

HANDLING MATERIAL IN SHIPYARDS. BY WALDON FAWCETT.

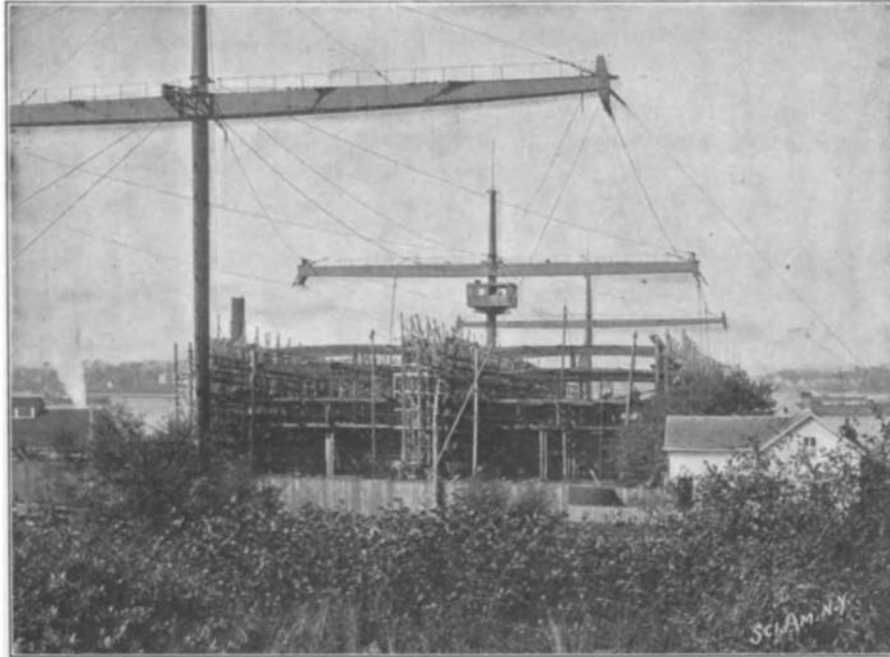
The problem of handling expeditiously and economically the various classes of material entering into the construction of the modern steel ship is one of the most perplexing which has been presented in connection with the industry, and one in the solution of which the American builders of metal vessels have expended much thought and experiment. The exigencies of the case are many. The material to be transported is almost invariably heavy and bulky; it must be carried long distances in a limited space of time, and as a rule it must be delivered at a point a considerable distance above the surface of the ground. Within the past year or two, however, American inventors have been particularly successful in evolving devices to meet these varied demands, and, in point of ingeniousness of appliances, the steel shipbuilding plants in the United States are now much better equipped than those on the other side of the Atlantic.

One of the most interesting installations of this character has lately been made at the newly established plant of the Eastern Shipbuilding Company, at New London, Conn., where there are now under construction for the Great Northern Railroad two of the largest and heaviest steamers ever built. The overhead trolley principle has been utilized, and the system consists of three vertical masts, each about 140 feet in height, erected between the two large ships mentioned, one mast being stationed at the sterns of the vessels, another at the bows, and the third at a point midway between the other two. Each terminal mast is about three hundred feet from the central support. To each of these masts, at a point about ninety feet from the ground, is affixed a large horizontal yard or crossbar of rectangular section about six feet square. The masts, which are of circular section, are embedded in foundations of great solidity, and are securely stayed in fore-and-aft directions by strong steel wire stays or guys, securely anchored in rock. To still further add to the rigidity of the after-mast, the water-end stay is supplemented by a steel strut or compression strong-back. To insure steadiness in the athwartship direction there are provided steel guys, similar to those forward and aft, and these, running from the ends of the yards, are also provided with rock anchorages.

The supports provided for the crossarms are equally efficient. Connecting the middle and end of each yard is a strong fore-and-aft steel wire stay, while running from the ends of each yard to the mast supporting it are diagonal wire-rope guys. The yards are supported from the mastheads by large steel-wire guys or lifts,

and the two terminal yards are, in addition, braced and trussed with heavy wire-rope tension guys. Upon each of the crossyards is a track upon which travel cars which act as anchorages or supports for the great suspension cables which are strung from mast to mast. Upon these cables in turn travel the carriages which convey the material to any point between the masts. It will thus be seen that by utilizing the athwartship motion of the cars on the masts and the fore-and-aft motion of the carriages on the cables, it is possible to deliver material to any point within a rectangle 600 feet in length and 175 feet in width.

Virtually any number of independent trolleys that



System of Masts, Yards, and Cable Lines as Used for Handling Material in Building the Two Great Steamships at New London.

the work may require may be suspended from mast to mast. For instance, as at present operated this system has four traveling trolleys, each having transverse and longitudinal motion, and at work simultaneously handling the heaviest pieces of material that enter into ship construction, whereas many of the forms of apparatus for handling material, heretofore in use, have a limitation to one or two simultaneous hoists.

Both the cars on the crossarms and the trolley carriages on the cable spans are electrically operated, and each wire-rope carriage is provided with hoisting sheaves and all necessary attachments, so that plates, frames, beams, or other parts of the ship or construction members, may be picked up or lowered at any part of either ship. The operating station from which the entire system is controlled is located in a house supported by brackets on the central mast just below the crossarm. It may be noted that Prof. Von Halle, of Berlin, Germany, who recently made a study of American shipbuilding facilities, declared this over-

head system of handling material to be "the great feature of the most remarkable shipyard in the world."

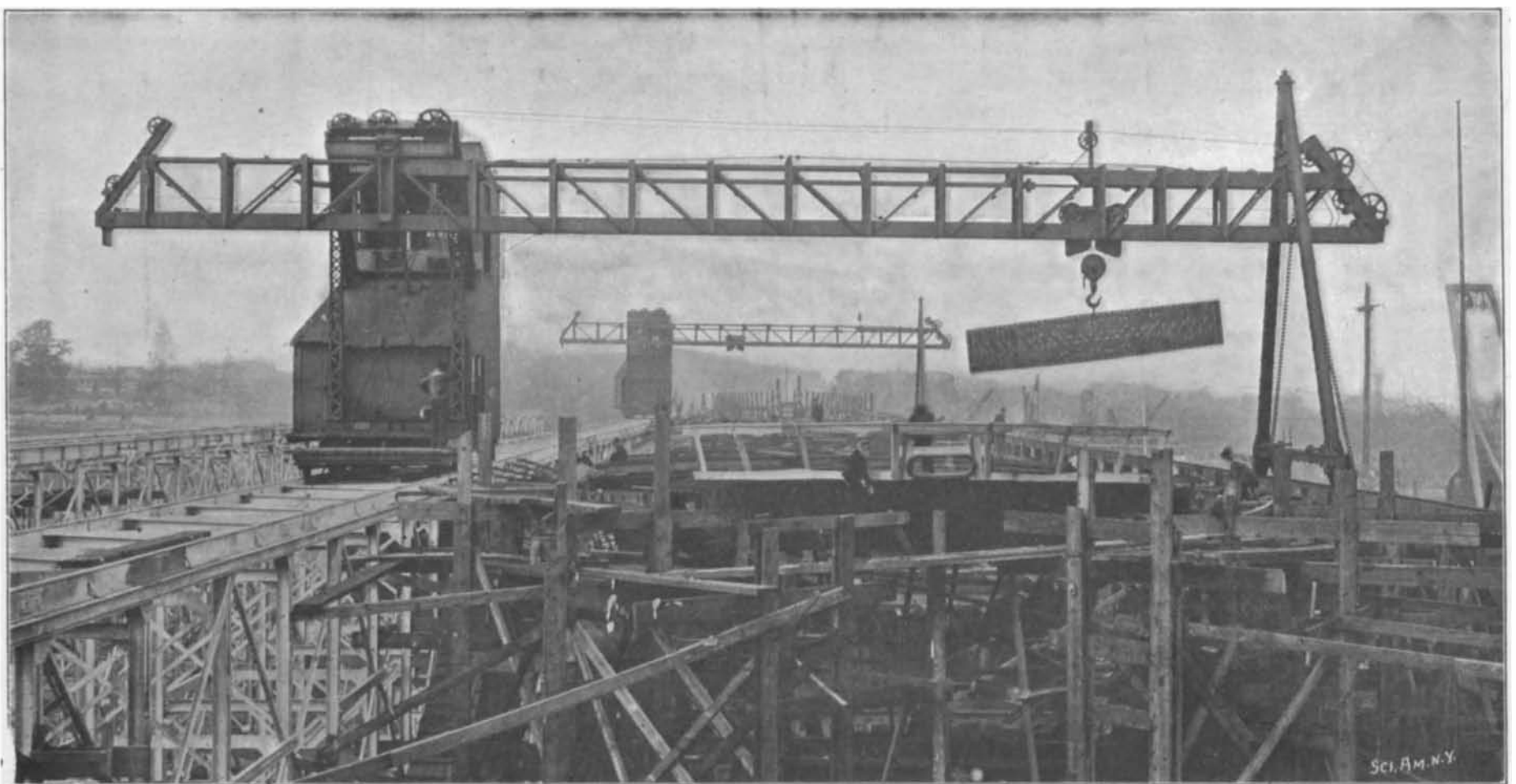
Another unique installation for handling shipbuilding material—like that at New London original in design—was employed in the construction of the immense floating drydock recently delivered to the United States government by the Maryland Steel Company, of Sparrow's Point, Md. This consists of a number of derrick cranes, or "locomotive derricks," as they have been termed. The latter designation is undoubtedly due to the presence of points of similarity between this new type of derrick and the familiar locomotive crane.

The derricks constructed by the Maryland Steel Company travel on standard-gage railroad track, and may thus be quickly transferred from one part of the yard to another, a track having been placed between every pair of building ways. The derrick consists of a skeleton steel structure, from which on opposite sides project slender steel arms to which are attached hoisting apparatus of the ordinary type. By the raising and lowering of these arms, for which operation power is supplied by a steam engine situated on the car-like structure which forms the base of the derrick, it is possible to elevate a load of ten tons or more to a height of from sixty to seventy-five feet, placing the ship plates or other material in the exact position desired on the side of the vessel under construction.

Another innovation of the new century in the handling of shipbuilding material is to be found at the new yard of the Fore River Ship and Engine Company, at Quincy, Mass. In this case a distinct advance has been made over the heretofore most gener-

ally accepted form of apparatus of this class, namely, the cantilever crane mounted upon an elevated track between two building berths, thereby allowing the crane to command two ships. At the Fore River Company's plant there has been erected over the berths an immense steel-framed structure of sufficient size to accommodate under its truss roof and projecting wings two battleships and two merchant vessels of the largest size. Longitudinal lines of girders are secured to the under side of the roof trusses of the frame, and these girders form tracks for electric cranes, each of five tons capacity.

The great advantage of the system is found in the independent action of the cranes. Two cranes are assigned to each building berth, and it is practicable to proceed with the construction of four ships simultaneously, with no possibility that an accident to a crane would entail a complete suspension of operations, as is necessary where two vessels are dependent for their supply of material upon a single



A Pair of Overhead Traveling Cranes.
HANDLING MATERIAL IN SHIPYARDS.

cantilever crane. By utilizing two of the cranes, loads of ten tons may be transported with ease.

M. Vignon's Researches and the "Holy Shroud."

At a meeting of the Paris Academy of Sciences on April 21, some remarkable photographs of brownish stains found on the "Holy Shroud" kept in the Treasure Chamber of Turin Cathedral, and traditionally said to be the winding-sheet of Christ, were exhibited in connection with a paper by Dr. P. Vignon. Upon reproducing these stains by photography, Dr. Vignon found that he obtained a realistic picture of a human figure, and the suggestion is that the picture is actually a representation of the body of Christ, produced by radiographic action from the body, which, according to ancient texts, was wrapped in a shroud impregnated with a mixture of oil and aloes.

In his paper published in *Comptes Rendus*, Dr. Vignon remarked:

"It is known from the work of M. Colson, published in the *Comptes Rendus* of the Academy of Sciences in 1896, that freshly cleaned zinc emits vapors at the ordinary temperature which are capable of affecting photographic plates in the dark. The researches of Russell have also shown that the striations of a plate of zinc are reproduced on a photographic plate. But it is a long step from this to the realization of an object in relief. I have succeeded in obtaining images either with medals powdered with zinc, or with bass-reliefs or objects fully embossed in plaster, and rubbed with zinc powder. These images are negatives, not by the inversion of light and shade, since they are formed in the dark, but by the fact that the reliefs give more energetic impressions than the cavities. To interpret these it is necessary then to invert photographically; positive images are then obtained in which the scale of relief is scrupulously respected, which is far from being the case in normal photographs of the same objects illuminated from the front. Naturally, upon images made at a distance, the reproduction of the most minute details could not be expected, the precision of the detail obtained being less at the distance increased. The clearness of the image depends upon the rapidity with which the action diminishes when the space increases between the emissive surface and the receiving screen.

"From a point of the active surface let a perpendicular be lowered onto the receiving plate; the foot of this perpendicular constitutes the center of a circle which makes a more energetic impression in its central region than on its edges; the clearness of the image will thus be greater the smaller the surface of the circle acted upon, and this surface varies inversely as the rapidity with which the actions decrease when the distance increases. It is on this account that the images correspond very nearly to those which would be realized if the actions were produced only according to the orthogonal projections of the different points of the active surface.

"It is a curious point that the images converted into positives frequently give rise to the impression of having been lit from above.

"This will be the case when a plane, such as the forehead, is seen from the front and forms at the same time a strong relief, while a plane near it is rapidly shifting, such as, for example, the region which connects the superciliary arch to the eyeball. When this plane shifts it appears to sink into a deep shadow.

"The truly specific character of these negative images which arise from action at a distance lies in the softness of the contours. The limit of the visible portion is the result for the eye of the receding of the surface. If this falling back takes place at a small distance from the receiving plane, the contour is still marked, though vaguely; but if this falling away is produced only at a distance greater than that at which the vapors can act, no corresponding effect is produced in the image, which gradually weakens up to its border; by insensible gradations until it disappears altogether. Practi-

cally in spite of the softness of the details and the outlines, the impressions produced by vapor are far from consisting of simple shadows; if the object is in strong relief, the image is energetic and well marked; it appears simply as if the object were seen through transparent gauze, or as if it had half emerged from a fog.

to the formation of ammonium carbonate and thus causes the browning of the aloes. The fermentation of a febrile sweat, rich in urea, leads to the same result, as is already well known."

The extension of Dr. Russell's researches on the photographic activity of certain bodies in the dark, contained in the above paper communicated to the Paris Academy by M. Vignon, has given rise to a most curious discussion, says Nature.

There is a so-called "Holy Shroud" at Turin in which tradition states the body of Christ was wrapped after the Crucifixion. An article in the Times thus refers to it and its connection with M. Vignon's work:

"It is said to have been brought from the East in the fourteenth century, and in the following century it passed into the hands of the House of Savoy, and was deposited at Chambéry. Finally, it was transferred in 1578 to its present resting-place by Duke Emmanuel Philibert, who wished to spare Carlo Borromeo, the sainted Archbishop of Milan, the fatigue of a pilgrimage to its distant Savoyard shrine. The Shroud bears upon it, traced in hues of brown, what is alleged to be a double impression of the figure of Our Lord, the outlines both of the face and back of which have reproduced themselves with wonderfully distinct exactness. So seldom, however, is it exposed to view that this remarkable characteristic had almost been forgotten when, in May, 1898, some photographs specially taken of it by Signor Secondo Pia, of Turin, with the consent of its possessor, the King of Italy, once more drew attention to this strangely living likeness. Eighteen months ago these photographs came under the notice of M. Vignon, who, recognizing their exceptional importance, at once began that inquiry of which the results were

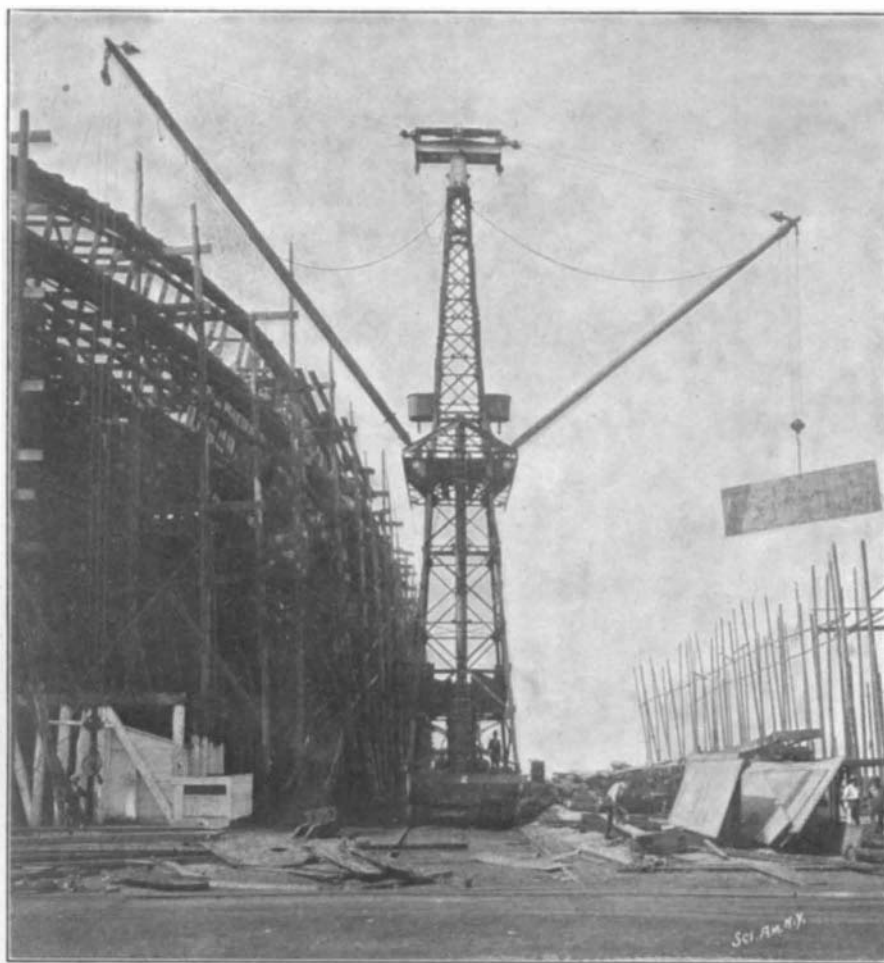
made public in a paper communicated to the Académie des Sciences."

In Paris, therefore, it has been generally accepted that a demonstration has been given by science of the authenticity, not only of the so-called shroud, but of all the historical events connected with it, and a much closer rapprochement between science and theology is predicted for the future.

Here, however, difficulties have been raised. Father Thurston, a learned Jesuit, writes to the Times as follows:

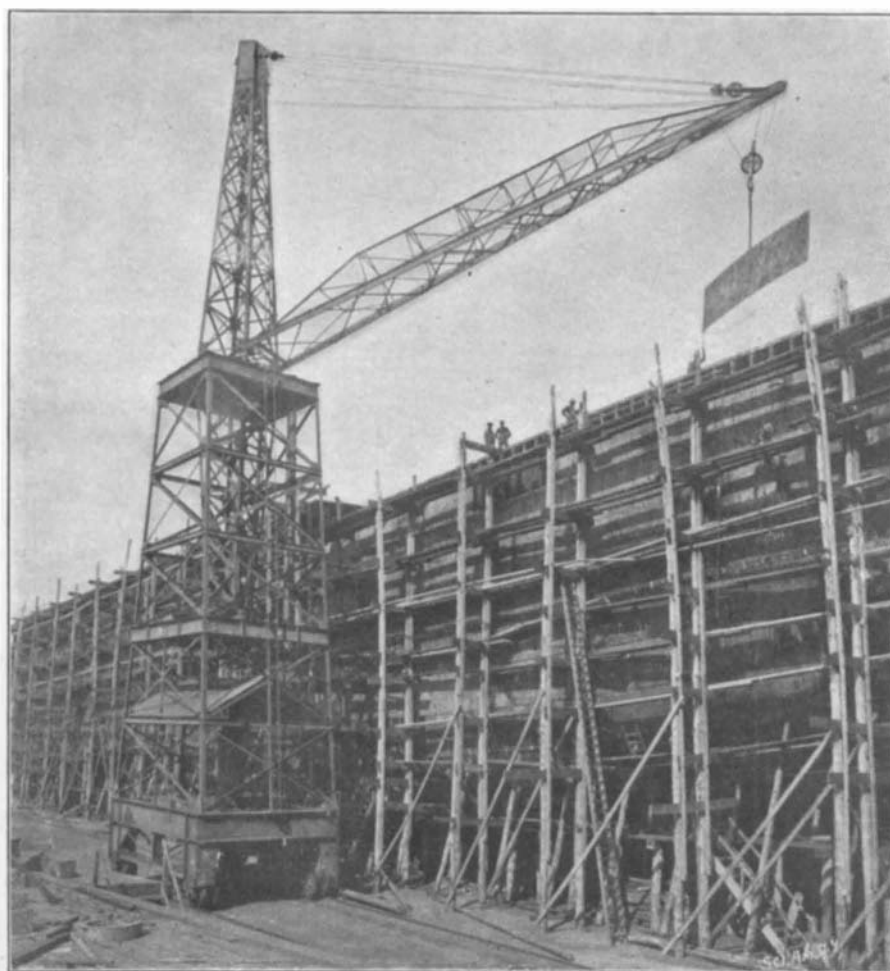
"Before we can profitably discuss the value of Dr. Vignon's scientific explanation of the marks on the 'Holy Shroud' a serious difficulty of quite another order has to be cleared up. The Abbé Ulysse Chevalier claims to have proved to demonstration that the linen winding-sheet exhibited at Turin is a spurious relic manufactured in the fourteenth century, and, as the writer believes, with fraudulent intent. M. l'Abbé Chevalier is a scholar of distinction, and of his perfect loyalty to the Catholic Church there can be no possible question. Moreover, his essay ('*Etude Critique sur l'Origine du S. Suaire*,' Paris, Picard, 1900) has been warmly welcomed by the more critical journals devoted to hagiography. In the Bollandist periodical, the *Analecta Bollandiana*, for instance, its Jesuit editors state (vol. xix., 1900, p. 350) that the Abbé Chevalier's discussion of the subject is final, and that 'il ne reste plus qu'à proclamer "à haute et intelligible voix," comme le voulait le Pape Clément VII.: "Hæc figura . . . non est verum sudarium Domini Nostri Jesu Christi."'

"They go on to state that the story of the 'image of the shroud' given by Geoffroy de Lirey to the college founded by him in 1353 is not lost in the mist of ages, and does not happen to present any of those obscurities by which the historian who wishes to impart his own laboriously-acquired conviction to others must at times find himself baffled. We have, for instance, the document addressed to the Pope by Bishop Peter d'Arcis, in which he denounces the fraudulent dealing of the Chapter of Lirey, who for motives of avarice pretended that miracles were worked by this shroud,



Locomotive Derrick Crane With Two Booms.

"Negative images have also been obtained by acting with ammoniacal vapors upon cloths impregnated with a mixture of powdered aloes and olive oil; it is known that aloes contains a principle which turns brown and is oxidized under the influence of alkalies in moist air. A plaster hand covered with a suede glove which has been moistened with a solution of ammonium carbonate acts similarly. There is obtained in this way a sort of print of the hand, a negative softened at the edges and wanting in proportion in so far that the points where the hand is too far from the cloth are too faint, the points of contact of the hand and cloth, on the other hand, being too strongly marked. The fermentation of urea, easily brought about by the addition of a little urine, leads



Locomotive Derrick Crane with Single Boom of Latticed Steel Construction.
HANDLING MATERIALS IN SHIPYARDS.

whereas his predecessor in the see of Troyes had officially investigated the matter and proved it to be a forgery. 'Et probatum fuit eiam per artificem qui illum (pannum) depinxerat, ipsum humano opere factum, non miraculose confectum vel concessum.'

There is also another difficulty. It is stated that there is at least one other Holy Shroud in another holy place.

QUEER CHINESE TREES.

BY ISAAC TAYLOR HEADLAND.

"Queer, aren't they?" said one of the party as they noticed the tree in the illustration. "Who's queer?" asked the little man with the short legs and large head. "The Chinese." "Why?" "Look at that tree."

The tree was of special interest to the little man, as he was collecting information about all kinds of queer growths of Chinese trees and flowers.

"No, not queer, just Chinesey," he replied.

The tree is an ordinary evergreen. It had been split up from the roots about six feet when a small sapling, the roots having been carefully divided, and thus planted in front of the temple. The two halves were placed three feet apart, each having the same curve to the place where they joined, from which point it grew in its natural form. It was placed directly in front of the door of the temple, between the door and the gate of the court, ten feet from the gate and thirty feet from the door, as though it was designed that the worshiper would pass through the tree before entering the temple.

Thus far we have discovered only six of these trees. Four are in the north end of the Forbidden City, in front of two of the temples. The one in the illustration is before the temple in the winter palace, where Count von Waldersee's troops were stationed, and the third is in a similar position in the summer palace. Whether this particular kind of tree is confined to imperial grounds we cannot say, but thus far we have seen none in other localities.

The Chinese are fond of wrapping or braiding two, three or four sprouts of a tree together, and allowing them to grow in that form. In the campus of the Peking University there was a species of locust, which they call the *Huai shu*, and which, by the way, is the best shade tree of North China, the two sprouts of which had been wrapped together when small, and when sawed down by the Boxers they were each six inches in diameter.

Only a short distance from where the writer is now sitting is an apricot tree on which is an abundance of fruit. It consists of four sprouts which have been neatly formed into a braid and have continued to grow until they are each three inches in diameter.

A favorite decoration for lawns or courts is made from this locust. The top of the tree is cut off and the root of another the same size grafted thereon. The roots thus become branches, which grow downward instead of upward, and are covered with a dense foliage. This species of shrub is very common and familiar to all landscape gardeners.

A very interesting and attractive flowering shrub is called *Kan-chieh-mei*. It is a species of plum, is used as a pot plant and grows two or three feet high. Every branch is bent or broken in as many ways as possible to bring them all close together, so that when it blooms—which it does before it leaves—it is a mass of flowers.

Perhaps the most attractive specimen of Chinese plant cultivation is the grafting of the chrysanthemum. They have a large, common weed called *hao tze*. In the early summer they cut the branches off this weed and in the place of each branch, as well as on the top, they graft a chrysanthemum stalk. The root of this weed is much stronger than the root of the flower, so that when they bloom the flowers are double as large as the ordinary chrysanthemum, and in addition to this extra luxuriance of blossom, all varieties of color appear on the same stalk. Blooming as they do in mid-winter, they are very attractive.

It goes without saying that a people who thus understand the grafting of flowers are not ignorant of any of the processes of budding, grafting or crossing fruit; as a result we are able to obtain very fine specimens, especially of the peach.

Carbureted Acetylene.

A departure which may turn out to be of some importance to the automobile industry, is described in a paper read by Dr. N. Caro, of Berlin, before the German Acetylene Verein at a meeting held at Eisenach. It appears from Dr. Caro's contribution that acetylene gas, when led through petrol, becomes heavily carbureted by it in much the same way as does ordinary atmospheric air. 100 liters of acetylene will in this way take up 125 grains of petrol, yielding 150

liters of carbureted gas. As a heating agent the carbureted acetylene is superior to ordinary acetylene in the proportion of about 6 to 4. It is plain that we have here a gaseous mixture containing a high degree of energy. Should it turn out to be applicable to explosion engines it ought to enable motors of extreme power per unit of weight to be constructed. There may, of course, be practical difficulties in the way, and they have not altogether been satisfactorily got over yet in the case of acetylene gas alone, while the fact that there is a tendency for petrol vapor to separ-



A PECULIAR TREE GROWTH.

ate out from the acetylene on cooling somewhat, may give rise to additional complication, but in any case the discovery is one of high importance, and possibly before long we may see it made practical use of in explosion motors.

STORY OF THE FISHSKIN GARMENTS OF THE AMUR TRIBES OF EAST SIBERIA.

BY WALTER L. BEASLEY.

Among the new and striking exhibits of the Jesup North Pacific Expedition, just installed in the Anthropological Hall of the American Museum of Natural History, are a number of elaborately ornamented fishskin garments or dresses. These were collected by Dr. Berthold Laufer, who spent two years in gathering material to illustrate the life and customs of the



TWO SIBERIAN FISHSKIN GARMENTS.

various tribes of the Amur regions of East Siberia. One of the noteworthy results of these investigations is the bringing to light of a tribe of highly skilled and versatile artists, who, though living in a primitive state, being unable to read or write, and having no written or historical records, are yet masters of decorative art. Several hundred specimens of their household effects and wearing apparel, profusely ornamented with astonishing designs, display the wonderful character of their native handicraft, which is considered an independent branch of East Asiatic art, entirely different from that of other Siberian peoples. It was found that the Gold were the most talented repre-

sentatives of the Amur tribes, possessing the best understanding of decorative art, and having the largest number of individual artists excelling all others in the proficiency of embroidery. The two fishskin dresses here pictured are the work of the women of this tribe. The original motives for all their designs and patterns are derived mostly from the cock and the fish. The fishskin dresses are worn exclusively by the women, and are highly ornamented with cut-out pieces of fishskin, generally colored blue. They are sewed with fishskin thread to a piece of fishskin adapted to the size and form of the ornament. The patterns are cut out by means of a long, sharp-pointed knife, as they do not possess scissors. The dress is composed of three layers of fishskin, the undermost representing the skin of the garment proper, the uppermost showing the ornaments in the cut-out form. Between these two layers is inserted a middle layer, which serves as a background to the ornament proper, throwing out distinctly the negative parts, as well as the outline of the ornament. On the left dress pictured are two neat naturalistic perching cocks, with trisulcate tails and open beaks. The bottom is occupied with a composition of conventionalized fishes and spirals. The garment on the right presents a different scheme of ornamentation and consists of three vertical rows, the two outer of which tally and are composed of three single figures each, while the middle series presents a coherent structure. The ornamental principle of this pattern is a pair of facing spirals in the middle; above and below them are two erect conventionalized bipartite fishes, and the whole is surrounded by a line corresponding to their form. A detailed study of the marvelous ornamental productions of this gifted tribe of Amur artisans would yield the American seeker after fresh and original designs for decorative purposes a rich field for selection. A splendidly illustrated memoir on the "Decorative Art of the Amur Tribes," by Dr. Berthold Laufer, has just been issued by the Museum.

A Substitute for X-Rays.

Years ago Becquerel found that salts of the rare metal uranium possessed the power of throwing off a feeble and invisible radiance that affected photographic plates, like the X-rays. Mme. Curie in Paris last year isolated from the Bohemian mineral pitchblende two other elements that behave in the same manner, but are far more active. One of them she called "polonium" and other "radium." The latter is said to be one hundred thousand times as intense as uranium in its photographic effect.

Prof. Geo. F. Parker, of the University of Pennsylvania, has been experimenting with all three of these elements and with the mineral (pitchblende or uranite) from which the two new elements are derived. He recently exhibited a series of photographic plates on which impressions had been produced by these substances. His procedure has been as follows:

A photographic plate was inclosed in black paper and then covered with yellow paper. After one whole day's exposure to the sunlight no effect was produced.

This precaution proved the thoroughness of the protection. Then the various metals and salts were placed outside the covering of the plate and they produced dark stains.

In order to take photographs of objects such as a hand or a foot these objects would be placed between the metal and the plate, and the result would be similar to those obtained by the X-rays. Such substances as bone show clearly through the flesh and surrounding tissue. A photograph can be taken by means of radium in half a minute.

The property of the new metal is apparently of great practical value. The results of the X-rays, now so useful in surgical diagnosis, can be duplicated by a method much cheaper. Radium seems to suffer no diminution of energy or loss of weight during the process. In addition to producing an impression on the photographic plate, radium produces phosphorescence and discharges electrified bodies. Thus it will be seen that it possesses all the qualities of the Roentgen rays.

Radium apparently violates one of the fundamental laws of physics, namely, that of the conservation of energy. It does not appear to derive its photographic power from the sunlight nor lose it by expenditure.

To Destroy Vermin on Fowls.

In order to destroy the vermin with which domestic fowls are often infested, a Canadian inventor, Edwin T. Stewart, of Ottawa, has devised a nest egg which is hollow so that it can be filled with an insecticide. The nest egg is of such construction that by the movement of the fowl upon its nest the insecticide will be automatically distributed.