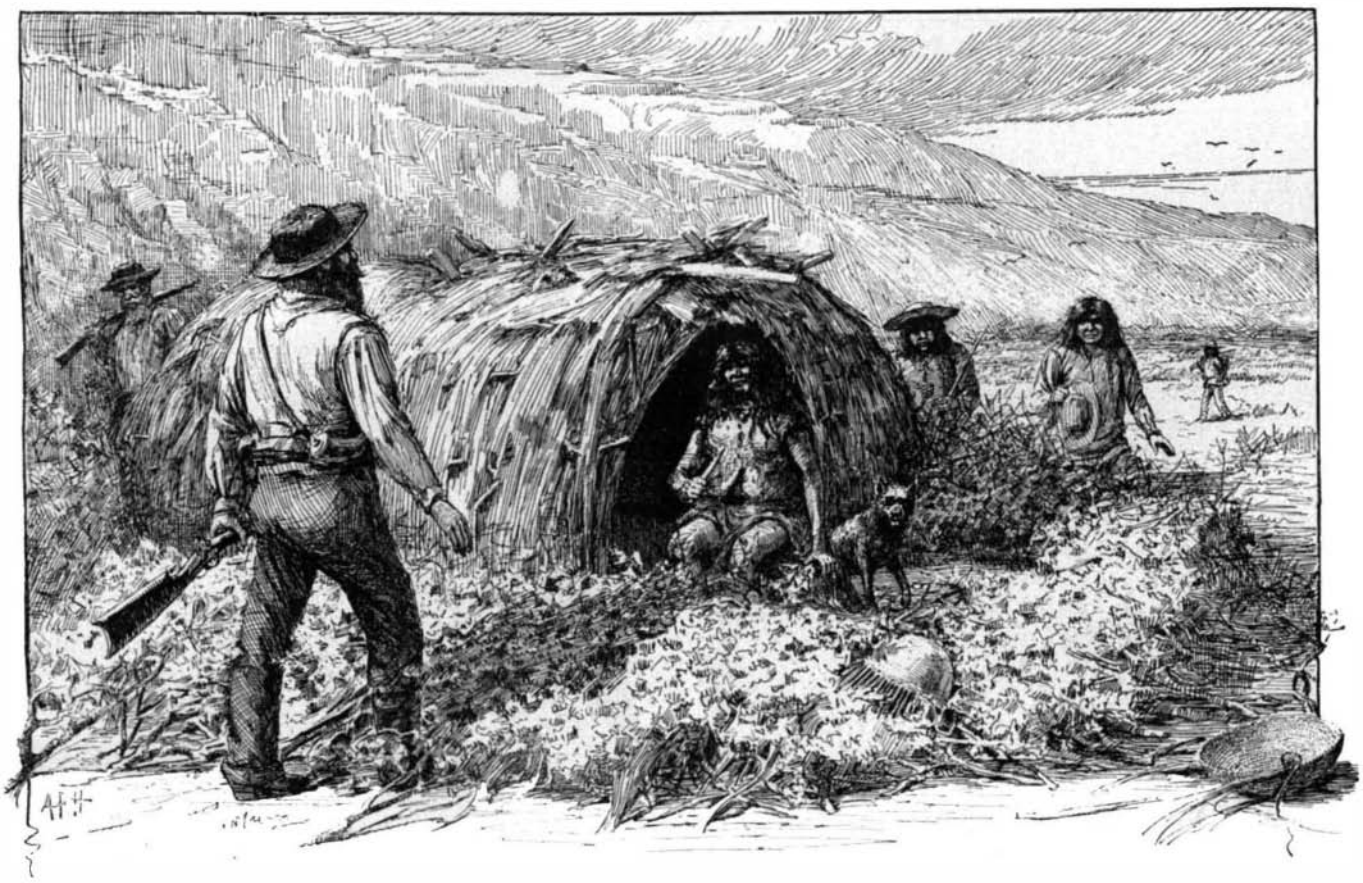
He proposes to give sufficient details to enable any one to obtain good results by carrying out his directions carefully. It will not be necessary to refer to the well-known process of obtaining the three negatives of the object desired, one giving the red rays, the second the green, and the last the violet. However, it will be useful to give the formulæ for the color-screens through which each of these negatives is to be taken. For the orange-red, two parts of eosine yellow and one part naphthol yellow are used, adding the proper quantity of water to give a good color. For the green, two parts of sulpho-green and one part of naphthol yellow are taken, and for the violet two parts of methyline blue and two parts of Paris violet. These solutions are to be filtered with care.

A clear gelatine plate is to be dyed in the solution: this may easily be obtained by dissolving out the silver bromide from an ordinary plate, then washing well and drying.

The plate thus prepared, which should be, of course, nearly transparent, is dyed in the color bath by an immersion of five minutes, agitating from time to time. The color-screens thus formed should be placed quite near the sensitive plate during exposure. For the reds and yellows, orthochromatic plates may be used, and ordinary plates for the violets. After a few trials upon colored bands whose tone is clearly defined, such as violet, blue, green, etc., the time of exposure through each of the screens is determined.

After having obtained the three negatives of the object, taken through each of the color-screens, the object is now to obtain a positive image in natural colors by placing together three positives which are to be made. For this purpose gelatine films are preferable. Eastman kodak films may be used, as they are sufficiently thin and transparent; they may also be printed through the thickness of the gelatine without losing sharpness.

Sensitizing.—A number of short pieces are cut off the roll of film and are then sensitized in a bath of bichromate of ammonia, 0·75 per cent. The immersion in the bath is about two minutes. They are then dried in the dark, being pinned against a board. As in this process the bromide of silver in the plate is a secondary consideration, the operation may be carried on by an ordinary lamp, but when the film is dry it should not be exposed to daylight before putting into the printing frame.



THE WILD WOMAN OF SAN NICOLAS.

Exposure.—The film is applied against the negative with its gelatine side outward, the light thus passing through the negative and through the thickness of the film before reaching the bichromated emulsion. As to the quality of negatives to be used for this purpose, they should be soft rather than too hard. The exposure in full sunlight varies from fifteen seconds to one or two minutes. It is possible, by opening the frame, to watch the progress of the image, but it is somewhat difficult to estimate in this way the exact amount of exposure to give, and the best plan is to use one of the well-known exposure meters, such as Warnerck's. By this means one may note the time of exposure of the proof which gives the best results, and work accordingly.

Development.—After exposure to sunlight, which may, in fact, be replaced by artificial light, the development of the image is proceeded with. This consists in washing out the unaffected portions in a hot water bath at 40° to 50° Centigrade; the positives are washed until the water shows no more traces of silver bromide. To avoid differences in the shrinkage, it is preferable to treat all the films which are developed at a time by water at the same temperature. A part of the bromide of silver has now been washed out with the soluble portion of the gelatine, and it is now necessary to get rid of that which is in the parts corresponding to the image. This bromide has been useful in making the image more distinctly visible, and thus the progress of the development may be noted; it is now dissolved out in a hypo bath of 15 per cent. The film is then washed in running water, and dried against a board.

Coloring of Positives.—Each of the positives is now to be dyed with its appropriate color, blue, red, and yellow, before assembling. To this end it is best to trace upon each of the films the letter corresponding to its color, before the bromide of silver is dissolved out, otherwise, as the films are then nearly transparent, it becomes difficult to identify them. [These colors are the complementary colors of the screens previously used; thus the negative taken through the red screen is to be marked blue, that taken through the green, red; that of the violet, yellow.] The blue to be used is rather inclined toward the green than the red; one of the best colors to use is the so-called metyl green, which in reality gives a very good blue. For the red, erythrome gives fine results; and for the yellow, a mixture of naphthol yellow and eosine yellow is brought up to the desired intensity. These colors are all soluble in water, and the solutions should be carefully filtered. The gelatine side of the film is applied to the surface of the liquid, and in a few seconds the gelatine will absorb the color to the desired degree of intensity. This depends, first, upon the degree to which the image has been printed, and second, upon the degree of saturation of the color bath. With a little practice, one soon becomes able to harmonize these two factors.

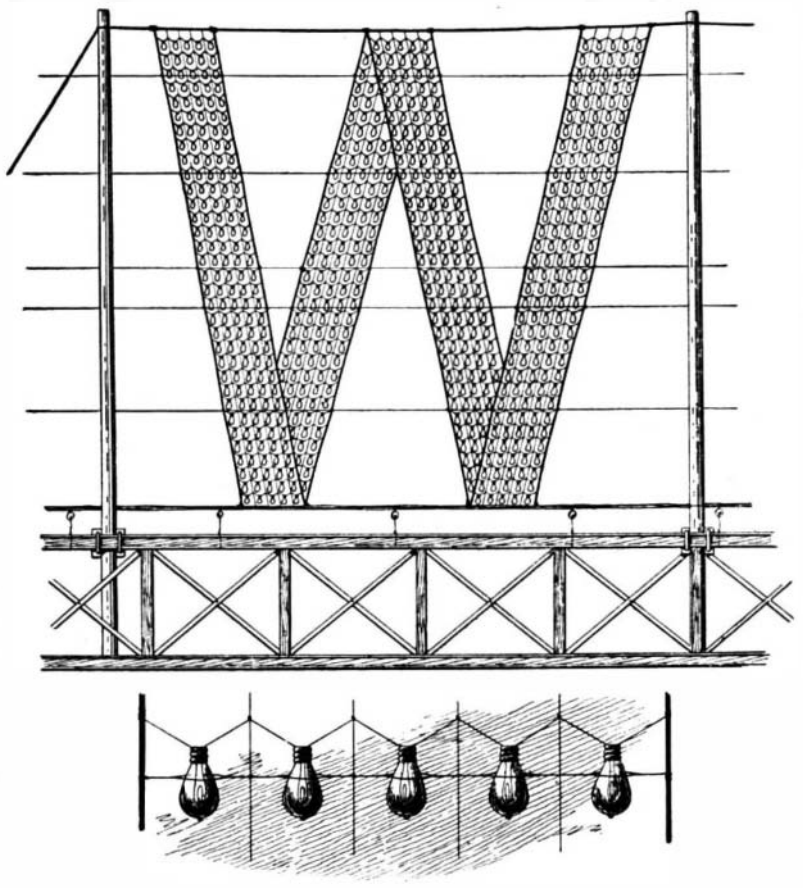
After dyeing the films they are dried without washing, and are then ready to be assembled. To this end the blue film is placed upon the yellow, and after having matched the images as nearly as possible, the two films are kept together by slightly gluing the upper corners. As soon as the glue takes effect, the red is put on, and held in the same way. The value of the result is now to be seen. If the exposures and color baths have been made to the proper degree, the result will be a brilliant image in natural colors. If the result is defective, it becomes easy to find the cause. Generally the yellow is good, but the red or blue may be too weak or too strong; it is then easy to correct this by making a new positive to replace one of these, especially if the exposure meter has been used.

When the films are good, they may be definitely mounted between two glass plates. By making stereoscopic positives by this process, remarkable results of relief and color may be obtained. It should be remarked that the colors are likely to fade under the action of strong daylight, and should therefore be protected. Another point to be observed is that the films

are subject to a certain shrinking, and therefore those which are to be matched exactly should always be worked under the same conditions.

THE ILLUMINATION OF THE BROOKLYN BRIDGE.

Electricity played an important part in the recent celebration in honor of the homecoming of Admiral George Dewey. Electric signs of all kinds were scattered throughout the city, and along the water front several corporations and private firms went to considerable expense to provide illuminated signs composed of incandescent lamps. The Brooklyn Bridge was naturally considered as a rare chance for illumination on a large scale. This was accomplished by erecting the words "Welcome Dewey" in incandescent lights. Each letter was thirty-six feet in height, and the entire length of the two words was 370 feet. The letter "W" alone contained about 1,100 lights and the total number of lights was 8,000. In addition, both of the lofty towers were provided with search lights, and the whole combined with the splendid fireworks made a never-to-be-forgotten scene. Our line cut shows the method of suspending the lamps between the poles. The poles were placed on the southern roadway and were lashed to the superstructure and were held in position with the aid of wires which acted as guy ropes. The lamps themselves were strung upon wires which were stretched between the poles. Before the work was completed it was found that the wind caused so much breakage that every lamp had to be anchored in position by the aid of wires which were twisted around the lamps as shown in our engraving. The current was taken under the roadway by cables and was fed to the latter by feed wires suspended between the posts at the bottom. Switches were provided on the posts to control the lighting. The effect of the gigantic letters was most imposing.



DETAIL SKETCH SHOWING HOW THE LAMPS ARE CONNECTED.

The Color of Blinds.

The remarkable and widely varying properties of the elementary colors which compose white light suggest that the employment of screens as in the blinds placed over our windows should be founded on a scientific basis, says The London Lancet. Our knowledge of the properties of each individual section of the spectrum is not exact, but this much we do know, that the rays of least refrangibility, the red rays, are without direct chemical effects, they occur at the heat end of the spectrum. On the other hand, the rays of the highest refrangibility contain the violet rays which chemically are exceedingly active. It is these rays which are concerned in photography and doubtless also in the great processes of vegetable nutrition and growth. The object of blinds is, of course, twofold—to keep a room cool and to screen out some of the light, so as to avoid the bleaching of coloring materials of the carpets and furniture. At the same time sufficient light must be admitted so that the occupant may see without difficulty. What then is the best color for this purpose? Since light exerts the peculiar action due to the actinic rays which materially and wholesomely affect the air of a dwelling room care should obviously be taken not to exclude all the rays that are so concerned. Thus ruby or orange-red material would be contra-indicated. Abundance of light is inimical to the life of micro-organisms, so that a material in some shape of a compromise should be selected. The best for this purpose is probably a delicately ocher-colored fabric. This would screen part of the active light rays, and if of a fair thickness the greater part of the heat rays, while admitting sufficient active rays to allow of a wholesome effect upon the room and its surroundings. Venetian blinds do not allow of the graduation, which is desirable, of the tone of light which may be adjusted with cloth fabric. As is well known, exclusively red light has been used as a therapeutic agent, and apparently with encouraging results, in measles.

The Human Body as a Caloric Machine.

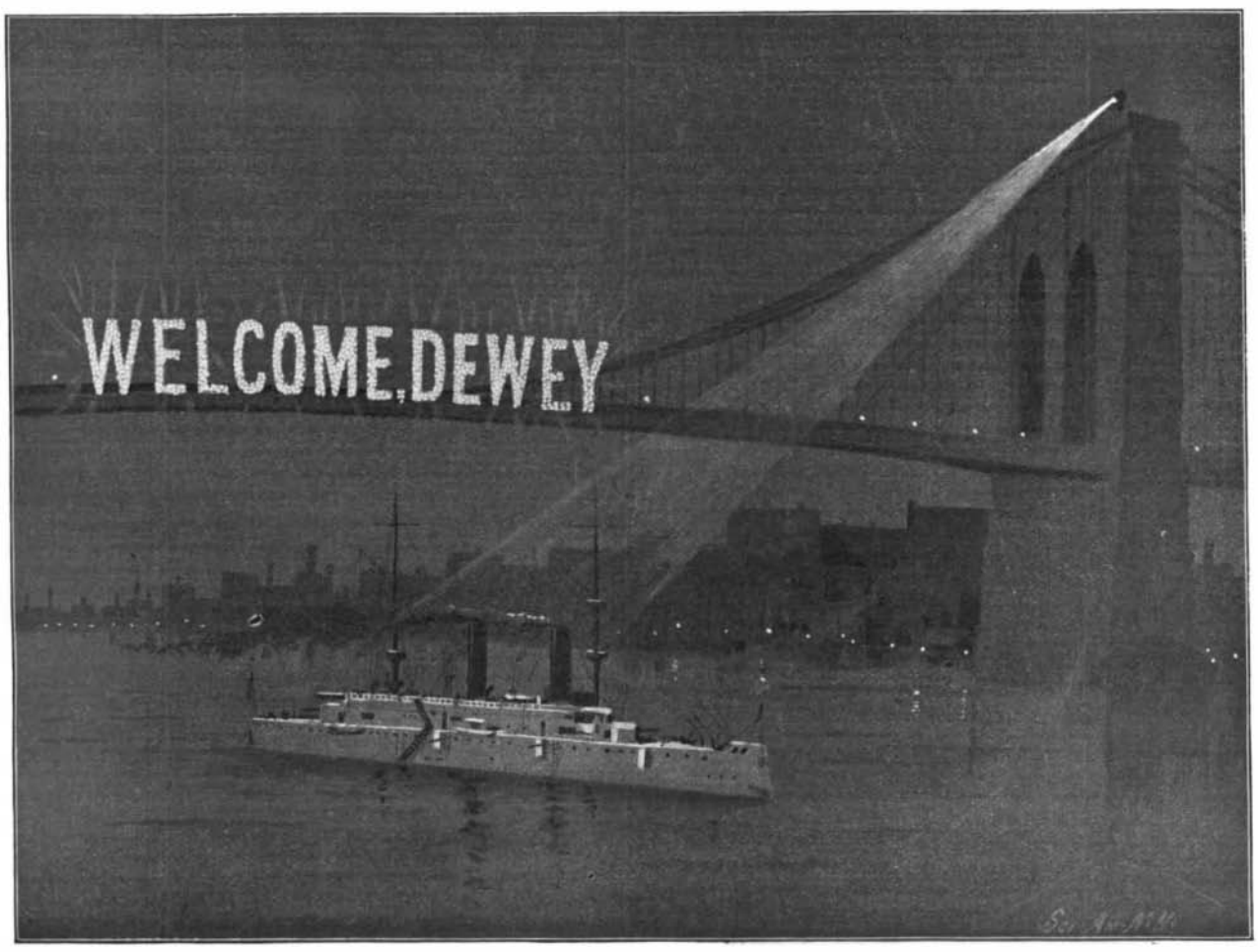
As the efficiency of a steam engine or other machine is considered as the relation of the work performed to the energy supplied to it, it is an interesting question to consider the case of the human system, and to find out what is the relation between the work which an average man is capable of performing and the aliments which he absorbs. A German savant, Rühlmann, has made some important researches in this direction. He considers the body as a caloric machine, i. e., as a motor in which the energy supplied is represented by the heat developed in the combustion, or rather oxidation, of the carbon and hydrogen contained in the aliments. The combustion of 1 kilogramme of carbon develops a quantity of heat equal to 8·08 calories, and that of a kilogramme of hydrogen 34·56 calories. A man of average strength produces in the course of twelve hours the oxidation of 0·252 kilogramme of carbon and 0·0156 of hydrogen. From this it follows that the heat of alimentation equals $0{\cdot}252\times8{\cdot}08+0{\cdot}0156\times34{\cdot}46$, or 2573 calories, corresponding, according to the mechanical theory of heat, to 1,094,000 kilogramme-meters, this figure representing the energy developed in the system.

To find out the average work performed by the individual, we may take as an example that of the Alpine guide considered by Dupin. The mean weight of this man was 70 kilogrammes, the load which he carried 12 kilogrammes, and the duration of his work 10 hours, each hour corresponding to an ascent of 400 meters. Accordingly the total work which he performed in that time was $82\times400\times10$, or 310,000 kilogramme-meters. To estimate the efficiency at which this work was performed, it is only necessary to find the ratio between this figure and that of the energy supplied to the body, as above estimated by Rühlmann, or $1{,}094{,}000\div328{,}000$. This gives us 30 per cent as the efficiency of the human motor. Or, if we wish to admit 25 per cent as a fair average, it is seen that a man gives only 25 per cent of the total energy produced by the oxidation of the aliments, the remaining 75 per cent being expended in internal work. This efficiency, it may be observed, far surpasses that of the steam engine and other similar motors, the steam engine giving on an average only 6 per cent of the energy stored up in the combustible.

The Man Who Has a Genius for the Inopportune.

The following from The New Orleans Times-Democrat illustrates the characteristic of persons one is continually meeting.

"There goes a man," said a Canal Street philosopher, "who has made a failure of life in spite of exceptional equipment for success. He is honest, affable, highly educated and industrious as a beaver. He has no bad habits, and I couldn't name a man in New Orleans who possesses a kindlier disposition, yet he is continually out of a job and is studiously avoided by everybody who knows him. The mysterious part of it is that nobody can tell you just why, and the poor fellow doesn't understand it himself. He is beginning to think that somebody has worked a rabbit's foot on him, but the secret is really this: He has a genius for the inopportune. By some malign freak of fate he always says and does the wrong thing at the wrong time. It is not lack of tact; it is destiny. For example, I like him, but he never called on me in his life that his visit wasn't highly unwelcome. He is morally certain to drop in just in time to catch one doing something foolish or discreditable, and you know how we hate the innocent chance witness of our follies. He made a mortal enemy of Col. —— because he happened to walk into his office while the old man was dyeing his mustache. He chanced on a certain prominent lawyer smirking before a mirror, rehearsing an impromptu after-dinner speech, and the prominent lawyer got even by knocking him out of a valuable contract. Those are two cases out of dozens. He never gossips or tattles, but the mere fact that he has seen things he oughtn't to see and heard things he oughtn't to hear makes his very presence embarrassing to the other fellows. It's most unfortunate, and all fate. If he were introduced to a man whose grandfather had been hanged, he'd be absolutely certain to begin talking about rope inside of two minutes. As I said before, he has a genius for the inopportune. My wife loathes him because her false frizzes blew off on the street one day and landed on top of his umbrella. He had nothing whatever to do with either the frizzes or the elements, but now I can't ask him to my house. Terrible to be under such a curse, isn't it?"



THE BROOKLYN BRIDGE ILLUMINATED IN HONOR OF ADMIRAL DEWEY.

OWING to the high price of copper, the imperial postal authorities of Germany propose to replace it for telephonic purposes with aluminum wire or iron wire coated with copper.