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THE SCIENTIFIC AMERICAN SUPPLEMENT,

No. 472,

For the Week Ending January 17, 1885.

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SUCCESS OF THE MISSISSIPPI JETTIES.

The attention now being given to the Tehuantepec Ship railway project of Captain Eads naturally recalls the former great engineering accomplishments of the originator of this bold scheme. Perhaps one of the most notable of these achievements was that which has so deepened and regulated one of the outlets of the Mississippi River into the Gulf of Mexico as to give free passage, at all times, for the largest vessels, up to the levees along the front of the city of New Orleans, so that even the Great Eastern, which could with difficulty be brought up to New York, will be enabled without trouble to anchor in the Mississippi off the grounds of the Exhibition buildings.

The difficulties attending the task which met Captain Eads had been for years the subject of much difference of opinion among engineers, and large sums had been expended with but little benefit. The city is 115 miles from the Gulf, and the river there was 150 deep and half a mile wide; at the head of the Passes, and about twelve miles from the Gulf, the depths were over thirty feet in the two larger Passes, and fifteen feet in the South Pass; but the depths on the crest of the bars in the Gulf, outside of the land, were, respectively, thirteen, eleven, and eight feet, at low water, and these, except as a channel was continuously dredged out, fixed the limit of draught for vessels passing up to the city. The enormous volume of the Mississippi, with the immense amount of sedimentary matter it carries, continually pushing the bars at its several mouths farther into the Gulf as this sediment was deposited in the waters where the river current almost ceased, rendered dredging operations each year more expensive, and the results obtained were of less and less value. For relief, a board of Army Engineers ten years ago suggested the cutting of a canal forty miles above the mouth of the river into an adjacent bay. This plan was met by Captain Eads' proposition to improve the channel by jetties, which would effect an artificial extension of the natural banks of the South Pass from the point where it commenced to widen and disappear in the Gulf to the crest of the bar, two and a half miles farther out. The building of these jetties has been often described, and the complete engineering details are given in back numbers of the SCIENTIFIC AMERICAN SUPPLEMENT; they were built of willow mattresses, sunk with riprap and capped at the outer ends by concrete blocks, the whole aim being to so confine the waters that the current would scour out and continuously keep clear a channel for the heaviest draught vessels to the deep waters of the Gulf.

The plan of Captain Eads was vigorously opposed by the Army Engineers in several successive reports on the subject, but the government approved the jetty system, and entered into contract with Captain Eads to carry it out, payment to be made for the work only after depths and widths of the channel specified in the contract had been obtained. On March 3, 1875 Congress passed the authorization act, and in July, 1879, the works were completed. The result has been so favorable as even to surpass the expectations of those who originally favored Captain Eads' plans. The least depth through the jetties was, last May, thirty-three feet, and the channel is steadily wearing itself deeper without forming bars at the mouth in the Gulf, so that the commerce of the Mississippi valley now has a seaward outlet comparing favorably with that afforded by any port on our Atlantic coast.

Besides his work on the jetties, Captain Eads' qualifications as an engineer have attracted public attention in at least two other noted cases. In the beginning of the war he, in an incredibly short time, provided the ironclad gunboats which succeeded in passing the forts in the lower Mississippi, when ironclad vessels were just beginning to be thought of. He was also the builder of the great St Louis bridge, which, from the difficulties met in obtaining a good foundation, was deemed at the time an engineering work of the highest order. It is especially pertinent just now to bear these facts in mind, in judging of the proposed Tehauntepec ship railway project, which seems to quite take the breath away from some of those in the profession, although its practicability is warmly indorsed by many of the most eminent engineers in this country and in Europe.

Jack Frost Bites.

Any plumber who holds his profession in high esteem should never complain of any sudden change in the weather, upon pain of expulsion from all societies of our craft. Notwithstanding, we do hear of chronic growlers, even when the zeros are around.

Any plumber who wipes a joint upon a burst is only *laying pipe* for another burst.

Cut it out and put in a new piece is the proper way. When pipes freeze they expand, and the lead becomes thin. Many suppose that the pipes burst when they thaw, but this is a false supposition. It is true the pipes never leak until they thaw. We have known incidents where pipes never thawed until the middle of June when left to thaw of their own accord.

The most economical way to thaw long lines of pipe is to abandon them, and run a new line; this will give water immediately, in the interval the old line will thaw of itself, then, when the new line freezes, you can connect on the old line.

There is nothing new or previous about this system.

When iron pipe freezes it generally splits for about a foot, while lead pipe expands for about four inches. The iron pipe necessitates the taking out an entire length from joint to joint. If the fittings are cast iron, just take a hammer and break an "L" or "T;" don't fuss trying to unscrew rusty threads.

Gas services when frozen up, disconnect at the meter, pour down half a pint of alcohol, shut off the service cock for five minutes, then open and blow gently down with your mouth; if the gas don't come, then connect your service cleaner and blow away.

An ingenious steaming apparatus has been constructed by Mr. John Haines, of Yorkville. It will save a great deal of digging where mains are frozen up. Mr. Haine's apparatus is attached to wheels, and looks like a miniature fire engine. He says it has paid for itself many times.

In very extreme cases when gas services are frozen very solid muriatic acid has been used to advantage, but care should be taken in the application of this; we do not recommend inexperienced hands to try it. All gas services should be run at an elevation from street main to meter, so that the drip should return to the main line. If impossible to run in this manner, then place a "drip plug" close to meter of sufficient length, say ten inches, of one inch pipe, with pet-cock for emptying at intervals.

Do not let the water run to prevent freezing; this is a poor precaution. Shut the water off and empty the pipes is a proper thing to do in cold weather.—*Plumbers' Trade Journal.*

Precautions against Cholera.

The first of a series of lectures dealing with precautions against cholera was delivered on December 8, at the Parkes Museum of Hygiene, London. It had been arranged that the three lectures should be divided into three parts, and that national, local, and personal precautions should be dealt with. Mr. Ernest Hart opened the series by lecturing upon national precautions. Director-General Crawford presided. In beginning his address, Mr. Hart remarked upon the increased knowledge which had been obtained in recent years in regard to cholera, and expressed the confident hope that, should cholera reach England, no such extensive suffering and mortality in our great towns as previous occasions had witnessed would occur.

Proceeding to sketch the history of international law and custom on the subject, Mr. Hart analyzed the results of the Vienna convention, and discussed separately the practices of European and Transatlantic nations in dealing with cholera. He urged that the evidence was overwhelming that European quarantine by sea, and land quarantine in any case, had invariably proved not only useless in preventing the extension of disease and loss of life, but cruel and mischievous, and had greatly added to the misery and suffering due to outbreaks of cholera. He condemned the attempts at quarantine practiced in France, Italy, and Spain, as being contrary to the experience and the knowledge of facts, as well as of science. Quarantine, he maintained, had never kept cholera out of any European country or limited it in any European district.

He proceeded to describe in detail the system of medical inspection at ports and termini, by which alone, he said, reasonable efforts might be made to prevent or limit the importation of cholera. Governments had practiced innumerable follies and insanities of quarantine, totally contrary to the rules of science, during the last epidemic. Rome, with its pure supply of water and its relatively efficient drainage, had remained free from cholera, while Naples, with its ground soil impregnated with sewage and its filthy habitations and polluted water supply, had suffered most lamentable losses. He had most excellent reasons for believing that the recent outbreak in Paris was due to the temporary supply of a highly polluted water to particular districts of the city. The prevalence of typhoid was, he declared, a true index of the liability to Asiatic cholera. Wherever typhoid prevailed, there the local conditions existed which would favor the propagation of cholera; and until typhoid fever disappeared from among us we could not consider ourselves free from the risk of the importation and the propagation of this epidemic disease. The lessons he desired to urge were: 1. That quarantine was useless. 2. That medical inspection of ports was essential, and with this should go means of isolation, compulsory notification of infectious disease, and the active exertions of all local authorities to free the districts under their control from the known conditions which rendered them liable to the extension of epidemic diseases when imported. 3. The disinfection was of most doubtful value under the known conditions of such disease. 4. That cleanliness in its fullest and widest sense was the prime element of safety.

The Recent Telephone Decision.

Perhaps no controversy for many years has contained so large an element of mystery, so many contradictions, as that regarding the telephone. From the almost simultaneous applications at the Patent Office of two rival inventors down to the time when an obscure mechanician suddenly appeared with a cloud of witnesses to challenge the pretensions of Bell, the history of the telephone has contained chapter after chapter of surprising disclosures.

It is a human tendency to rejoice with the victors, and to regard as deserved the discomfiture of the vanquished. Yet some are doubtless to be found who, having carefully read the evidence as presented in the recent trial, will be inclined to look upon the fate of Daniel Drawbaugh as unmerited as it has been severe; and, without presuming for a moment to doubt the technical justness of Judge Wallace's decision, be slow to admit that the late defendant is either an imposter or a co-conspirator.

To the lay mind, the fact that Drawbaugh had not applied for a patent until 1880—about four years after Bell—was fatal to his cause from the start. But the truth is, if he could show, as he claimed he could, that he publicly exhibited a telephone at Eberly's Mills before 1876, then neither Bell nor any other would have been entitled to a subsequent patent, and hence he could have succeeded in having the general principle of the telephone thrown open to the public. Indeed, it is not too much to say that such a result of the recent litigation would not have greatly surprised the officers of the Bell Company themselves or some of them.

It must be said there were some grave inconsistencies in Drawbaugh's case, and some extraordinary coincidences—coincidences as startling as was that of Graham Bell and Elisha Grey hitting upon the same extraordinary contrivance at the same time, unbeknown the one to the other, and appearing at the Patent Office through their agents on the same day (Feb. 14, 1876), and within a few hours of each other. It would not be more extraordinary if two men, living the one far distant from the other, should simultaneously discover the greatest secret in the old alchemy, the transmutation of the baser metals, and be found at the same time clamoring for their rights in the corridors of the Patent Office.

The court that considered the relative claims of Grey and Bell conceded that the former possessed a practical means of transmitting articulate speech, while Bell had but the germ of a great invention, and only decided in favor of Bell because of the mistake made by Grey in depositing a *caveat* in the Patent Office instead of demanding letters patent, as Bell did. With Bell and Grey it was a matter of hair-splitting priority; but in the case of Bell and Drawbaugh, evidence was not wanting to prove that the latter constructed a "talking machine" several years before Bell claims to have done so. It rested with him to prove that Bell had not, in reality, discovered anything, and was not therefore entitled to a patent; that he had only succeeded in constructing a something already in existence, and that, like Columbus, whose claim for having discovered America is usually allowed, he had, in fact, been only a late comer. He brought to his assistance nearly one hundred witnesses from his home at Eberly's Mills and other towns in Cumberland County, Pa., who severally swore that they had either seen the "talking machine" made by Drawbaugh and heard it "speak," or had had it described to them by neighbors. And all this several years before the date in 1876 when Bell got his patent.

To judge from the reading of this evidence, the "talking machine" would seem to have been town talk in Eberly's Mills long before 1876. Nor was the apparatus a mere crude device calculated only to deceive country folk. If we are to believe the witnesses, this "talking machine" would do all the improved telephone will now do, and even the experts employed by the plaintiff agreed that the instrument as shown in court and identified by witnesses was an efficient instrument for the transmission of articulate speech.

But if Drawbaugh really invented a "talking machine," why did he not discover himself when, at the Centennial Exposition, Bell exhibited his telephone, and its extraordinary powers were heralded all over the world? Why, indeed, did he wait four years before applying at the Patent Office?

In answer to these questions, Drawbaugh says substantially that he was poor; that it costs money to make such a demonstration as would have been required; and that his townsmen, if they had before hesitated in going in with him as projectors of the "talking machine," were now decided against the project by the fear of legal entanglements. One of Drawbaugh's witnesses, hailing from another part of the State, testified that he heard of the telephone at the exposition, and supposed of course it was the one he had long before seen in the workshop at Eberly's Mills and that Drawbaugh had taken Bell into partnership with him.

The points sought to be made by the complainants were that Drawbaugh never invented any telephone prior to the exhibition made by Bell at the Centennial; that if he had any ideas regarding such a contrivance, he obtained them from that exhibition, or rather from the copy of the SCIENTIFIC AMERICAN which the witness Shapley swears he loaned him in October, 1876; that after, but not before, various mechanisms more or less similar to those constructed by Bell found their way into Drawbaugh's shop. In support of this position a deal of what might be called negative evidence was obtained by the introduction of witnesses who had visited Drawbaugh's shop between the year 1865 and the autumn of 1876 without seeing or hearing of any "talking machine."

This would seem to be the weakest part of the case for the prosecution, because surely the affirmative evidence of witnesses equally reliable that they did see and hear of the "talking machine" is more conclusive than that of their fellows who did not. Again, the claim that Drawbaugh did not use his alleged invention, save in his own shop and experimentally, will scarcely stand in the face of the mass of evidence gathered from a hundred witnesses that his "talking machine" was generally known and talked about through all the country side, and in the sense of the patent law this would seem to have made his claims public.

It must be conceded that the claim set up by Drawbaugh's friends, that he was too ignorant to understand the value of his invention, too poor to patent it, and too obscure to obtain credit or assistance, was successfully refuted by the other side. It is in evidence that during part, at least, of the very time he is alleged to have been so poor, ignorant, and unknown, he was advertising himself as a machinist with electrical machinery as a specialty, and, singularly enough, as a solicitor of patents.

Taken as a whole, this telephone case is, to say the least, extraordinary. Could this cloud of witnesses, hailing from various parts of a great county, be deceived as to what they saw or heard? Were they mistaken only in the time, but always on the right side of 1876 for the defendant, or was it a gigantic conspiracy? If so, as Senator Edmunds said, it is a fabrication as gross as the Tichborne case or that regarding the earldom of the Earl of Selkirk.

After Drawbaugh himself, perhaps the public will have been the greatest loser by the recent decision, for had the general principle of the telephone been thrown open, rival companies would have entered the field, and rates for telephonic service, now so exorbitant, would have been reduced to a reasonable figure.

The Astronomical and the Civil Day.

When midnight struck on Dec. 31, 1884, two fellow travelers who had long been tramping, one just half a length in advance of the other, linked arms and continued their unwearying journey side by side. They were the two days, the astronomical and the civil, the former adjusting his pace to that of the latter, falling back twelve hours to get in step. So the astronomical day that began at noon, Dec. 31, was only a half day, and at its end the hands of the great twenty-four hour clock at Greenwich were turned back to begin anew, and corresponding changes were made at other observatories throughout the world, in accord with the recommendation of the late conference at Washington.

Hitherto the astronomical day has begun and ended at noon, with the successive returnings of the same terrestrial meridian to the center of the sun's disk. The civil day has begun and ended at midnight. The recent change was confined to marking the astronomical day from midnight to midnight. And the great timepiece on Greenwich Hill, as well as those in other observatories, will continue to be regulated by observing the precise instant of the sun's passage across the meridian, the meridian being represented by an exquisitely slender filament of cob-web stretched across the object glass of the transit instrument.—*Tribune.*

A New Process for Toughening Steel.

The French Societe d'Encouragement have had under prolonged examination a process, invented by M. Clemandot, for working steel. The process is described by the *Revue Industrielle* as consisting in heating the metal until it acquires a sufficient ducility, and then subjecting it to high pressure during cooling. In this way a modification of the structure of the metal is produced, and the material acquires properties analogous to those developed by tempering. Similar processes have been tried in France, but only upon the same principle—that is to say, by operating upon the metal while yet in the state of fusion. M. Clemandot, on the contrary, takes steel already made, heats it simply to a cherry red, and submits it, by means of a hydraulic press, to pressures of from 1,000 to 3,000 kilos. per square centimeter. After having allowed the steel to cool between the two plates of the press, it is withdrawn with all its new qualities perfectly developed, and does not require any further treatment. The result of the process is to impart to the steel a fineness of grain, a degree of hardness, and a notable accession of strength to withstand rupture. This alteration is most considerable with highly carbonated steel; and in this respect the metal is made to resemble tempered steel, without being in all points identical with it. The cause of the alteration in physical condition is ascribed to the rapid heating and no less rapid cooling of the metal. When the red-hot steel is first strongly compressed, the conversion of the mechanical energy into heat serves to raise the temperature of the entire mass, at the same time that the particles of the metal are more closely cemented together. This effect is followed by a rapid cooling, due to the contact of the plates of the hydraulic press with the surfaces of the metal. The close pressure materially increases this conducting effect of the cold metal.

A Talk on Slate.

"Few people have any idea of the magnitude of the slate industry in this country. Until a few years since, the product of the different slate quarries in the United States was quite limited. Now the total amount produced, of roofing-slate alone, is about 500,000 squares per year. A 'square' is 100 square feet, or sufficient to cover a space 10 feet by 10 feet, when laid on the roof. It covers the same area as 1,000 shingles, and sells for from $3.50 to $4.50 per square.

"As a roofing material slate is becoming more generally used, as it lasts a lifetime, is fire-proof, needs no painting, and renders rain-water pure and untainted. Besides the large amount of roofing-slate produced, a great deal is used for other building purposes, such as window-sills, steps, floors, and mantels. Billiard table beds are now made exclusively of slate, and it is also used largely for flagging."

"Where is most of the slate quarried?" was asked.

"Well, most of the quarries are in eastern Pennsylvania—in Northampton and Lehigh counties. More than one-half of the total product of the United States comes from that region. Maine and Vermont produce small quantities. There are also small beds of slate in Michigan and Virginia. The quarries at Bangor, Pa., in Northampton County, are considered superior to any, as the slate is tough, durable, and of an unfading dark blue-black color. The quarries there are valued at from $50,000 to $500,000 each.

"Over 3,000 men are employed in eastern Pennsylvania, and the number is fast increasing, as new quarries are opened and developed. The workmen are mostly Welsh and English. They earn good wages, have comfortable homes, and are a happy, sober, and industrious class.

"The slate is first blasted out, then hoisted by steam power in large irregular shaped blocks to the bank. These blocks are then broken or 'scalloped' into smaller blocks; then split into sheets of required thickness. For that purpose, a chisel or knife, about 18 inches long, resembling a large putty knife, is used. The slate splits readily whenever the knife is put in, if inserted when the block is wet, or 'green' as it is called.

"The workmen speak of the original moisture in the slate as 'sap.' After the blocks are dry, they harden and cannot be split.

"After the blocks are split, the sheets are dressed or trimmed with a machine worked by foot-power, to the required size, which is from 6 by 12 inches to 14 by 24 inches. They are then shipped to all parts of the Union and to the Old World. A great deal of slate goes to Australia.

"When beds are found, the slate is in inexhaustible quantities, and improves in quality as the depth of the quarry increases."—*No. Chatauqua News.*

THE old publishing house of Henry Carey Baird & Co., of Philadelphia, well known for its publications on engineering, mining, manufacturing, and other industrial subjects, celebrates the centennial anniversary of its founding on January 25.

Mr. Baird, the present representative of the above firm, comes from a line of eminent writers on political economy upon both his father's and his mother's side, he being a grandson of the late Matthew Baird and a near kinsman of Henry C. Carey, both of whose writings are familiar to the older readers of the SCIENTIFIC AMERICAN.

Both families adhered to the principles of protection with steadfastness, and the present Mr. Baird, now 54 years old, besides conducting his extensive publishing business, finds time to write exhaustive articles for encyclopedias and magazines.

Unique Advertising.

A British pill manufacturer has sent 10,000 handbills concerning his business to Gen. Wolseley, with a check for £150, the handbills for distribution among the soldiers and the money to be paid to the one who shall first post one of the bills upon the door of Gordon's palace at Khartoum. The man of pills also agrees to advertise the name of the winner in every paper in England.

THE Oil Well Supply Company, of Bradford and Oil City, Pa., have published probably the most complete catalogue of machinery, tools, and supplies used in drilling and operating artesian wells for oil or water, or to test land for coal or other minerals, that was ever issued from the press. It is amply illustrated, and gives many valuable details on well boring.

The Painless Extinction of Life of Animals.

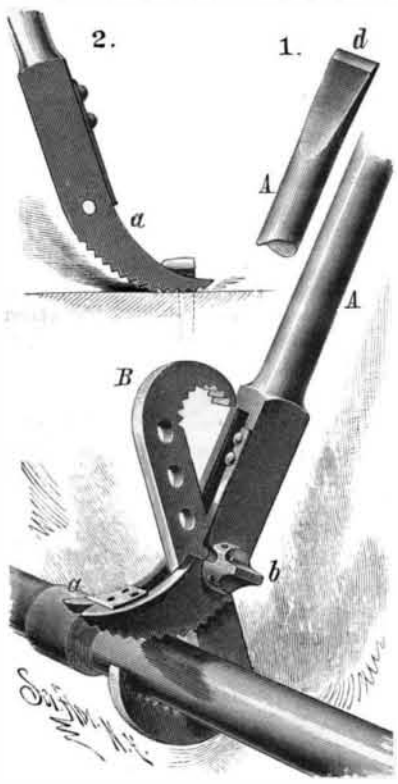
Dr. Richardson, of London, in a lecture on his process of painless killing of the lower animals, said in the closing passages of his discourse that at the Dogs' Home over 6,000 dogs have during the past seven months slept their final sleep, knowing as little of their deaths as of their births. The principal agent used for the narcotic action is carbonic oxide, passing, at summer heat, over a mixture of chloroform and carbon bisulphide into a lethal chamber, in which chamber as many as 100 dogs can at once receive euthanasia. This is on the large scale; but Dr. Richardson described also a small apparatus in which from one to six animals can be painlessly killed, and which is so portable that it can be wheeled from a central station to any house or street ready for immediate use. Thus every village and town may be provided at a small cost with a means that will give painless death to any domestic animal without offending the most sensitive individual. By an extension of the same design the author next intends to apply it to animals of the larger kind that are used for human food. It is no contemptible part of its history in this century for the profession to leave, as a bequest to the future, the means of taking the sting of death from all the lower animals whose fate is under our control.

Peroxide of Hydrogen as a Beer Preservative.

Since peroxide of hydrogen has been recommended as a good preservative for beer, the following experiments by Weingartner will be of interest to our readers, although only negative results were obtained. Some flasks of beer treated with hydrogen peroxide became clouded, while some pasteurized samples remained perfectly clear; the taste of the beer had changed to a flavor of rum, a microscopic examination showing much albumen and many living yeast cells. In another series, nine flasks of beer, to which had been added 3, 5, 6, 7, 8, 9, and 10 c. c. hydrogen peroxide, were placed on board a ship for a sea voyage lasting a month; they were daily inspected as to color and transparency; three days after commencement of the voyage two flasks which were not so treated, but kept as control, became muddy; the nine flasks treated with hydrogen peroxide remained clear and bright throughout the voyage; but on opening the flasks four days afterward, during very hot weather, it was found that the beer became clouded, although the taste and aroma remained good.

IMPROVED PIPE WRENCH.

The handle bar, A, of the wrench has a curved foot, and is slotted to receive the arm, B, which is held in place by a pivot pin, *b*, that is held by a spring catch which allows its ready removal. The arm has both ends made hook shaped—one being larger than the other—and is made with three or more holes for the pivot pin, so that the end in use can be set nearer to or farther



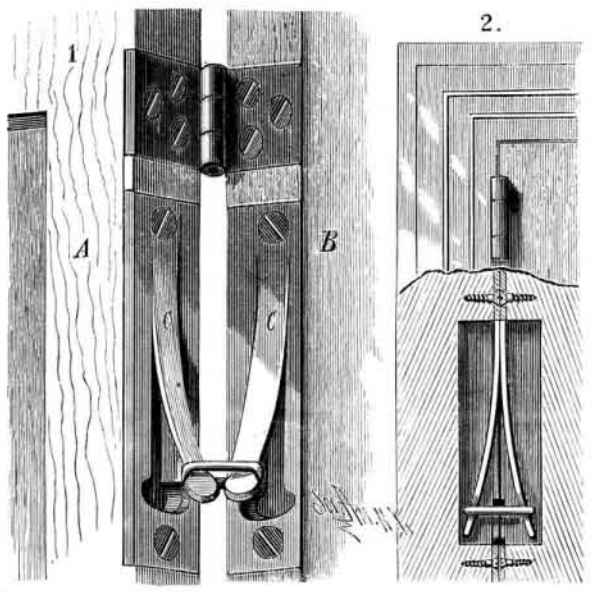
MORRISON'S IMPROVED PIPE WRENCH.

from the serrated end of the foot. The arm is to be reversed end for end, according to the size of pipe, and, with its endwise adjustment, adapts the wrench for a large range of work. Pipe fitters usually have to carry separate chisel bars and nail drawers, and in order to save this extra weight and expense the outer end, *d*, of the bar is tapered, so as to serve as a chisel bar or screw driver, and the curved end of the foot, *a*, is made with a notch, so that the bar can be used for drawing spikes and nails, as indicated in Fig. 2.

This invention has been patented by Mr. W. S. Morrison, and further particulars may be obtained by addressing Mr. James Lond, of 1101 Main Street, Fort Worth, Texas.

DOOR SPRING.

Let into and fastened to the edge of the door and the side of the jamb-rabbet are the like plates, C, which have spring tongues formed by slitting or pressing the plates by suitable dies. The free ends of the tongues are formed with notches which connect with a link. Normally, the free ends of the tongues lie back of the plane of the plates, the door and jamb being recessed to permit their entrance, as shown in the sectional elevation, Fig. 2. By this construction the tongues have a drawing or pulling action on each other, when the door is shut, to hold it firmly closed. It is evident that when the door is opened the tongues will be drawn outward



CLARK'S DOOR SPRING.

by the link and put in greater tension, so that on releasing the door they will act instantly to close it. The link, by its rounded ends, adjusts itself in the notches as they change their positions relatively to each other as the door is opened. The spring is wholly concealed from view, is positive and efficient, and can be cheaply made from suitable spring metal plates.

This invention has been patented by Mr. Enoch H. Clark, of Greenland, N. H.

Limited Use of Lumber in Mexico.

United States Consul Winslow, of Guerrero, writes that the amount of timber useful for manufacturing purposes in Northern and Central Mexico is very limited. The mesquite, the principal native product, although it is a very hard wood, and capable of taking a fine polish, is not suitable for general manufacturing purposes, as the trunk and branches are very crooked, and a straight piece of over two yards long seldom occurs. It is used, however, for making doors, door frames, for railroad ties, and for the heavy beams placed over the doors to support the stone walls, and for a number of other articles for which long lumber is not required. Its hardness, color, susceptibility of taking a fine polish, recommend it as useful for veneering, for making clocks, sewing machines, tool handles, and some articles of furniture.

There is, and will be, a demand for lumber, especially pine lumber, at those points reached by the Mexican Central, National, and International railroads, as new towns are being built along these roads; and, besides, large quantities of lumber are used in the mines and in the construction of bridges. All this lumber must come from the United States, but then the demand is not so great as may be supposed, as the manner in which Mexican houses are built must be taken into consideration. The houses, with but few exceptions, are of one story, some twenty feet high, and from twelve to fifteen wide, with flat roofs; built of blocks of stone, with walls two feet thick. The floors are made of a concrete, consisting of lime, sand, small stones, and water mixed together. The ground having been leveled where the floor is to be made, this composition is spread evenly over the surface, is allowed to dry somewhat, and is then beaten down by heavy wooden pestles, and afterward when nearly dry is smoothed down and polished by rubbing it over with round blue limestone. This requires considerable time and patience. The floor when thus made is smooth and glossy and hard, and will last twenty years. Wood floors are not suitable for this country, as they are liable to be eaten by insects, and afford a hiding place for vermin. The walls are plastered inside and outside, and whitewashed. The roof is made by extending joists from one wall to another, so that the joists show inside, and on the principal joist is painted date of building and some religious or political motto. Over the joists is nailed a flooring of boards, so that the flooring of a Mexican house is really on the roof. Over the roof is spread a composition, similar to that of the floor, which is also beaten down, so that the house becomes perfectly watertight and fireproof, and will easily last a hundred years. For example, the house in which the Consul lives was built in 1778. The roofing is of sabine and the doors of mesquite, and they are still sound. The houses consist generally of one room, some ten or twelve yards long, with sometimes another attached, as a kitchen; but the kitchen is most frequently made of adobe, and thatched with straw, and is in the back yard, retired from the house. The houses of the poorer class are made of adobe, or of sticks stuck in the ground and plastered with mud.

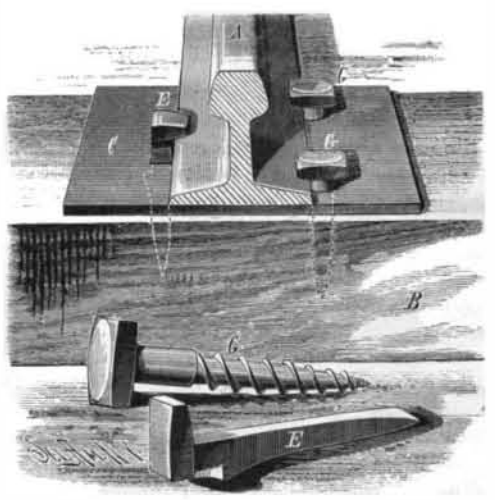
The kinds of lumber best to ship to Mexico are joists, two by twelve inches and sixteen and twenty feet long; pine and cypress boarding, one inch thick and twelve inches wide; scantling, two inches thick and four inches wide; double doors, one and three-quarters of an inch thick, six and a half feet high, one foot and a half wide; Venetian blinds for doors; shingles; oak, hickory, and ash lumber, three to four inches thick and ten to twelve feet long; materials for making carts; cart and carriage wheels, etc.

Expenses of Business.

A well informed merchant of Boston recently said to a representative of the Boston *Herald* that he had been looking back over his accounts, and was surprised to find that since the close of the war there had been a steady increase in the ordinary expenses of carrying on business. Mere office work cost a great deal more now than it did in 1865; more clerks were needed, and, on the whole, each of these received higher pay. Assistance was required in the receiving and delivering departments to an extent and of a character that would not have been dreamed of two decades ago. Then there were a variety of incidental expenses that now entered into the compilation. There were telephone charges, printing, the expense of solicitors, the whole making up an amount sufficiently large to eat up all that would have been considered fair profits a quarter of a century ago. It is probable that the experience in different trades varies, and yet we fancy that in most lines of business statements somewhat similar to the above might be made. The tendency, all the time going on, to lessen the hours of service, both in offices and workshops, would of itself make the cost of business proportionately higher. The cheapening process, if there is one, would seem to be in enlarging the amount of business which each concern carries on.

A NOVEL RAIL FASTENING.

For ordinary railway tracks and traffic the preferred dimensions for the wear plate, C, are 14 inches long, 6 to 7 inches wide, and about ⅜ of an inch thick; but the size may vary with the hardness of the tie, one of hard wood not requiring so large or thick a plate. Next to the outside flange of the rail is punched a rectangular hole in the plate, through which the spike, E, is driven, and next to the inside flange are punched two round holes, through which the screws, G, are turned down into the tie. The spike and screws are so arranged as to take a triangular hold on the base of the rail. The spike has a projecting lip at the back, with a square shoulder formed at a distance from the under side of the head corresponding to the thickness of the flange and plate. In laying the rails they will be set on the plates, which will be placed so that the inner ends of the spike holes will lie about in line with the edge of the outside flange. The spikes will then be driven home, which will bring the shoulder just below the under surface of the wear plate, which will then be driven inward until the outer end of the slot comes



HOWE'S NOVEL RAIL FASTENING.

against the spike above the shoulder. By this means the rail is locked to the plate and tie by the spike, which is also locked by the plate. The screws are now turned down until their heads rest upon the flanges, to complete the fastening. It will be seen that a spreading of the rails is prevented, since the edge of the outside flange comes against the side of the spike below its head, and the screws have a firm downward hold on the inside flange. With this device fewer ties may be used, and those used will last longer. When considered necessary, the wear plates may extend along the tie from one side rail to the other under both rails.

This invention has been patented by Mr. John Howe, of Newhall, California.