

TWELVE TON HYDRAULIC WHARF CRANE.

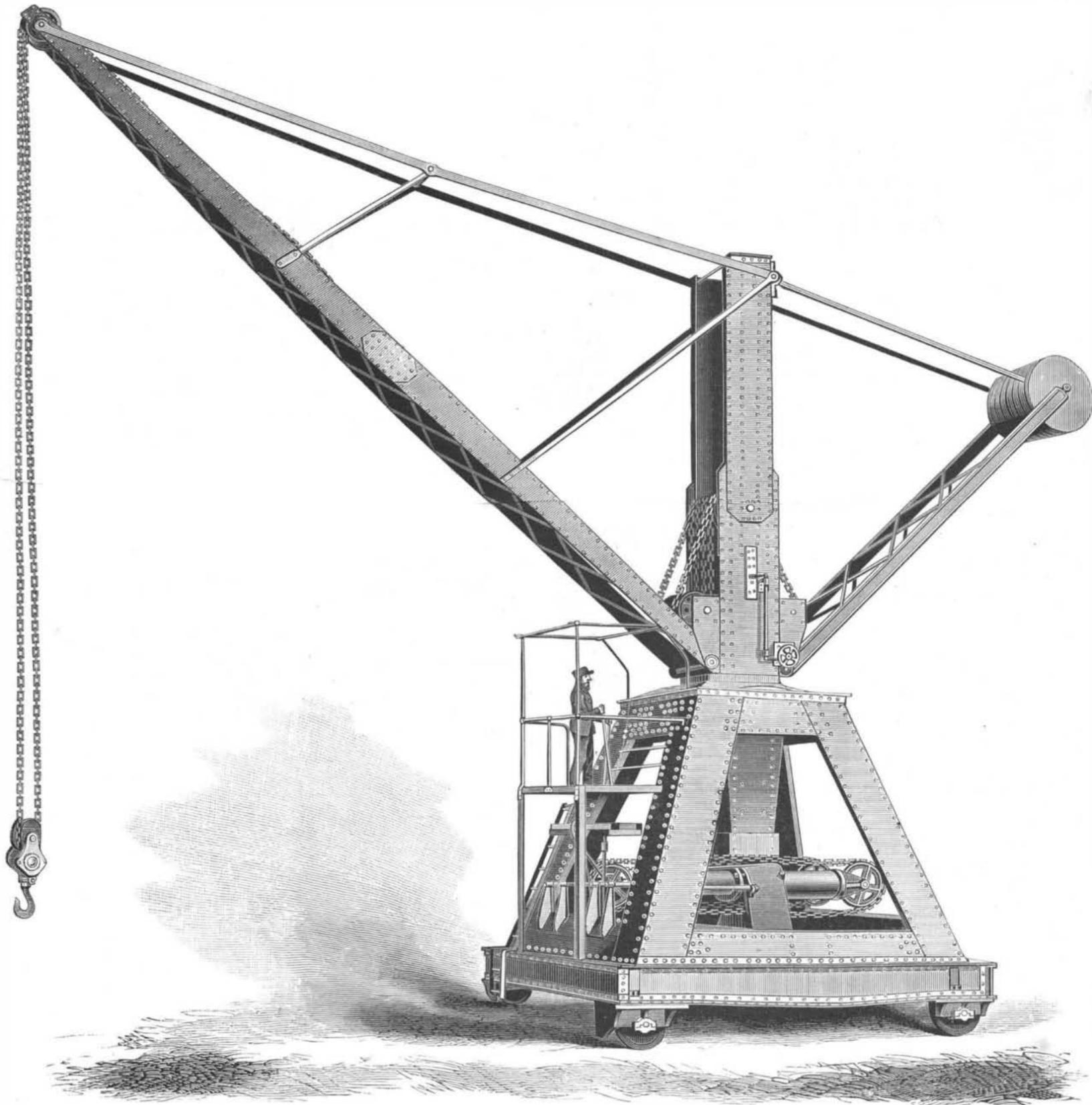
Our engraving illustrates the construction of the 12 ton crane made by the Glenfield Company, Kilmarnock, for the Karachi harbor. The crane lifts a load of 12 tons, at a radius of 34 ft., through a vertical height of 60 ft. and swings through 480 deg.— $1\frac{1}{2}$ circle. The lifting rams are arranged to lift up to six tons with the smaller and up to twelve tons with both engaged. They have a stroke of 10 ft., a doubled 1 in. chain being wound in multiple of six to give a lift of 60 ft. The crane has a wheel base of 15 ft. in the direction of the rails, and 12 ft. 10 in. from center to center of rails. This gives stability at any horizontal angle of jib, but an additional security is obtained by hooking the pedestal to the wharf girders. The jib and mast are of steel, and the pedestal frame of wrought iron plates

without them, are given over to marsh and jungle. Northern Ceylon, especially districts which in the early centuries of our era supported large populations, are now, owing to the ruin of the irrigation works of the ancient kings, almost uninhabitable. For some years past the colonial government have steadily directed their efforts to restoring these mighty works, and early in the present year the Kalawewa tank, the largest and most important in Ceylon, was declared completed, the formal opening by the governor taking place on February 22, although the various festivities were spread over several days. The tank was constructed in 460 A. D., to supply the ancient capital of Anuradhapura and the neighborhood, the water being conveyed from it by a canal 54 miles in length, which on its way supplied a large system of village tanks. It has

the most important part of the second largest province in the island. When the work of restoration began, the bed of the tank was quite hard and dry. It is now covered with seven square miles of water 20 ft. deep, and supplies towns and villages over an area as great as an English county, and filling tanks belonging to considerable towns more than 50 miles away, which in their turn become centers of distribution. With all this, the government of Ceylon in the 19th century is only restoring the work of the government of the fifth century.

State Taxation of Agents Void.

In its decision upon the commercial travelers' tax question in the Robbins case, last year, the Supreme Court of the United States held that legislation by

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and angles. The construction and arrangement of the parts are so clearly shown by the engraving that further description is unnecessary. The pumping engines and accumulator for the harbor were made and supplied by the Glenfield Company. The engines indicate 160 horse power, and the accumulator ram is 17 in. diameter by 17 ft. stroke.—*The Engineer.*

Restoration of a Great Reservoir in Ceylon.

In the last week in February, a succession of festivities and ceremonies took place at Kalawewa, in Northern Ceylon, to celebrate the restoration by the government of the great tank at that place. The policy of restoring the ancient and stupendous irrigation works of Ceylon, though it did not originate with Sir Arthur Gordon, will make his administration memorable in the history of the island, for these huge reservoirs, which are called "tanks" in India and Ceylon, spread cultivation and fertility over large tracts of country which,

an area of 4,425 acres, or about seven square miles, with a contour of 30 miles. On all sides but one it is surrounded by high ground, from which it is fed. On the remaining side an enormous embankment was constructed, which measures six miles in length, with a breadth of 20 ft. at the top, and an average height of 60 ft. It is formed of large blocks of stone and earthwork, and provided with fine spill wall 260 ft. long, 200 ft. wide, and about 40 ft. high. Just beyond this wall was the great breach which destroyed the tank at some unknown period. It was 1,000 ft. broad, and it is not known whether it was caused by a heavy flood or by an invader. This is the breach which has just been repaired. A huge masonry wall has been thrown across, the canal has been renewed, and regulating sluices and other works have been provided. The whole has taken four years. It is described by Mr. Burrows in his "Buried Cities of Ceylon" as the grandest experiment in irrigation ever undertaken in modern Ceylon, for its completion means the resuscitation of

States or municipalities imposing taxes on commercial travelers engaged in interstate commerce was not warranted by the Constitution, the court taking the ground that a salesman from one State entering another to solicit orders or negotiate sales by samples or otherwise was engaged in interstate commerce. The question has arisen, in a case decided lately in Memphis, whether agents resident in a State, but acting for non-resident principals, come within the protection of this decision. Chancellor Estes, the sitting judge, held that the taxing authorities could not tax such resident agents. He took the ground that the substantial question was whether the legislation imposed a burden on interstate commerce or not. He held that a tax on the agent was a burden on interstate commerce, and that it was wholly immaterial where the agent resided, or whether he was a traveler or had an office in the State. This decision, it will be seen, is an extension of the principle laid down by the Supreme Court in the Robbins case.—*Bradstreet's.*

A Substitute for Gum Arabic.

The high price of gum acacia has led Trojanowsky to seek for a substitute. This he believes may be found in the mucilage of flax seed. By boiling the seed with water and precipitating the strained decoction with twice its volume of alcohol, he obtained a substance which, after drying, consisted of opaque, yellowish-brown irregular fragments, somewhat brittle, but not easily reduced to powder, dissolving in water to a turbid mucilaginous solution. Of this five grains were sufficient to emulsionize an ounce of cod liver oil. The large quantity of alcohol required for the precipitation and the difficulty of drying the adhesive product are, however, serious objections to this product. The author, therefore, pursued his study of the subject further, and believes that he has satisfactorily solved the problem.

He still employs flax seed as the source of the mucilage, but by treatment with sulphuric acid he converts this into a gum more resembling acacia. He directs to boil one part of flax seed with eight of dilute sulphuric acid and eight parts of water until the mixture, which at first thickens, becomes quite fluid. The mixture is then strained through muslin, and to the strained fluid is added four times its volume of strong alcohol. The precipitate is collected on a filter, washed with alcohol, and dried. The alcohol, after neutralizing with chalk, may be recovered by distillation, or it may be used for many purposes without distillation. The gum thus obtained is in the form of translucent, grayish-brown, brittle fragments, easily pulverized, and without odor or taste. Thirty grains of this gum will emulsionize an ounce of cod liver oil, and the product resembles exactly that made by the use of acacia.

Another substitute for acacia, made from starch, has been recently patented in Germany by Schumann. Two hundred parts of starch are boiled under a pressure of two to three atmospheres with 1,000 parts of water and one part of sulphuric or nitric acid, until the mixture begins to be fluid. The acid is then neutralized, and the mixture is again treated under a pressure of three to four atmospheres, until the starch is completely converted into gum-like substances. After filtering through animal charcoal the solution is evaporated at a low temperature. The product is a transparent colorless substance, which is non-hygroscopic, and has essentially the same useful properties as gum arabic.—*Pharm. Era.*

Detection of Adulteration of Lards.

A correspondent of *Science* says: The recent examinations of lards made at the Agricultural Department have resulted in the discovery of a test by which the presence of cotton seed oil may be detected instantly by any dealer or housekeeper. The experiment is as follows: As much lard as can be taken up on the point of a case-knife is placed in a teacup. About a quarter of an ounce of sulphuric acid is poured upon it and thoroughly mixed with it. If the lard is pure, it will coagulate, and there will be a little difficulty in the mixing. If it is adulterated with cotton seed oil and stearine, the mixture will take place immediately and easily. After half a minute one-fourth of an ounce more of sulphuric acid should be poured upon and mixed with it. The whole process thus far should not occupy more than one minute.

The substance thus obtained is poured into a common test tube, such as may be bought at any chemist's shop for a few pennies. The acid, somewhat colored, will sink to the bottom, and the fatty substance will remain on top. If the lard thus tested was pure, the color of the latter will be that of a light colored sponge, changing in a minute or so to a dark cinnamon color. If it has been adulterated with cotton seed oil, the color at first will be darker, changing immediately to a dark brown. These differences of color are so marked that no experience is required to detect them.

Cards might be printed upon which the colors produced by the sulphuric acid reaction for both pure and adulterated lards might be shown; and dealers, by using this test, may prove to their customers in a minute or two that the lard they are selling is an unadulterated article. The experiment is simple, and the cost of it almost nothing. The novel thing about it is the placing of the mixture in a test tube, in which the acid may become separated from the fatty substance, thus making the test much more decisive and satisfactory. This was first suggested by Dr. Thomas Taylor, who has extended his experiments to a great number of different animal and vegetable oils.

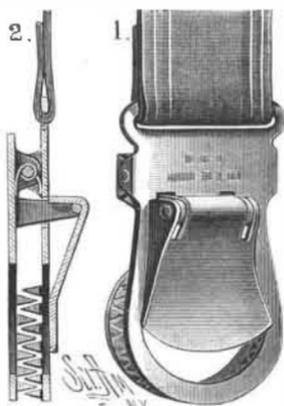
Why Require a Seal on Deeds?

In a recent address before the Yale Kent Club, at New Haven, the venerable David Dudley Field said: "Another of the anomalies which should be eliminated from our legal system is the distinction between sealed and unsealed instruments. Can anybody give a reason for this distinction, except the historic one that seals were used when most men were unable to write? Now, when most men do write, why use the seal? Or if the seal is used, why give it a significance and importance not given to the writing? I find in your revised statutes a provision that a deed of real property must

have a seal and two witnesses at the least. You cannot transfer to your neighbor a cabin for a hundred dollars without these ceremonials; but you may transfer to him a million dollars' worth of railway stock by a simple signature, without seal or witness. Upon a sealed instrument you may bring suit within seventeen years; but if the seal is wanting you must sue within six years. Is it a reason why these anomalies should be retained in the valley of the Connecticut, because they come from the valley of the Thames?"

AN IMPROVED CLASP.

A simple and effective device to attach to the end of a strap or tape for suspending garments, or other uses, is illustrated herewith, and has been patented by Miss Annie Lewis, of 105 West Church St., Galveston, Texas,



LEWIS' CLASP.

Fig. 1 being a front view, and Fig. 2 a sectional side view. It has a front and a rear plate, with circular opening, and each provided with toothed jaws, arranged in a semicircle around the opening. The plates are hinged together on a spindle, on which is a coiled spring, for pressing the front and rear plates from each other, and from the rear plate project lugs, with a full-curved locking plate. The jaws of the clasp being open, the parts to be clasped are placed between them to be engaged by their teeth, when the locking plate is brought downward to the position shown in the illustration, and the jaws are securely locked in position, so that they cannot swing back until the operator lifts the lower part of the locking plate, and turns it upward. It will be seen that the teeth of the clasp embed themselves in the material and make a double grip thereon.

IMPROVED HAND TURNING TOOLS.

The accompanying illustration represents a tool in which the handles are so constructed that they will firmly hold the bar steel as it comes from the manufacturers, without any forging or fitting, and wherein the steel can be turned end for end in the handle, and both ends of the bar be shaped into tools. The handles are made to hold four sizes of steel: No. 1, $\frac{1}{4}$ in. square; No. 2, $\frac{1}{4} \times \frac{1}{8}$ in.; No. 3, $\frac{3}{8} \times \frac{1}{8}$ in.; No. 4, $\frac{1}{2} \times \frac{1}{8}$ in. The handle is made of iron, with flat sides and rounded edges, and is hollow inside, so that it is but little heavier than a wooden handle, and may also be useful for other tools which can be made of corresponding sizes of steel. These tools are made by Messrs. Goodnow & Wightman, of No. 176 Washington St., Boston, Mass., the small figures showing the different shapes of



GOODNOW & WIGHTMAN'S HAND TURNING TOOLS.

tools to go with the handles, the tools and handles being sold separately, or in sets of twelve handles and twelve tools in a neat box.

The Physical Training of the Greeks and Romans.

The Thursday lecture on March 22, given at the Parkes Museum by Mr. Alexander Murray, the keeper of the Greek and Roman antiquities of the British Museum, was of no ordinary interest. The subject, that of the physical training of the Greeks and Romans, was attractive to the sanitarian, the athlete, and the antiquary, and it is needless to say that it was handled with great ability by the learned lecturer, whose discourse afforded that evidence of research and literary culture which was to be expected from one whose reputation is so well established. "The Greek notion of physical training," we are told, "was associated in one of the oldest Greek legends with the practice of medicine. The Centaur Cheiron not only instructed the young Achilles and others in bodily exercise, but he also taught them at least as much of surgery as to make them able to attend to such wounds and bruises as were likely to arise in the rough life they were to lead." Even Apollo learned something of medicine from the Centaur Cheiron, and Apollo was one of the gods of the Greek gymnasias, of which, however, Hermes was the principal deity.

According to the old poet Simonides, the two things which the Greeks desired most were to be healthy and to be beautiful. "This statement," said Mr. Murray,

"is perfectly true as to health, and would be equally true as to beauty if we used the word in the same strict sense as did the Greeks. They applied it to a beauty which was, or seemed to be, the result of careful physical training. And if you wish to see what they regarded as the perfection of beauty of this kind, you have only to go to the Elgin room of the British Museum and observe the frieze of the Parthenon." The sculptor had anticipated Plato in assigning to horsemanship the first place in physical training, and the frieze might be considered as a vast glorification of youth. From this point of view, as well as from the artistic one, the frieze of the Parthenon is unique, and it stands alone as a vast conception devoted to the glorification of youth made beautiful by healthy exercises. It might be suggested that there was too much uniformity in the type of the youths represented in the frieze of the Parthenon, but this objection is the result of tastes formed in the bustle and variety of modern life, and whenever there is a continuous application of many persons to one pursuit, uniformity of appearance is to be expected. The great object of the physical training of the Greeks was to prepare boys and youths for the military profession, and also to insure health for those who were to devote themselves to statecraft or literature. The games which the children played were very much the same as those in vogue at the present day. Balls, hoops, seesaw, knuckle bones, tug of war, blind man's buff, and leap frog were all popular with the Grecian children, and, like the modern children, they built toy houses and modeled boats and beasts.

According to Galen, boys of seven were allowed to commence horsemanship, and soon after this the youths entered at the public gymnasias or palaestra, where properly regulated exercises were carried out under the direction of a gymnasiarch. In the public gymnasias great and implicit obedience was exacted, and much care was used to proportion the exercises to the age and strength of the learners, and to insure that competitors were selected with due regard to these two conditions. Mr. Murray reviewed the exercises in detail, and dealt in the first place with foot races, speed of foot being of great importance, not only in war, but in carrying messages in a country where roads were bad. These races were mostly for short distances, although it was customary to make the course "heavy" by laying deep sand upon it, and occasionally races in full armor were ordained in order to try severely both strength and endurance. Many Grecian runners were possessed of enormous "staying" power, the most notable example perhaps being found in Pheidippides, who carried the news of the approach of the Persians from Athens to Sparta (a distance of 112 miles over mountain paths) in two days. Wrestling and boxing, and the combination of these two exercises in the "Pankration," was very popular, and it was mentioned that those who took part in these contests had their bodies oiled and then sprinkled with fine sand, a proceeding the object of which it is difficult to understand. A common form of contest was found in the Pentathlon, in which the competitors met in a series of five exercises—viz., running, leaping, wrestling, disk and spear throwing. The most popular form of leaping was the long jump, in which the athlete used a spring board and carried in his hand two iron "dumb bells," called *halteres*. The Romans afford a great contrast to the Greeks in the matter of exercise. With the Romans the great institution was the bath, combined with so much exercise only as was sufficient to keep the body in training. The luxurious Romans delighted, in the intervals of campaigns, to be amused, to luxuriate in the bath and watch the gladiatorial and other spectacles in the amphitheaters. Rome was the great center for professional athletes, while Greece was the home of the gentleman amateur.—*Lancet.*

THE King of the Belgians recently sent to the Sultan of Morocco a present of a locomotive and a Pullman car. The difficulty is that there is no railway in Morocco. A contemporary suggests that probably the first contractor who got there would have the job of making a small line; but there are several obstacles in the way. The secretary of the treasury never pays bills except when he has money in hand, and, as a rule, he never has any. Moreover, when he is impecunious, he has the bastinado and the bowstring quite handy for the contractors. Under all circumstances, we do not suppose that many railways will be made in Morocco just yet awhile.

FROM our foreign exchanges we learn that the preparations for the Barcelona exhibition are progressing satisfactorily, and it seems likely to be a great success. Not only Spanish and colonial, but also foreign exhibitors, are so numerous, that fresh building space has been added to the original plan, for which the government has contributed one hundred thousand pounds. Barcelona is preparing splendid festivities, including bull fights, regattas, races, shows, theatricals, concerts, and literary and other congresses, to give foreigners and natives a favorable impression of the most prosperous manufacturing and commercial city in the kingdom.