Death of Cyrus H. McCormick.

This well known inventor, whose name will always be associated with improved harvesting machinery, died in Chicago, May 13, 75 years of age. He was born in Virginia, his father being a farmer of mechanical bent, and the inventor of several machines, one of which was a reaper that was not found practicable. Young McCormick experimented on a farm given him by his father, and, after having invented a hand cradle and a hillside plow, experimented on the reaper, for which he obtained patents in 1834. It was first placed upon the market in 1840. In 1845 he moved to Cincinnati, and in the same year secured patents upon several important improvements in the machine. In 1847 he moved to Chicago, where he has since lived, and where he erected large works for the manufacture of his reapers. Up to 1848 he had not made the machines himself, but had had them manufactured by a firm at Brockport, N. Y. In 1848 he began building them himself, and made seven hundred the first year. For some years past now the annual sales of the machines have ranged between forty and fifty thousand. His famous invention brought great wealth to Mr. McCormick, and many honors as well. Gold medals and grand prizes were showered upon him at expositions, and Napoleon III. gave him the Grand Cross of the Legion of Honor. His wealth he used wisely and well. In 1859 he founded and liberally endowed the Theological Seminary of the Northwest, at Chicago. He also endowed a chair in Washington and Lee University, Virginia, and gave to the University of Virginia a fine 26 inch refracting telescope. He was a member of the Presbyterian Church.

Death of Charles O'Conor.

Charles O'Conor was born in this city in 1804, of Irish parents. He received only a common school education and lessons in French and Latin, his father being unable to give him the benefit of an extended course of instruction. He studied law, and was admitted to the bar in 1824. A wonderfully accurate memory, complete fearlessness, and indomitable perseverance enabled him to overcome all difficulties, and, his abilities being recognized, he rose rapidly in his profession, and for half a century ranked among the foremost lawyers at the American bar. He maintained this position because of his strict integrity and impartiality, his vast learning, his knowledge of the law, and his intimate acquaintance with all its intricacies. He was connected with many of the most celebrated cases that have been before the courts during the past fifty years. He was good authority on the interpretation of constitutional law.

Mr. O'Conor died at his home in Nantucket, Mass., on the 12th inst., at the age of 80 years.

The Conductivity of Copper.

The true nature of electrical resistance is by no means well known; and the only light which the induction balance of Professor Hughes has as yet shed upon it has not revealed its true nature. An interesting observation recently made by Mr. W. Groves, the well known practical electrician of Bolsover Street, W., deserves to be more widely known. Mr. Groves took thin disks of brass and coated them by electro deposition with a thick layer of pure crystalline copper. He then cut similar disks of copper from the deposit, and tested them in the induction balance. The scale gave 200 as their induction value. The same disks, after being melted in a founder's furnace, only gave 100 on the scale, and after a second melting their induction value had fallen to nearly that of ordinary sheet copper, namely, from 50° to 80°. If, as many believe, the induction value represents the conductivity of the copper, there is here a great falling off, and it might be valuable, not only in a theoretical but a practical sense, to find out the true cause. Dr. Mathiessen found that copper lost in conductivity by absorption of oxygen, and the pure copper being fused in an ordinary founder's furnace may have lost its electric conducting power by absorption of this impurity. Should that prove to be the case, there is much to be gained by fusing copper in presence of hydrogen, which uniting with the oxygen would form water, and leave the copper in its pure condition.

New Sodium Battery.

The *Bulletin* of the Societe Internationale des Telephones has recently announced the formation in Paris of a syndicate with a capital of 12,000*l.* for working the sodium battery lately invented by M. P. Jablochkoff. Whether such an organization has been, or is to be, established, says *Engineering*, we do not know, but space may well be devoted to a short notice of the battery referred to. In designing it M. Jablochkoff's object was to obtain an element having a much higher electromotive force than any other hitherto devised, and for this purpose he has made use of pure sodium. This metal is used in thin plates, and is coupled with compressed carbon, such as is employed in other batteries, or the plates may be placed in a metal capsule, in the midst of broken carbon. Under such conditions, and subjected only to the humidity of the air, the battery yields the relatively high electromotive force of four volts, which may be raised to six volts by impregnating the carbon with certain metalloid solutions.

This latter fact, however, has no practical value, because the price of such solutions, and the difficulty of using them, make the arrangement quite impracticable. With a couple of sodium and copper, the electromotive force falls to three volts. Such a battery, which may be of value in some cases, is made up of a thin plate of sodium, and a piece of red copper gauze. It will be seen that the force of this battery is considerably in excess of others now in use. So far as we know, there is not yet sufficient information as to the durability and the internal resistance of the sodium battery, to establish any useful comparisons with ordinary types. On account of the avidity with which sodium decomposes water, and absorbs oxygen, it is necessary to shield the battery from exposure when it is not in use, and for this reason it should be kept, except when active, in a bath of naphtha, or at all events in a hermetically sealed vessel. M. Jablochkoff asserts that the waste of the sodium, that is to say, its combustion, beyond what is converted into useful energy, is extremely small. One of the objections, which naturally present themselves to this battery, is the great precaution which must be taken in using it, on account of the explosions which occur when sodium is brought into contact with water. With proper precautions, however, such a danger is not great, although more than one serious accident has happened from this cause.

The Liquefaction of Hydrogen.

M. Olszewski recently stated, in the *Comptes Rendus*, that he has liquefied hydrogen by the aid of liquid nitrogen; his previous use of liquid oxygen being unsatisfactory. The nitrogen was compressed to 60 atmospheres, and cooled in a glass tube to —142° C., for a considerable time by the aid of ethylene evaporating in a vacuum; and in this way was liquefied. The pressure being diminished to 35 atmospheres, the nitrogen began to boil with such rapidity that it seemed white and opaque in the upper portions of the tube containing it. If the pressure was maintained at this point, the nitrogen ceased to boil; wholly clarified itself; and showed a very pronounced meniscus. The liquid nitrogen, amounting to from 3 to 4 cubic centimeters in volume, preserved this condition for a considerable time, slowly evaporating, and producing an increase of pressure in the apparatus. At length its meniscus became less and less distinct; and it finished by completely vanishing when the pressure gauge stood at 39·2 atmospheres; which is, therefore, the critical pressure of nitrogen. When the liquid nitrogen was reduced to the pressure of one atmosphere, it at first rapidly evaporated; but afterward, when scarcely half of it was left, the evaporation slackened, but the liquid itself remained completely transparent, without freezing. The nitrogen did not freeze, even when evaporated under a vacuum; but it was very different when hydrogen contained in a glass tube of about 4·5 millimeters internal diameter was plunged in the liquid. While the nitrogen evaporated in the vacuum, and the pressure of the hydrogen fell from 160 to 40 atmospheres, the hydrogen was observed to condense into a colorless transparent liquid, running down the sides of the tube. A moment later, the exterior surface of the tube was covered with an opaque white coating of the portion surrounded by the gaseous nitrogen, and with a semi-transparent ice on the portion dipping in the liquid nitrogen. This ice and the white coating were evidently due to the nitrogen, which thus solidified upon the sides of the tube, prodigiously cooled by the ebullition of the contained hydrogen. The insufficient quantity of liquid nitrogen has not hitherto permitted M. Olszewski to observe the meniscus and critical pressure of liquid hydrogen; but he is convinced that nitrogen, in considerable quantity, boiling in a vacuum, will furnish the only means of liquefying hydrogen to its static condition.

Petroleum as Fuel in Rolling Mills.

Among the many ways in which efforts are being made to economically employ petroleum as a fuel, one lately tried at the Union Rolling Mill at Cleveland, Ohio, is said to have been a pronounced success. The apparatus is described as quite simple, and easily attached to an ordinary puddling furnace. What may be styled shallow pans, or receivers, are set upon the floor of the furnace, and in these pans are heavy, closely fitting perforated cast iron plates, lying upon shelves but half an inch raised from the bottom; leading to the centers of these receivers, from beneath, are oil pipes connecting without with a tank or barrel sufficiently elevated to give the oil a good head; intercepting the oil pipes near the furnace is a small cylinder in which is an automatic valve, which can be set at any position to automatically regulate the flow of oil. Auxiliary, are pipes for carrying exhaust steam for blast, a bridge wall back of the receivers to detain the flame, and a water-lined arch to protect the burners.

In operation, the automatic valve being set, the oil is allowed to flow into the receivers; a handful of cotton waste, ignited, starts the fire; the plates become heated, and the oil, forcing its way up under the plates, is instantly atomized, and rushes up through all the perforations—gases, hydrocarbons, and all—into a brilliant flame, leaving no residuum whatever beneath. The first fire was lighted about 9:30 A.M., but the full heat was not let on until about 11. At 12:10 P.M. the furnace was charged, and at 1:22 P.M—exactly one hour and twelve minutes—the first heat was concluded. The pig iron melted rapidly, the balling was performed without difficulty, and the ball went through the squeezer in excellent shape. Necessarily there were some drawbacks. The steam used for blast was scarcely dry enough, the pressure being only 70 pounds at most; there was a slight escape of smoke from the rear of the furnace when the draught was open, and a high wind at the time did not conduce to the most favorable test; nevertheless the results made a favorable impression on practical men who witnessed this trial.

This mode of burning petroleum is the plan of a Cleveland lady, and seems not unlike, in principle, the proposed way of burning petroleum in locomotives contemplated under the Holland patents.

DECISIONS RELATING TO PATENTS.

United States Circuit Court.—Southern District of New York.

MUNDY *vs.* LIDGERWOOD MANUFACTURING COMPANY.

When an inventor merely brings an old element into his machine, he makes no invention; but where he does more—dispenses with certain parts, duplicates others, rearranges and simplifies the machine—he must be held to have made an invention.

When a patent is for a combination, one element of which is a gear wheel with a cone supported in a peculiar manner, and the defendant uses the gear wheel with the cone, but the latter is supported differently, though the elements employed by the defendant are the equivalents of those of the complainant in the patented combination, *Held* that the defendant takes the complainant's combination and infringes his patent.

The New York Produce Exchange.

The dimensions of this great building, which was illustrated in the SCIENTIFIC AMERICAN for May 10, are as follows: Length on Broadway and Whitehall Street, 307½ feet; on Beaver Street, 150 feet; and on Stone Street, 149 feet; the tower being 40 by 70 feet, and 200 feet high. The aggregate floor surface in the building is 7½ acres, and the Board Room proper is 220 by 140 feet, 60 feet high in the center, and lighted by 23 windows, each 31 feet high, and a skylight over the center. The cost of the site and the pile foundations was $1,000,000, and the total cost of building and site about $3,000,000.

In this great building, by the aid of the cable, the telegraph, and the telephone, the principal commercial emporiums of two continents are brought into instantaneous commercial intercourse. Substantially all the agricultural productions exported from New York are bought and sold on the floor of the Exchange, and how large this business is may be estimated from the fact that in 1880 there was received at New York 59,000,000 bushels of wheat, 61,000,000 bushels of corn, and 5,000,000 barrels of flour; and in addition to these articles the transactions in beef and pork and their related products are always on an immense scale.

New Stone Saw.

A new sort of saw for cutting stone is described in *La Semaine des Constructeurs*, which seems to have advantages over those now commonly in use, and is easily and cheaply made and operated. In place of the ordinary long steel blades, supplied with sand to enable them to grind their way into the stone, the new machine presents only a slender endless cord, composed of three steel wires twisted together, which is stretched over pulleys in such a way as to bring the lower portion horizontally over the stone to be cut. The frame carrying the pulleys is movable, so that the cord can be brought into contact with the stone, or lifted away from it, at pleasure, and the whole is kept in rapid motion, while water falling in drops from a reservoir above serves to moisten the stone. The three wires which form the saw differ from the ordinary kind in being square in section, and by twisting into a cord they are so turned as to present a succession of oblique cutting edges, which act, when set in motion, in nearly the same way as so many small chisels, while the rapidity with which the blows follow each other probably adds to the effect.

American Institute of Electrical Engineers.

At the call of a number of prominent electricians a meeting was held on the 13th of May, in the rooms of American Society of Civil Engineers, New York, and the organization of the above named society was effected.

The first of its kind in this country, it bids fair to have a prosperous career, and will undoubtedly tend to promote the interests of all those engaged in electrical pursuits. That the society is a representative one, will be seen by the list of officers elected which is as follows:

President: Dr. Norvin Green.

Vice-Presidents: A. Graham Bell, Charles T. Cross, Thomas A. Edison, George A. Hamilton, Charles H. Haskins, Frank L. Pope.

Managers: Charles F. Brush, William H. Eckert, Stephen D. Field, Elisha Gray, Edwin J. Houston, C. L. Hillings, Frank W. Jones, George B. Prescott, W. W. Smith, W. P. Trowbridge, Theodore N. Vail, Edward Weston.

Treasurer: Rowland R. Hazard; Secretary: Nathaniel S. Keith.

Incorporation of a Bridge Building Company.

The firm of Clarke, Reeves & Co., proprietors of the Phœnixville (Pa.) Bridge Works, has been merged in a corporation under the style of the Phœnixville Bridge Company. The works of the company have a capacity of thirty to thirty-five thousand tons a year, and among their productions have been the Kinzua Viaduct, numerous new bridges for the West Shore Railway, and the structures of the Second and Ninth Avenue elevated railways of New York city. Mr. David Reeves is president of the company, and Mr. Adolphus Bonzano is vice-president and chief engineer.

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The Artificial Light of the Future.

In his "Science Notes," in the current number of the *Gentleman's Magazine*, Professor Mattieu Williams says: "My note on this subject last July* was preceded by one on the researches of Professor Radziszewski. I now learn that he has actually separated the luminous matter of the *Pelagia noctiluca*, one of the multitude of species of marine animals that appear like little lumps of jelly, and produce the phosphorescence of the sea. He evaporated to dryness 180 specimens; and from the residue he dissolved out (by means of ether) a peculiar kind of fat, which, mixed with potassa, gives out, when shaken, phosphorescent flashes. This is exactly what happens to the living animal. When quiescent it is not luminous; but if shaken or rubbed, it flashes. I have collected and examined a great variety of these animals at different times; the most remarkable occasion being one morning after a magnificent display of marine luminosity in the Mediterranean, a few miles off the shore of Algiers. The surface of the sea was incrusted, I might almost say, with countless millions of small jelly-like creatures, of spherical, ovoid, oblong, dumb-bell, and other shapes, varying in size from a mustard seed to a pea. A bucketful of water taken over the ship's side appeared like sago broth. They were all internally dotted with a multitude of what I suppose to be germs, that would be liberated on the death and decay of the parent. The practical importance which I attach to the study of the luminosity of these creatures is the fact that they supply light without heat. The costliness of all our present methods of artificial illumination is due to the fact that we waste a largely disproportionate amount of energy in producing heat as well as light. This wastefulness may be illustrated by supposing that we obtain a pound of the phosphorescent fat of the noctiluca, and divide it into two equal halves; making one-half into candles to burn in the ordinary manner, and using the other half to give out its light by cold phosphorescence. I am not able to give precise figures, but believe that I am well within the truth in estimating that the candle would dissipate 95 per cent of the potential energy of the fat in the form of heat; giving but 5 per cent of the amount of light that the other half pound would emit as cool phosphorescence. Let us, then, hope that Professor Radziszewski will continue his researches, and discover the whole secret of both the analysis and synthesis of this fat; and that of the glow-worms, the fire-flies, etc. Now that we can supply the confectioner with the flavors of almonds, raspberries, jargonelle pears, nectarines, etc., and imitate the perfumes and the richest colors of nature's sweetest and brightest flowers, all by the chemical manipulation of coal tar, we need not despair of solving the chemical problem of transforming mutton suet, or palm oil, or vaseline into glow-worm or noctiluca fat, to be used for illuminating purposes." —*Journal of Gas Lighting.*

GRAVIMOTOR.

The engraving represents a small vehicle which is fastened to the foot, and is so constructed that when the weight is thrown upon the foot-rest the wheels are revolved, carrying the operator forward, and when the weight is removed the foot-rest is raised to its normal position by a spring. The rest is supported by a rod which has a strap attached to its lower end, the other end of the strap being secured to a wheel mounted on the same shaft with a cog wheel, from which motion is transmitted to the shafts of the driving wheels. Clutch disks engage when the rest is depressed, and the driving wheels are revolved. This brings a spring in tension, and when the weight is removed the rest is lifted. As a motor is fastened to each foot, it is only necessary to bring the weight of the body on each foot alternately. The

HALL'S GRAVIMOTOR.

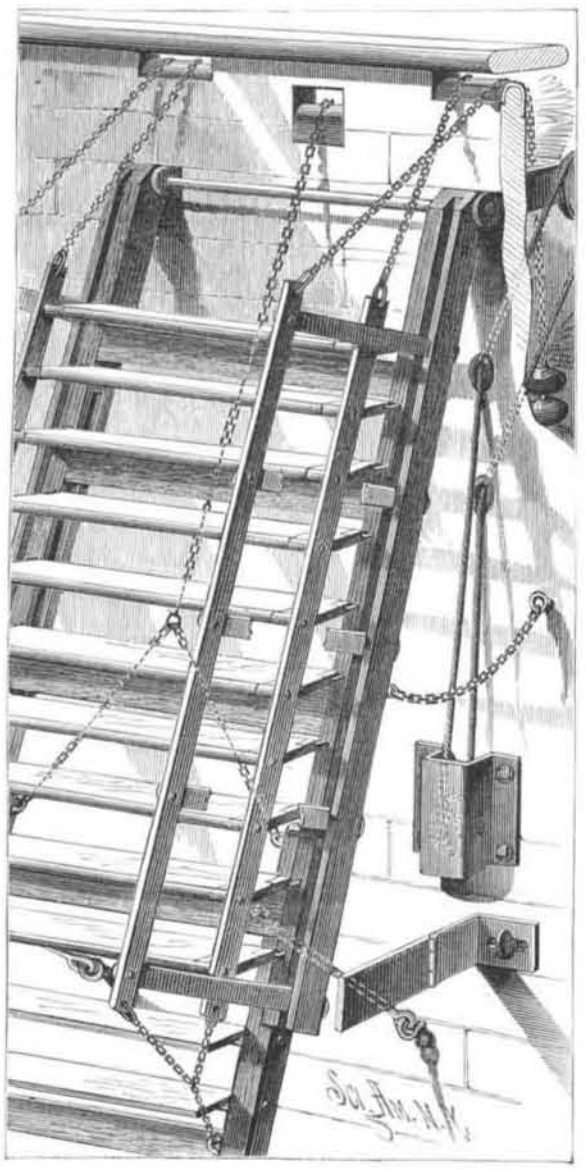
motor may be constructed with two driving wheels forward, with a single rear wheel journaled on a fork to a spring arm of the frame, above which a tongue projects to act as a brake. The foot rest is carried by a rack engaging with a cog wheel which is connected by suitable means with the shaft of the driving wheels.

This invention has been patented by Messrs. T. P. and J. B. Hall, and additional particulars can be obtained from the latter, whose address is School of Science, Toronto, Canada.

* See *Journal*, vol. xlii., p. 565.

FOLDING STAIRCASE.

An automatically folding staircase or ladder that can be used as a fire escape, for boarding vessels, etc., has recently been patented by Mr. Charles H. Chase, P. O. box 2,035, New Orleans, La. Our engraving shows the device attached to the side of a vessel. Two longitudinally grooved side bars, united by a series of transverse pieces, are hinged to the side of the vessel. Sliding in the grooves and united by cross pieces are two bars, to which is attached a chain, the upper end of which passes through an opening in the side of the ship, and is secured to a shaft placed directly before the opening. A brace rod connects the side bars with the



CHASE'S FOLDING STAIRCASE.

vessel. Pivoted to the upper edges of the side bars are steps whose upper edges are pivoted to rods having their lower ends connected by chains to the ends of the sliding bars. To the outer surfaces of the side bars are pivoted the lower ends of bars whose upper ends are pivoted to hand rails having their lower ends connected by chains to the lower ends of the sliding bars. Chains, which are fastened to the hand rails and to the rods to which the outer edges of the steps are pivoted, pass through holes in the ship's side and have weights on their inner ends. On one end of the shaft is rigidly mounted a grooved pulley, over which passes an endless chain that also passes over a pulley secured to the outer surface of the ship. A jointed locking plate is hinged to the outside, and is adapted to be swung over the lower part of the staircase.

When the staircase is to be swung outward for use, the shaft is so turned as to unwind the chain to allow the sliding bars to move downward. The weight of these bars carries downward and outward the outer end of the brace, thereby swinging the lower end of the staircase outward. At the same time the hand rails are raised and the steps swung into position. The shaft can be turned by means of a crank handle or by the endless rope from the outside. To fold the staircase the chain is wound upon the shaft, the sliding rods are drawn up, and the apparatus swung against the side of the vessel. The staircase can be made of any suitable length or width.

Plans for a New Harlem River Bridge.

Three plans for a new bridge over the Harlem River at One hundred and eighty-first Street, this city, have been laid before the Park Commissioners. The design of A. P. Boller, C.E., is for an iron cantilever bridge, 125 feet high, 100 feet wide, and having a central span 580 feet, to cost $1,500,000. The design of George McNulty, C.E., is for an arched iron bridge 132 feet high, 90 feet wide, and having a span of 543 feet; the approaches to be built of arched masonry; cost, $3,564,000. J. M. Wilson, C.E., presents plans for an iron cantilever bridge, 100 feet high, 80 feet wide, and having a span of 450 feet. There are two designs presented by Mr. Wilson, one contemplating stone piers and estimated to cost $1,193,347; the other with iron piers to cost $1,062,954.

A Couple of our Contemporaries' Opinions.

Referring to the removal of the SCIENTIFIC AMERICAN offices to 361 Broadway, the *American Garden* says, and we take pride in quoting their words, that as an "exponent of American progress the SCIENTIFIC AMERICAN stands unrivaled; and, combined with a high moral tone throughout, its educational value as a family paper cannot well be overestimated. We are glad," adds the editor, "to perceive the marked popularity and success which have compelled the publishers to remove to more spacious quarters. The new offices are beautifully lighted, airy apartments, more than fifty feet wide and one hundred and sixty feet long, and furnished with everything needful for the prompt and efficient execution of business.

"The SCIENTIFIC AMERICAN is not, as might be supposed from its name, devoted strictly to scientific matters only, but presents in a clear, practical manner the entire progress and development of our age: Science, art, literature, mechanics, industrial interests, inventions and discoveries of every kind, natural history, agriculture, horticulture, and many other topics of interest to every intelligent person."

The *Christian Intelligencer* has the following good word for us: "A great deal can be and ought to be said to commend the SCIENTIFIC AMERICAN to those who wish a popular scientific and mechanical journal of the highest character and greatest utility, edited with special ability disciplined by a long experience. It is possible that a few really valuable labor-saving inventions or important mechanical achievements in this country escape the vigilant editors of this weekly paper, but the number must be small. Besides being clearly described, many of such inventions and achievements are illustrated in pictures of unsurpassed excellence. Interesting and important scientific discoveries and facts are recorded by the hundred in the course of twelve months. At the beginning of the year we said that at least one copy should be in circulation in every school district in the United States. We still hold that opinion."

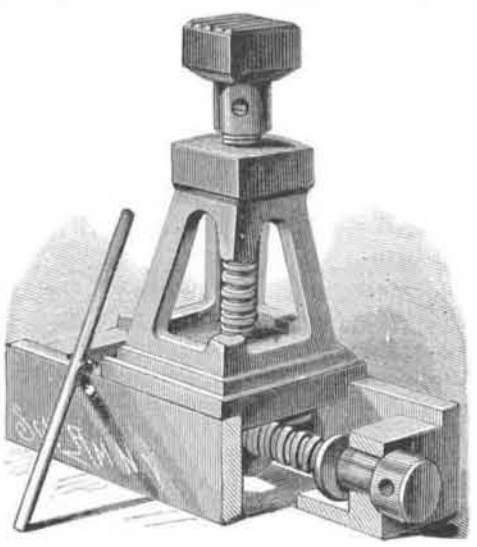
A Hot Region.

One of the hottest regions of the earth is along the Persian Gulf, where little or no rain falls. At Babrin the arid shore has no fresh water, yet a comparatively numerous population contrives to live there, thanks to the copious springs which burst forth from the bottom of the sea. The fresh water is got by diving. The diver, sitting in his boat, winds a great goatskin bag around his left arm, the hand grasping its mouth; then he takes in his hand a heavy stone, to which is attached a strong line, and, thus equipped, he plunges in and quickly reaches the bottom. Instantly opening the bag over the strong jet of fresh water, he springs up the ascending current, at the same time closing the bag, and is helped on board. The stone is then hauled up, and the diver, after taking breath, plunges in again. The source of these copious submarine springs is thought to be in the green hills of Osman, some 500 or 600 miles distant.

IMPROVED LIFTING JACK.

The screw jack herewith illustrated is arranged to shift the hoisting screw after the load is raised, to move the load while supported on the screw. The bed frame consists of two parallel side sills connected by cross pieces which are a little lower than the sides. The nut for the hoisting screw rests upon four legs, which, together with a broad base plate, are cast in one piece. The base plate rests upon the sides of the bed frame, upon which it can be shifted.

A strong screw nut is bolted to the bottom of the base plate. Fitted in bearings in the cross pieces and in the nut is a working screw, which is located directly under the



QVARNSTROM'S IMPROVED LIFTING JACK.

hoisting screw and the center of the base plate, so that with a plate of considerable length, to prevent turning so as to cramp between the sides, one screw is sufficient to shift the hoisting screw. By placing the cross pieces a little lower than the sides the base plate can be shifted along over them. The base plate is made with a hole under the hoisting screw in order that the screw may be made longer and have a greater range.

This invention has been patented by Mr. E. J. Qvarnstrom, and further information may be obtained from Mr. J. E. Hagey, of Vulcan, Mich.

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