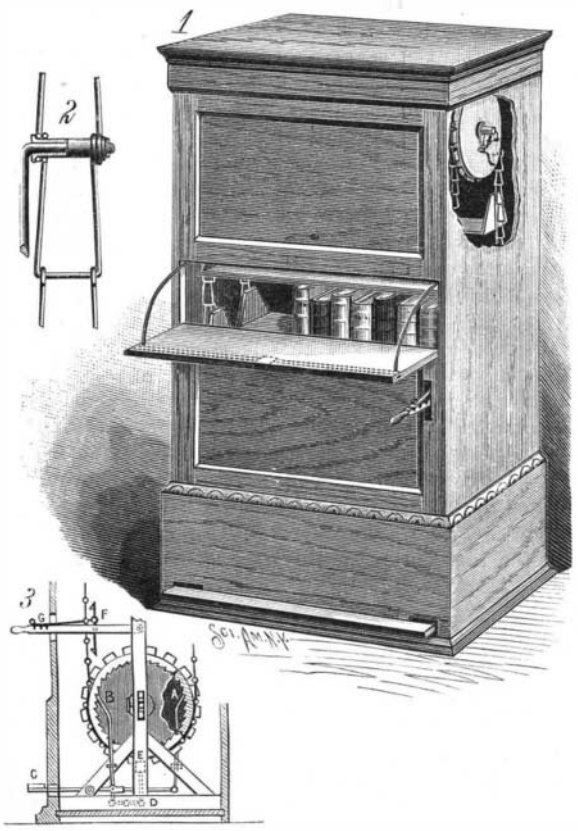
IMPROVED ARRANGEMENT OF MOVABLE SHELVES.

A method of suspending pendulous shelves from endless carriers, whereby any of the shelves will be easily accessible without changing one's position, is illustrated herewith, and has been patented by Mr. Francis V. Comfort, of Stillwater, Minn. Fig. 1 shows such shelving arranged within a case, Fig. 2 is a detail view of one mode of suspending the shelves, and Fig. 3 is a sectional side elevation, showing how the carrier is operated. The endless chains or carriers, from which the shelves are suspended, run over upper and lower sprocket wheels, the ends of the lower shaft being vertically adjustable. The carriers are chains formed of U-shaped links, at the intervening joints having their free ends looped over short gas pipe or other tubular sections, with flanged ends to hold them in place. For raising and lowering the shelves by hand, either direct pressure may be employed or the hand lever, G, to which is pivoted a spring arm, carrying at either end reverse pawls, F, adapted to engage the links of the chain. For operating the shelving by foot, a tread, C, is connected with spring pawls, A and B, engaging with internal circular pawls on either end of the bottom carrier shaft, either pawl to be thrown into engagement with its respective ratchet for raising or lowering the shelves by pressing the tread to the right or left, when the shelves are either raised or lowered, as desired, by working the tread vertically. The working of the tread also operates a lever, D, to move a counterbalance weight, E, which normally acts on a pin to prevent all movement of the shelving when the shelves have been arranged in the desired position. In applying this improvement to small or medium sized bookcases, the latter will ordinarily have a transverse partition, or "false back," between the front and rear, to render the front shelves alone visible.



COMFORT'S MOVABLE SHELVING.

Anti-Vaccination.

The success of the anti-vaccinationists is aptly shown by the results in Zurich, Switzerland, where, for a number of years, until 1883, a compulsory vaccination law obtained, and small-pox was wholly prevented—not a single case occurred in 1882. This result was seized upon in the following year by the anti-vaccinationists, and used against the necessity for any such law, and it seems they had sufficient influence to cause its repeal. The death returns for that year (1883) showed that for every 1,000 deaths 2 were caused by small-pox; in 1884, there were 3; in 1885, 17; and in the first quarter of 1886, 85.

AN IMPROVED GAS PIPE WRENCH.

A simple and very powerful wrench, specially adapted for gas pipes, and designed to fit all sizes of pipes, is illustrated herewith, and has been patented by Mr. John M. Haynes, of Maxwell, Cal. It consists of a lever, on one end of which is fulcrumed a griping jaw having a segmental toothed edge, a chain being secured by one end to the lever, and adapted to be hooked by one of its links between the inwardly curved prongs or hooks on the free end of the griping jaw. The chain is usually drawn as taut as possible before being hooked by its link, and thus a pipe of any ordinary size can readily be operated upon, as the chain is hooked in position according to the respective sizes of pipe.

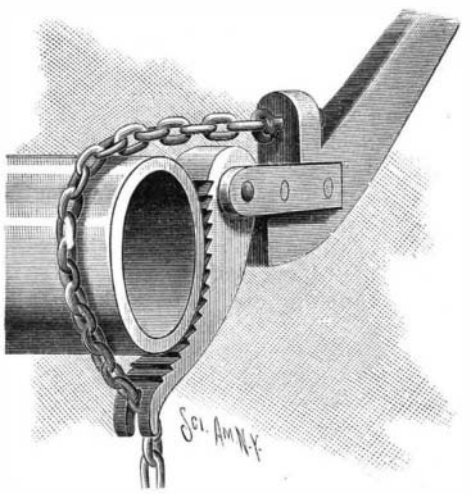
AN IMPROVED FARM AND ROAD WAGON.

A vehicle gear which is especially designed to facilitate building a low-down wagon on high wheels, and in which the line of draught will be directly from the center of the wheel, is illustrated herewith, and has been patented by Mr. Edward A. Gardiner, of Mullica Hill, N. J. On the under side of each straight axle is held a downwardly extending truss, by means of hangers supported by the axle, the outer ends of each truss being connected together by a strengthening rod. In the middle of the truss on the forward axle is a recess for the reach held on the axle by the usual king bolt, and on the top of the axle is the bolster with the usual standard on each end. The several parts are preferably made of wrought iron and cast steel, principally the latter, and are so arranged below the axle that the wagon bed can be placed from six to eight inches lower than in the usual style of wagon with as large a wheel, while by this system of truss bracing the axle is not liable to spring.

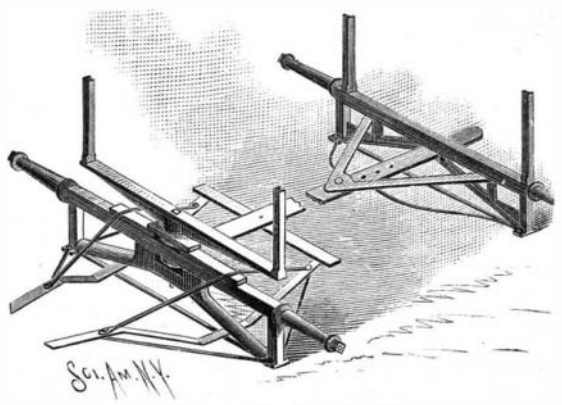
TWENTY-FIVE TON CRANE.

We illustrate a Goliath crane designed for raising concrete blocks, weighing 25 tons, and intended to be employed in the construction of harbor works in one of the Grecian islands. The framework is entirely of wrought iron. The main struts are of the box girder type, and support double girders crossing the top and carrying the chain sheaves. The whole structure is well tied and trussed with cross girders, struts, and gusset plates. The cradles are of box girder form with recesses left for the traveling wheels.

The load is raised by a double sheave snatch block, the chain passing over sheaves fitted on the top cross girders, and being coiled on a spirally grooved barrel. The gearing is double purchase, with a factor of safety of about 10 to 1. A powerful brake is fitted which controls the full load at any point of lowering. Massive cast iron side frames are fitted to planed wrought iron joists machined to fit the main framework. These frames carry the whole of the gearing, chain barrel, etc., and allow the machinery to work with a minimum of friction. Hand lifting gear is applied to work with the other gearing, so that four men can raise the full load. A ratchet and pawl is fitted to this gear to prevent the load running back, and the brake is also made available for lowering by hand when required.



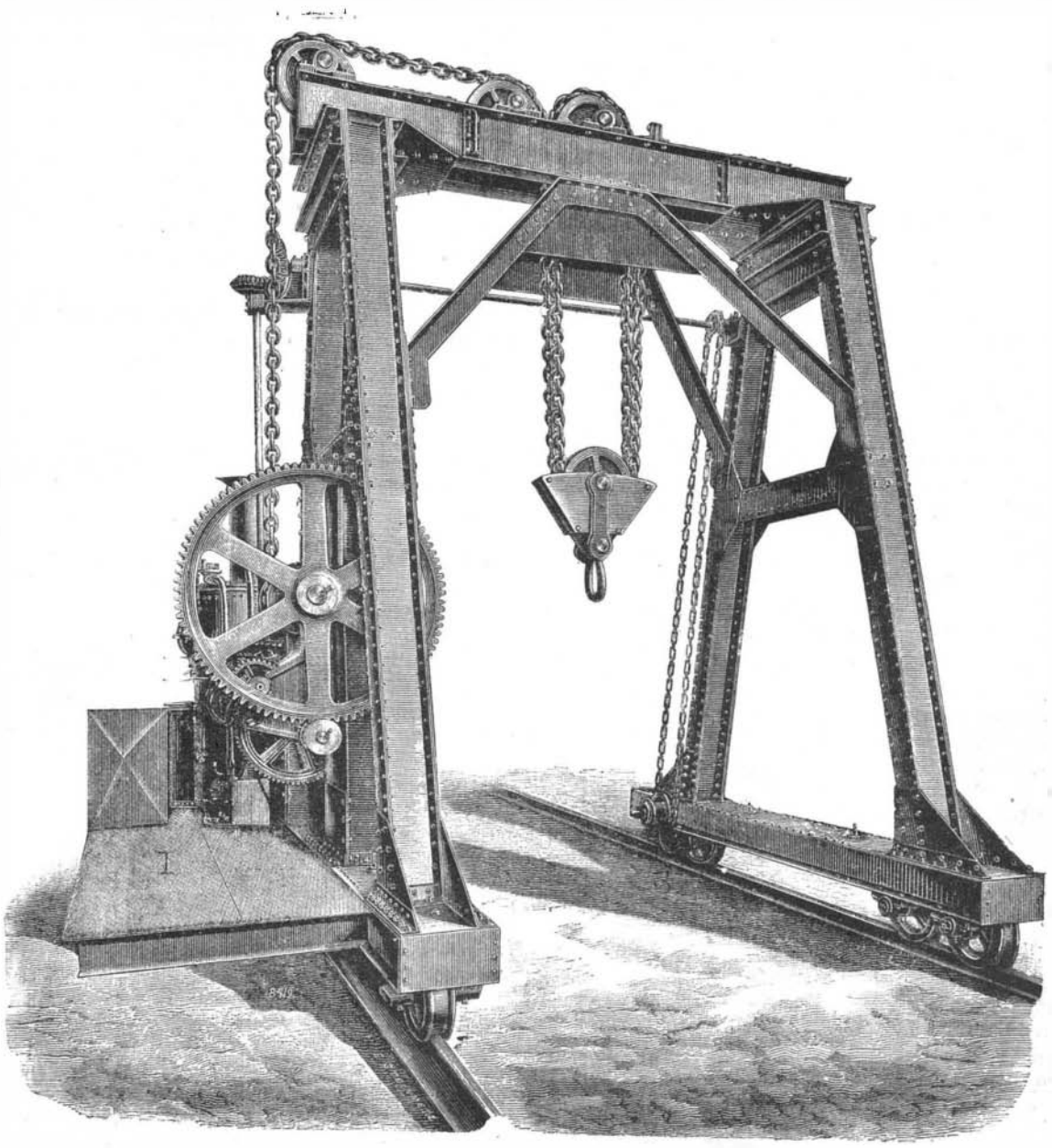
HAYNES' WRENCH.



GARDINER'S VEHICLE GEAR.

The traveling gear is driven from the crankshaft of the engines by bevel wheels and cross shafts, connected by steel pitch chain to gearing, which is fitted to the cradles. A clutch for working this gearing is fitted on the crankshaft, and clutches are also fitted to the lower part of the gearing to allow of the crane being moved by hand, handles being also provided for this purpose. The traveling wheels are in pairs, four pairs in all. One pair in each cradle are ordinary flanged wheels, without gearing, the pair at the opposite end of each cradle being geared and driven by pinions actuated by the steel pitch chain driving chain wheels fitted to the pinion shafts.

The driving and lifting power consists of a pair of vertical engines of ample size, arranged on an independent planed and machine-fitted wrought iron framework, in order that any strains, due to working or bad roads, shall not affect the working parts of the engines. The engines are fitted with an improved form of reversing motion, which has for some time been adopted by the constructor of this crane for all kinds of crane engines, in order to lessen the number of working parts and to obviate the unsatisfactory results obtained by using link motion for small engines. The lever for this motion, together with all the other levers for the crane, are brought to one spot to enable the attendant, without any change of position, to have the whole of the levers, as well as the brake, under complete control. A spacious



TWENTY-FIVE TON GOLIATH CRANE.

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wrought iron checkered plate platform is supported on girders attached to one of the cradles, and upon this is placed a vertical cross tube boiler for supplying steam to the engines. A feed water tank and a coal bunker are fitted at the side of the boiler.

The crane was tested before leaving the works, and careful observations were made as to the frictional resistance of the chains, gearing, engines, etc., when raising and lowering the full load of 25 tons. Under these tests the coefficient was found to be remarkably low, mainly due to the care that had been bestowed in preventing strains on the main framing affecting the bearings and working parts.

The crane has already been erected at its destination, and reports which have come to hand show that the design and workmanship have met with the fullest approval of the government officials and the contractor for the works. The mode of working is to lift the concrete block, weighing 25 tons, high enough to admit a truck under it. The block is then lowered on to the truck, and is pushed by hand on to a strong wrought iron pier truck, which is fitted with hand propelling gear and brakes, and runs on a line of rails laid at right angles to the lines upon which the crane and truck run. The rails for the pier truck are laid on a lower level, so as to facilitate the transfer.

The pier truck is then worked down to the pier head with its load by the hand gearing, and on reaching the head of the pier the block is lifted by a floating crane, consisting of a powerful derrick attached to the forward part of a barge and worked by a steam winch of unusually large proportions, combined with suitable blocks and chain, and is then lowered into the sea on stone and rubble foundations already prepared.

As soon as the crane has completed loading one line of blocks it is traveled on to the pier truck and taken to the next line, repeating the operation until the whole yard is cleared.

The pier truck, slings, chains, blocks, and other lifting machinery, together with the Goliath crane, which we illustrate, have all been manufactured for this contract at the works of Mr. Henry J. Coles, Southwark, London.

When these harbor works were first contemplated, plans, specification, and tender were asked for a block-setting titan which would lift the blocks from the yard and travel bodily with them to the pier head. Mr. Coles' design for this crane was approved by the ministry, and instructions were given for the titan to be ordered, but for various reasons it was afterward decided to use the plant forming the subject of this notice.—*Engineering.*

Photo-Microscopic Stereographs.

There are innumerable bodies in the world of small things which can only be properly observed, so as to realize their configuration, by a binocular microscope; and in the case of such objects, no matter how much they may be enlarged by photography in the usual way or with what perfection their detail may be rendered, they still afford a very inadequate idea of their form.

Our object at present is to point out, briefly, some methods by which the possessor of an ordinary monocular microscope may be enabled to photograph any suitable object with all the relief as seen in the finest binocular instruments, and this, too, without incurring much expenditure for costly appliances. Premising that the method to be described is intended for employment with low powers, we shall explain its principle of action by a simile we employed many years since, when we had occasion to introduce it to the notice of our readers of those days. Let a bust or statuette be placed on a table at a distance of a few feet from a single fixed camera, and a negative be taken. Now, without moving the camera, rotate the statuette on its axis in the slightest degree, and then take a second negative. Prints from these two negatives will, when mounted side by side on a stereoscopic card mount and examined in the stereoscope, show the image in all the solidity that could be desired, the amount of relief being determined by the extent to which the original object was rotated previous to the second negative being taken. Reasoning from analogy, we now proceed to apply this system to the production of micro-stereographs.

The object slide must not be placed flat down directly on the stage of the microscope, but upon a secondary or super stage so constructed as to allow of the small platform upon which rests the object slide to oscillate from right to left within a limited sphere. The one we constructed for the purpose is made of thin brass, pivoted at its two sides into guiding side pieces, the axis of motion being adjusted so as to coincide with the object to be photographed. Having focused the object, and using a diaphragm in front of the objective so as to increase its penetration, the first photograph is taken, when the little seesaw slide holder is tilted to one side, after which it is tilted to the opposite side preparatory to making the second exposure The amount to which the tilting takes place must be only very slight, else the apparent solidity of the image when subsequently examined in the stereoscope will be exaggerated.

Success in this is insured by employing an objective of small angular aperture, or, should it be too wide, limiting this otherwise excellent quality by a diaphragm cap being slipped over the end.

Another way by which stereoscopic photo-micrographs can be obtained by a monocular microscope is to employ an objective having an effectively large front lens and covering it with an easy fitting cap, having in it an aperture so much at one side as to cover up one half of the lens. When making the first exposure, the cap is turned so as to uncover one side of the lens, and is rotated half a turn before taking the second negative. The resulting pair of pictures will be stereoscopic.

There are several other methods which may be employed, and which are more especially adapted for the higher powers. This article is, however, mainly intended for the photo-microscopic aspirant with limited appliances.—*Br. Jour. of Photo.*

Land Torpedo Boats.

The question as to whether machine guns should be attached to cavalry seems at last to have settled itself affirmatively, and we may hope soon to see their proposed issue an accomplished fact. When, some three years ago, it was suggested by Lord Charles Beresford to use the machine gun as a "land torpedo boat," he had in his mind's eye a light well-horsed weapon that could dash on with the advanced cavalry of a force to seize important advanced points, or that could dart from point to point of a battle field as its services might be required. In accordance with this idea, a strong, light two-wheeled carriage was designed, which carried a Nordenfelt three-barreled gun, mounted on a double limber box, with room for one man sitting on each side of it. It was drawn by a pair of horses, one of which carried the driver. This gun was thoroughly tested in every way by the 10th Hussars, under the superintendence of Colonel Liddell and Major Wilson, and latterly by the 13th Hussars, in the hands of Captain Baden-Powell. Several improvements were added, and new guns have within the last four months been issued to the cavalry regiments at Aldershot. These are now being put through an exhaustive trial as to their mobility and accuracy, and their detachments through a course of training in their use. Ever since the idea of their adoption was first mooted, objections have from time to time been urged and freely argued, and recently a discussion took place in the theater of the Royal United Service Institution, which may be said to have asserted finally the necessity for their adoption as a service weapon. On this occasion it was proposed, in a very able lecture by Lieut. Benson, R.A., that a limbered ten-barreled Nordenfelt gun should be adopted as the service machine gun, to be organized and worked on the battery system. An interesting discussion followed, in which some of the speakers strongly pointed out that were this system to be introduced, the whole idea of the "land torpedo boat" would be lost. Whether or not such an arm as that proposed by Mr. Benson should be started as an additional branch in our service remains to be determined by the development of events; but that it should take the place either of the cavalry galloping machine gun or of the portable infantry weapon is an idea not to be entertained. The very different nature of the action of cavalry from that of other arms demands a special form of weapon for it. As one of the speakers pointed out, cavalry action as compared with that of infantry or artillery differs as a Frenchman's style of fighting from a Briton's. The one hits out fair and square, while the former endeavors to disable his adversary by a sudden and unexpected kick on the shin. Cavalry relies for success on the suddenness and sharpness of its attack, and for such tactics the present gun is pre-eminently adapted. When one takes into consideration the various duties of cavalry in modern war, it must be confessed that a machine gun of equal mobility must almost at any time be of very great assistance to it. Thus, when covering the advance of an army into an enemy's country, such a gun would be most valuable in assisting to seize and hold advanced posts, defiles, bridges, etc., until the arrival of re-enforcements. Among outposts it will add to the strength of the pickets, especially at night, by sweeping the main lines of approach open to the enemy.

In action, when the opposing lines are advancing against each other, the gun may gallop to the front and flank and knock a gap in the oncoming enemy's line in a few seconds. In the defense of posts or in street fighting it would not only materially assist the power of the carbine fire of the dismounted men, but would also tend to render the presence of so many of them unnecessary—would do away with the bad economy described by Colonel Brabazon as "an endeavor to make the best cavalry in the world into indifferent foot soldiers." With rear guards the value of machine guns could not be overestimated. For sudden harassing of the enemy's flanks and lines of communications, convoys, etc., the insignificant appearance of the gun will enable it to get almost anywhere unnoticed, and to come into action at most unexpected times and places, with immense moral as well as practical effect. But for these duties it is imperative that the gun should be of the most mobile mounting, capable of rapid movement over bad ground, able to come into or to cease from action almost without a pause, and that it should be always on the spot with the cavalry. These vital points would be lost were a corps of limbered machine guns established in lieu of the galloping cavalry guns. The action of machine guns in the above class of work is one of momentary opportunity. There would seldom be time to send off to the nearest troop of the machine gun corps for the desired assistance, the limbered gun with its four horses would only make its way indifferently well in bad orinclosed country as compared with that on two wheels, and would attract the attention of a watchful enemy before it had time to wheel up, unlimber, and come into action; and on the slightest hint of a counterstroke by the enemy, it would have to limber up and get away sooner than the cavalry gun, which can maintain its fire up to the last moment, and continue firing even in retreat if necessary. But to get the most out of such a gun, it is very desirable that its points be thoroughly recognized, and as thoroughly instilled into those deputed to work it. A wise step to this end has been taken in establishing a class at Aldershot for instruction in the uses of the new weapon. —*Broad Arrow.*

Dangers of Overhead Electric Wires.

In New York, recently, people passing along the east side of Union Square, about 9 o'clock in the evening, were attracted to a small but brilliant pyrotechnic display made by one of the telephone wires crossing Fourth Avenue at Fourteenth Street.

Suddenly a spark larger and more brilliant than any of the others flew from the wire, and a team of horses drawing car No. 137 of the Fourth Avenue line, which was passing under the wire at the time on the uptown track, began to dance and prance about.

One of the horses the next moment dropped to the pavement as though it had been shot, and the driver noticed that the thin telephone wire was broken and wound round the animal's legs and neck.

He jumped from the car and was about to tear the wire from his horse's neck, when Officer Kaieser, who happened to see the occurrence, held him back.

It was then discovered that the horse which had fallen was dead, and the deadly character in the broken wire thus being demonstrated, there was a lively scattering of the crowd in all directions. Officers Kaieser and Hass succeeded in taking the harness from the live horse, and saved it from the fate of its mate.

Travel was delayed on the Fourth Avenue line for over a half hour. Finally a man came along with a ladder, and with a huge pair of rubber gloves on his hands. He climbed the ladder, which the policemen held as far from the dead horse as possible, and cut the wires.

The circuit was thus broken and the danger removed. The horse was quickly hauled from the track and travel resumed.

The accident was caused by the telephone wire falling upon the electric light wire, and becoming impregnated with the strong current of the latter.

Telegraph Line across the River Luan-ho.

The extension of the Chinese telegraph system has involved the crossing of several large rivers—a matter of no small difficulty, owing to the enormous dimensions of the summer floods. The river in question, whose ordinary width is about half a mile, is swollen by the rains to a breadth of more than eight miles, and quite recently a large village situated nearly five miles from the western bank was completely destroyed by the overflowing torrent. Heavy cables have been used for these crossings, but their lives have been of short duration, due partly to the *debris* brought down, partly to the constantly changing river bed. It was therefore decided to divert the land line some 19 miles, taking it to higher ground, where the river was naturally more restricted as to its channel, and effect the crossing by means of a wire rope. The extremities of the rope at the position selected are respectively 447 and 737 feet above the level of the river, the distance to be spanned being 1,549 yards. The line is supported at either end by stout wooden posts some 14 feet high and 14 inches diameter at the top. These posts are firmly stayed and guyed by steel ropes. In consequence of the exceedingly heavy strain, it was found necessary to employ granite blocks about 4 feet in circumference as insulators. A similar wire rope crosses the river Kistna at Bezarrah, in the Madras Presidency, having a span of 1,690 yards; there are two across the Ganges with spans of 966 and 943 yards; the Hooghly is crossed by a line of 711 yards; and in the United States a wire rope of 666 yards crosses the Missouri. The Chinese aerial line is consequently the second longest. The wire rope was manufactured by Messrs. Siemens & Company, of London. It is composed of seven steel wires stranded, each wire 0·145 inch diameter.

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J. B. Dancer.

We are indebted to the *Manchester Guardian* for the following particulars of Mr. Dancer's life:

Mr. Dancer was born on October 8, 1812, in London, and may be said to have been born an optician, his father and grandfather having been makers of optical and scientific instruments. In 1818 his father, Mr. Josiah Dancer, removed to Liverpool, where he carried on the business of optician and philosophical instrument maker. In 1835 the father died, and the business was afterward carried on by the subject of this notice. After a few years Mr. Dancer removed to Manchester. He was the first to suggest the application of photography to the magic lantern, and he also improved the arrangement of the optical parts, producing a clearer image and a flatter field than had before been obtainable. A list of the instruments, apparatus, and processes in the invention or improvement of which Mr. Dancer has been concerned is too considerable to reproduce here. We have only space to mention the most important. In 1838 he suggested the introduction of earthenware porous jars to separate the two solutions in voltaic batteries, which before this time was done by means of bladder or other animal tissue. In the same year he invented a still more important instrument, viz., the automatic contact breaker, or the vibrating interrupter—an instrument which is absolutely indispensable at the present day wherever electricity is employed for telegraphy or signaling. Again, in 1838, and resulting from the same experiments, came the deposition of metallic copper by voltaic electricity. This was the very beginning of electro-plating, of which art Mr. Dancer was really the inventor, though others have run away with the credit of it. In 1841 he commenced microscopic photography on daguerreotype plates, and this wonderful art he perfected in 1852, when the introduction of the collodion process much simplified this and every other photographic process. In 1853 Mr. Dancer invented the twin-lens stereoscopic camera; that is, a camera with two lenses placed side by side, at a short distance apart. Omitting several other instruments which Mr. Dancer improved, we must mention his connection with Dr. Joule in his renowned heat experiments and discoveries. Dr. Joule found the necessity for accurate thermometers, and with Mr. Dancer's assistance determined to make them for himself. The result was the production of a new thermometer, "the first made in England with any pretensions to accuracy," as stated by Dr. Joule himself. Mr. Dancer also arranged the apparatus for measuring the internal capacity of the bore of thermometer tubes. Of Mr. Dancer's connection with the microscope, Professor W. C. Williamson thus wrote a few months ago:

"Mr. Dancer successively brought out several forms of instruments, as excellent in their mechanical and optical arrangements as they were moderate in price. Instruments fully equal to the requirements of original research were thus brought within the reach of many whose observing faculties were more conspicuous than their financial resources."

After such a catalogue as this, one would in the ordinary course of things suppose that we should have to record that Mr. Dancer had died one of the most wealthy men of his time. Unhappily, he died one of the poorest. Too modest for business push and flare, he kept in the background while others gained by his labor; too unselfish to look after paying business, he "wasted," as it may perhaps be termed, time on the scientific interests of others—time and effort which might have been turned to his own profit. Any scientific man, if finding himself confronted by a difficulty, has gone, all through the last forty years, to Mr. Dancer as to an encyclopedia. Days absorbed in this way had to be made up by nights spent over the microscope, and in the end Mr. Dancer lost his most precious possession—his eyesight—not suddenly, but little by little. With the failure of his sight, business also began to fail, and a few years ago the old shop in Manchester had to be shut up. Then a few gentlemen came together, an appeal for subscriptions was issued through the papers, and very quickly a few hundred pounds were raised. From that time the small income that has come from this fund has been Mr. Dancer's only means of living. The story is one of the saddest it has ever been our lot to chronicle.

Large Silver Nuggets.

General A. G. Greenwood (says Mr. G. F. Kuntz) recently called my attention to a nugget of native silver weighing 606½ ounces troy, one of sixty that have been found at the Greenwood group of mines, in the State of Michoacan, Mexico.

The other nuggets weighed from one to thirty-five pounds each. The large nugget is entirely worn except in cavities, where some of the crystals are rounded and the form is still visible. It is almost pure silver, scarcely a trace of any gangue rock being discernible. This specimen was found on the surface, and in its original state is said to have weighed 12 pounds more. It is one of the most remarkable nuggets of silver ever found. The geological formation is a limestone with outcroppings of limonite.

Curiosities of Telegraph Construction in Mexico.

Like the land of Grecian fable, Mexico is a paradise girt with fire, says Frederic R. Guernsey in the Boston *Herald*. There are at least three distinct climates—that of the Tierra Fra, or Cold Land, up in the mountains; that of the Tierra Templada, Temperate Land, on the plateau, and extending down the slope toward the coast a few score miles; and, lastly, that of the Tierra Caliente, or Hot Land, which takes in the coast on the Pacific and Atlantic sides with also some of the sloping country.

The Tierra Templada is at the north of the country, characterized by the vast treeless plains, over which must be hauled by railway, or by cart where the railway does not penetrate, the poles and wire for the lines. Oftentimes great loads of poles, cut in the forests around Toluca or Paizcuaro, in the southern part of the republic, have to be slowly and laboriously hauled over the hot plains of Chihuahua and put in place by men who carry their rations for days with them. The cost of the poles and the wire is necessarily greatly enhanced by the transportation, and it may be said that telegraph wire, placed almost anywhere in Mexico, costs the government three times what it did landed at Vera Cruz or Paso del Norte.

Travelers on horseback in northern Mexico traversing these vast, treeless, and melancholy plains stop at night for camp, and, finding the telegraph poles accessible and admirably seasoned, cut them down for firewood. And this is not all. The humble ranchero, desiring a stock of wire with which to fence in an inclosure, goes with his peon servants and cuts down a mile or two for use, leaving poles oftentimes prostrate. I have myself seen poles wireless, and also long stretches of wire without poles.

And the poles brought so far at so great an expense have other enemies besides man. There is the insignificant-looking worm, the "jengen," which insidiously honeycombs the poles till some fine day they fall at the breath of a breeze, strewing fragments of wood over the ground. This is a formidable opponent of telegraph communication in Mexico, and any bright American who can show how to keep it out of the poles may fairly demand a reward from the Mexican government.

"Y los pajaros son enemigos tambien" (and the birds are also enemies). There is a Mexican woodpecker who sits up toward the top of the poles and pecks and pecks for whole days, till the top comes off, and wires and cross arms go too. A great rogue is this Mexican woodpecker, the sworn enemy of telegraph poles. The linemen (celadores) shoot him when they can, but of what use? One dies and forty come after to the funeral!

And then the white ants, those industrious, unseen hollowers-out of timber! These tiny creatures will eat out the inside of a pole till it is a mere shell, solid apparently, sturdy seemingly, but absolutely as good for nothing as an eggshell. Up comes the wind, and the poles blow away as if they were hornets' nests detached by a cyclone. These "hormigas blancas" dig out the inside of house timbers in some parts of the country. They have even been known to so hollow out the legs of a dining table that one day down it came with all its crockery and the noonday meal, too. The hormiga blanca is also the sworn enemy of civilization and progress as represented by the telegraph.

But the Hot Land has its enemies of telegraph also. How Mayne Reid or Ballantyne or Verne would have seized on the facts here presented! Picture to yourselves, good friends on seaside piazzas or lounging on mountain tops this summer day, a country of impenetrable vegetation, with gigantic palms and plantains, with jungles so dense that it is hard work with a stout and sharp machete to make a path through them, a country of intense heat, of innumerable mosquitoes, and ticks, and malaria, and snakes, and vegetation that grows up in a day to a height that interferes with the labor of man.

Such are some parts of the Mexican states of Tabasco and Yucatan, and it is through such regions that the telegraph which connects the Mexican capital with important points like San Juan Baptista or San Cristobal must penetrate. This is country where the linemen go in couples, and armed with rifles to fight off the fierce "puma," or Mexican tiger (tigre), who assaults man and is especially ravenous for telegraph constructors! The Mexican linemen down in the hot coast country shoot many a puma while out attending their lines.

A scarcely less formidable antagonist is found in the monkey tribe which inhabits the jungles and chaparral of Tabasco. Literally, "the woods are full of them." Their favorite diversion, when not in quest of food, is to betake themselves to the telegraph line for gymnastic exercises, and linemen assert that often one hundred able-bodied monkeys may be seen swinging on the wire, festooned, monkey fashion, by looping their tails. The continuous vibration of these forest gymnasts starts the iron nails used on the cross arms, and these often come down, bringing the wire with them.

And it is not a safe matter to undertake to disperse these robust monkeys who play the dickens with the telegraph lines in the sparsely inhabited state of Tabasco. Linemen have found that on shooting a monkey swinging on the wire they have been pursued by a whole regiment of monkeys. "It is no joke (*no es broma*)," said a lineman recently, "to have a tribe of monkeys pursue one; they are very strong (*muy fuertes*) and can hit with a stone or a stick in a fashion to make a man howl with pain, a thing the monkeys enjoy hugely."

In the coast country, especially on the Gulf of Mexico side, the wires, from the humid condition of the air, oxidize rapidly, and a wire is found by experience to be in need of replacement in a year's time. This adds heavily to the cost of keeping up the service.

Still another difficulty in maintaining a good service in the Hot Land States is the impossibility of acclimating, in many regions, telegraph operators from the colder table lands. They easily fall a prey to fevers, and, if they escape with their lives, they have been absent from their posts and the service has suffered. So it has been found necessary to make use of natives of those regions, often imperfectly educated, and from whom much must be borne, perforce, for they make blunders with fatal facility and try the patience of the city of Mexico officials to a degree.

Speed of Atlantic Steamers.

The returns for the present fiscal year, which have just been issued by Mr. Nicholas M. Bell, the Superintendent of Foreign Mails in the Post Office Department at Washington, give some information regarding the speed of Atlantic steamers which will be read with interest by those who took an interest in the recent discussions on the mail contracts. The Americans have a special reason for observing and recording the time taken by the various steamers to cross the Atlantic, for they send their letters by the fastest vessels only, altogether irrespective of their nationality or of the particular line to which they belong; and it is therefore necessary that the information on which they base their information should be thoroughly complete and accurate. From an engineering point of view, moreover, as well as from a postal, the statistics are worth a little study. These give the time occupied in the conveyance of mails during the twelve months from New York to London, and perhaps the most striking feature about the list is the distance of time separating the boats at its extreme ends. The Cunard liner Umbria heads the list with an average time of 187·5 hours, while the Wisconsin, belonging to the Guion Company, which stands at the foot, requires 258·1 hours to perform the same passage, being a difference of very nearly three days. The second on the list is the Umbria's sister ship, the Etruria, with 188 hours. Next in order comes the North German Lloyd steamer Trave, with an average of 199·3 hours, and the Anchor liner City of Rome, with 203·4 hours; while the Alaska, of the Guion line, and the Aller, of the North German Lloyds, compete very closely for the fifth place with times of 205·3 and 205·7 respectively. Then we have a considerable number of North German liners with approximately equal times, the average of which is very nearly the time taken by the Cunard liner Aurania. Then follows the Servia, of the Cunard line, with 211·2 hours, and then the White Star liners put in an appearance—the Britannic, with the time of 219·8 hours; the Germanic, 228 hours; the Adriatic, 230 hours; the Republic, 235 hours; and the Celtic, 236 hours. The best of the Hamburg-American line takes 240·7 hours, while almost at the bottom stand the Inman liners, the quickest of which, the City of Chicago, takes 241·6 hours; and the slowest, the City of Chester, requires 256·8 hours. It is probable, however, that the new boats now being built for this latter company and for the White Star line will completely change their positions in the list.

Polygonal Locomotive Wheels.

A locomotive possessing several unusual features has been recently built by the Hinkley Locomotive Company, of Boston. The engine is designed to run fast passenger trains, and has a single pair of drivers, 67 inches diameter on tread, and a pair of 42 inch trailing wheels with radial motion. The front end of the engine is carried on a four wheel truck as usual. The engine has piston valves, but the most novel feature is the form of the tread of the driving wheels. The circumference of the tire, instead of being a true circle, is polygonal, and formed of 105 flats each about 2 inches long. The object is to prevent slipping. The engine has not yet been tried, but it is claimed that polygonal tires have been running on a four-coupled engine on the Boston & Lowell during the last year with satisfactory results.

A flat wheel is generally regarded as damaging to the rails, while the motion of an engine or car with flat wheels is exceedingly unpleasant. Whether any extra adhesion will be gained seems doubtful, but even this means of preventing slipping would certainly, according to all preconceived notions, be more objectionable than the use of sand. However, such a bold departure from time-honored practice deserves a fair trial, and should not be condemned till actual experiment has demonstrated that flat wheels have no redeeming feature.—*Railroad Gazette.*

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