

road track and the telegraph poles. Imagine the ground covered with an incrustation of alkali, which, when stepped on, breaks and lets one sink ankle-deep into soil as soft and fine as powder. Picture a gale of wind blowing over the waste, the air filled with fine particles of sand, the sun obscured, and no objects visible one hundred feet away, and you will have formed a faint idea of the worst aspect of the desert. It is hard to imagine anything so fearful as the reality; and, unless one can see the ground, and feel the sand, and experience a heat of 120° in the sun, we can have only a poor conception of the desert.

#### IMPROVED VELOCIPEDE.

We give an engraving of a novel velocipede lately patented by Mr. A. C. Johnson, of Martin, O., which is propelled entirely by the hands and guided by the feet. The rear axle is fixed in the hubs of the rear wheels, and turns in roller bearings on the frame. The driving mechanism consists of a train of three spur wheels, one being fixed to the middle of the rear axle, another turning in bearings on a triangular frame supported by the main frame of the vehicle, the third and uppermost wheel in the series being mounted on a shaft having at opposite ends hand cranks for driving. The bearings of this shaft are in a movable frame, pivoted on arms projecting from the top of the triangular frame. This arrangement is to admit of bringing one or another of three driving wheels on the upper or driving shaft into gear with the intermediate wheel to secure the advantage of more or less leverage over the resistance to be overcome.

The forward end of the frame of the velocipede rests upon a fifth wheel on the front axle, and the latter is connected by levers with a steering foot lever conveniently near the rider's seat. This seat is mounted on springs attached to the rear of the main frame.

All of the parts of this machine are made very light and graceful, yet strong enough to endure every-day use.

The use of four wheels gives a wide base, and the forward or leading wheels run in the regular wheel tracks of a road, giving, in this respect, a great advantage over the three-wheeled velocipede. There is also considerable advantage in running the machine by hand instead of foot, especially if the upper portion of the body of the rider needs development by exercise.

This velocipede is light running, easily propelled, and is not expensive in its construction.

#### IMPROVED BAND SAWING MACHINE.

The band-sawing machine shown in the annexed engraving is designed principally for cross-cutting logs into measured lengths for heading, shingles, fuel, staves, and for the various other purposes for which timber in this form is used, and by changing the carriage it may readily be converted into a saw for making lumber.

This machine is the invention of Mr. Lewis F. Kettler, of New Bremen, O., who has lately secured a patent for it.

The base of the machine, which rests upon the ground or any suitable foundation, consists of two timbers connected by crosspieces and supporting the framework which contains the upper wheel of the saw, the lower wheel being carried by a shaft journaled in boxes on the base timbers. These two wheels are covered with rubber on their peripheries, and the journals of the upper one are supported by levers, adjustable up or down by wedges entering the mortises above and below the levers.

The head block near the saw is provided with a toothed roller for moving the log forward preparatory to making a new cut, and this head block is movable only across the bed frame of the machine. The tail block is mounted on two sets of rollers and is capable of being moved either lengthwise or crosswise of the bed frame.

A square shaft running the entire length of the bed frame carries two pinions which engage racks on the head and tail blocks. The pinion carrying the rack on the tail block is movable along the shaft, but cannot turn upon it. The shaft is rotated by means of bevel gearing at the side of the head block, a crank wheel being secured to the outer end of an inclined shaft for the purpose of operating the gearing.

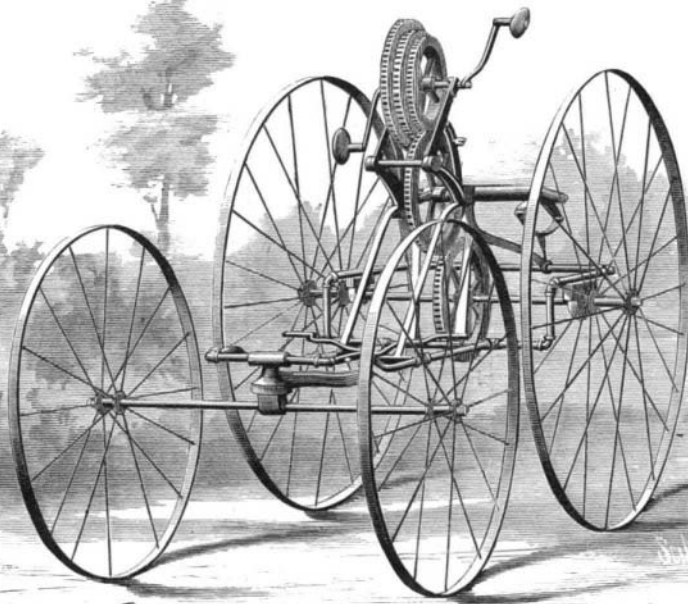
Power is applied to the pul-

ley on the shaft of the lower band-saw wheel. The log is moved forward by means of the lever and pawl mechanism connected with the toothed roller, and the log is carried against the cutting edge of the saw by turning the crank wheel on the inclined shaft. It will be noticed that with this arrangement both ends of the log are moved at once.

This saw, while being very simple in its construction, is adjustable in all essential parts, is easily managed, and does it with the application of a minimum of power.

#### Education in Iceland.

The correspondent of a Swiss journal thus writes as to this subject: "One would certainly have no trouble in finding among the corps of teachers some men of great merit, even erudite, whose obscure and modest science is devoted to study and to the good of their country, without care for renown or the reward of this world. I once asked a young Icelander, who undertook the instruction of children who, from the distance of their dwellings or the poverty of



JOHNSON'S IMPROVED VELOCIPEDE.

their parents, could not attend school? 'At the age of seven years,' he replied, 'all our children know how to read, write, and cipher; among the poorest fishermen of the coast there is not one who has not received what may be called a good primary education. Our mothers are our teachers, the *boer* (Iceland house) our schoolroom. The nearest pastor has an oversight of the progress of the children, and that one who does not furnish the proof of a sufficient education would not be admitted to confirmation. An Icelandic mother would not survive the chagrin of seeing her children refused by the pastor, and not a single example is known of it.' Ask the first child you meet who it was that taught him or her the history and geography of his country, the name of the birds and flowers, and the invariable reply will be, *Modremin*, my mother. Touching in its simplicity and grandeur, and revealing truly the character of this sympathetic people! At twenty-five the young man is profoundly religious, chaste, gentle, and honest as on the day when at his mother's knee he was spelling out his first lesson. Can one be astonished after this that in Iceland there are neither soldiers nor cannon; that the art of robbing one's neighbor

of his purse or his land is unknown; that one sees there no police nor prison; and that for centuries one has lost the memory of every kind of crime?"

#### NEW INVENTIONS.

Mr. Louis Wolf, of San Antonio, Texas, has patented an improved device for pressing and drying garments, which consists in a combination, with a hollow form of the shape of the garment to be dried and pressed, of hollow half-forms, and means for adjusting the half-forms on the form and heating them.

A novel folding seat for counters, patented by Mr. James A. Reeder, of Corinth, Miss., has an arm pivoted to the bottom of an upright, and supported by the ends of one or two downwardly-inclined guide-bars. The upper end of the arm carries a seat, and, when not in use, the seat is raised up against the upright and under the counter by a counterweight.

An improved open link has been patented by Mr. Solomon Shetter, of New Cumberland, W. Va. The link is formed of two parts, which are oppositely bent to form hooks, which are diagonally flattened or faced to fit upon each other. The straight end of one part is flattened at right angles to the plane of the hook, and this flattened portion is perforated and pivoted on the end of the other part.

Mr. Asa G. Golding, of New York city, has patented an improved butter-dish, made with an interior plate-supporting flange, by which the plate will be supported out of contact with the bottom of the dish, and in a cap ring, by which the edge of the plate will be covered and concealed.

A novel corner piece for wagon bodies has been patented by Mr. Richard B. Perkins, of Hornellsville, N. Y. The object of this invention is to provide means whereby the boards of wagon or carriage bodies and wagon seats, and other similar boxes, may be securely joined at the ends to form square or rounded corners without dovetailing and without the use of nails, screws, or similar fastenings, and in such manner that the corners will be shielded and protected from every direction, the rounded corners being rounded both upon the inside and outside of the box, or only upon the outside, as desired.

Mr. Edwin M. Fitzgerald, of New York city, has patented an advertising apparatus combining a clockwork, a series of rollers carrying an endless band, and a spring-driven chain of gear wheels, the band being moved automatically through fixed distances at regular intervals.

A combined child's chair, seesaw, wagon, and swing, has been patented by Mr. Thomas C. Keeler, of Mount Holly, N. J. This invention consists of a high or table chair for children, constructed so that it may be readily converted into a seesaw, wagon, or swing.

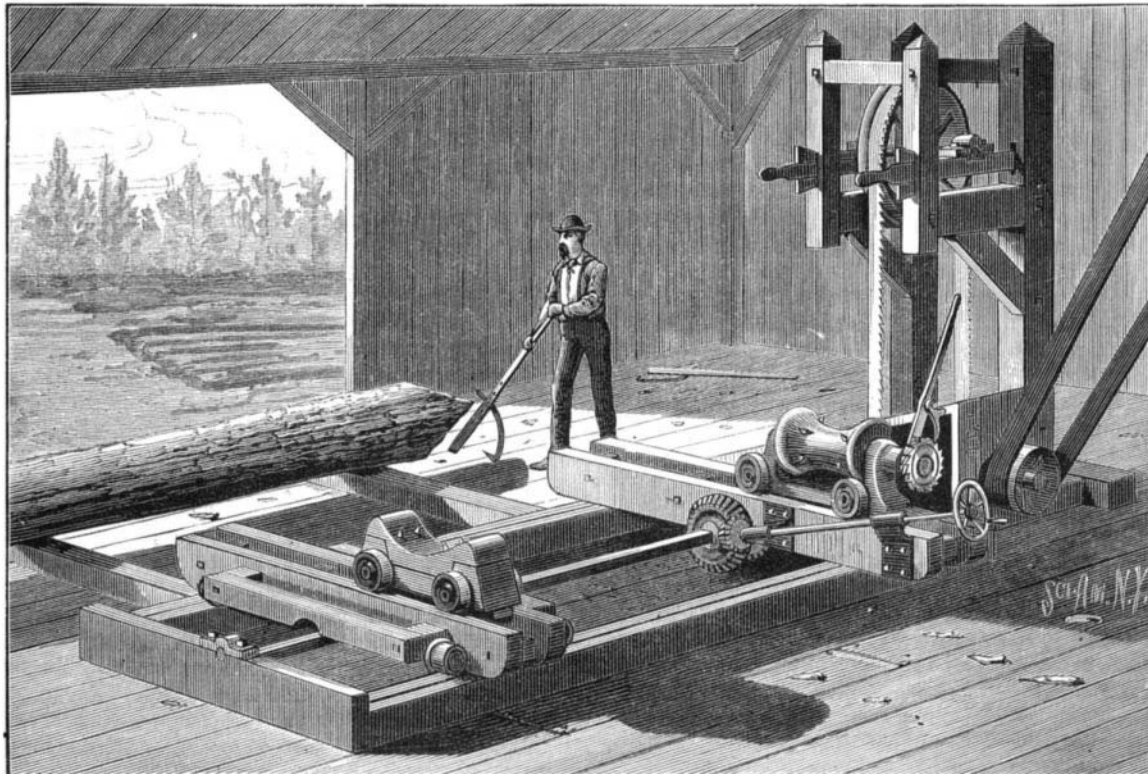
Mr. John C. Klett, of New York city, has lately patented an improved folding invalid chair. This chair is convenient for use in sick rooms, and it can be folded into small compass for transportation or for storage.

A case for clocks which is unaffected by heat, and which is practically dust-proof, has been patented by Mr. John G. Raine, of Grand Island, Neb. This clock case is intended particularly for clocks used on locomotives and in similar places.

Mr. David Thompson, of Leeds, County of York, Eng., has patented an improved kiln for bending, burning, staining, and annealing glass, burning art-tiles and pottery, and for other similar purposes. The object of the invention is to improve the use and application of gas and air so as to produce a uniform, safe, and certain result with less labor, time, cost, and liability to damage, and without the employment of additional or mechanical force or pressure to either the gas or the air.

An improvement in gas cooking stoves and ranges has been patented by Mr. William W. Goodwin, of Philadelphia, Pa. The object of this improvement is to perfect gas cooking stoves so that they will utilize the heat to the greatest possible extent, thereby economizing in the use of gas fuel. This stove is so designed as to give the greatest facility and convenience for cooking operations.

An improvement in hollow tableware, patented by Mr. Henry Korf, Jr., of Cincinnati, O., consists in a peculiar manner of cushioning the bottom or the feet or legs of ice pitchers, butter dishes,



KETTLER'S BAND-SAWING MACHINE.

tea and coffee pots, and similar articles, to prevent scratching of the table, tray, stand, or other things upon which they may be placed.

An improvement in grain-meters has been patented by Mr. Alexander Kaiser, of Munich, Bavaria, Germany. The object of this invention is to provide an improved apparatus for weighing and measuring cereals or other granulated or pulverized substances.

An attachment for ladders, patented by Messrs. Joseph D. Norton and Leonard M. Norton, of Loudville, Mass., consists in a central arm clamped on to the upper rounds to act as a pivot to permit the bottom of the ladder to stand square upon the ground when the ladder is placed against any oblique or irregular object, like the limb or crotch of a tree

**IMPROVED BELT STRETCHER.**

The engraving shows an improved belt stretcher recently patented by Mr. P. H. Kum, of Dixon, Ill. It consists of two clamps capable of grasping the belt tightly, and provided on opposite ends with pulleys, around which ropes pass, one rope being upon each edge of the belt. The ends of the ropes are attached to a windlass located between the clamps and operated by levers at opposite ends of the windlass, or by a lever and pawl acting on a ratchet wheel in the center of the windlass.

The clamps are made with a wedge-shaped serrated piece that clamps the belt in a wedge-shaped mortise, an increase in strain on the belt increasing the pressure of the clamp.

**A Boss Miner.**

A fire broke out in a shaft of a deep coal mine at Canton, Ill., and the miners made a wild rush for the elevator, crowding the cage and fighting for places. Five trips of the cage would carry them all up, but it looked as though the flames would quickly close the exit, and in the fright and confusion all struggled to be first. Tom Lukey, the cool and muscular boss of the gang, drove them all aside, and then called out the names of as many as could be hoisted out at once. In making the selections he chose those who had large dependent families. When the cage came down he filled it with those who had fewer relatives, and next time with husbands who had no children. It was not until the fourth lift that unmarried men were given a chance. The fifth carried some almost worthless bummers and Lukey himself, with the fire scorching their clothes. When praised for his act he carelessly replied: "Oh, that wasn't anything. If I hadn't got those fellows out of the way I would have been burned up, don't you see."

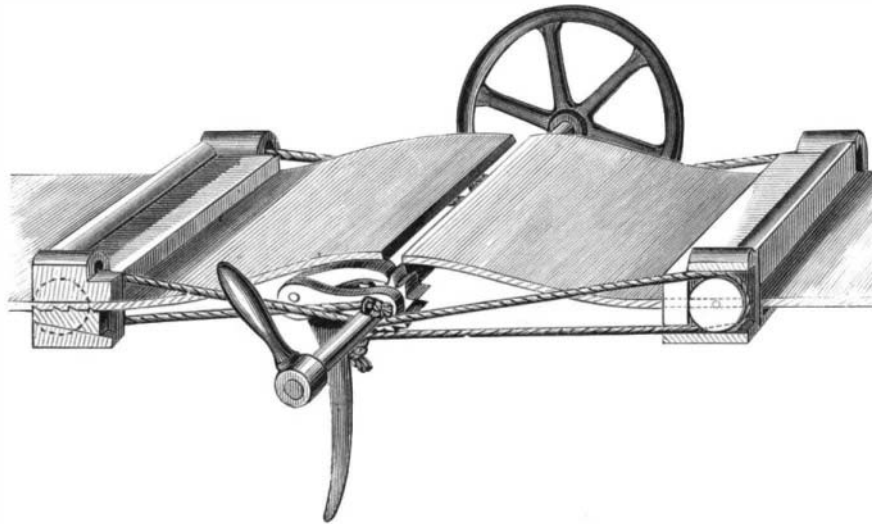
**Canadian Industries.**

A marked improvement in the industrial condition of our northern neighbor has taken place during the past year or two. The Minister of Finance, Sir S. L. Tilley, in presenting his annual budget the other day, said that at no period in the history of the country had government met parliament with the finances in as good a position, credit so high, and the people more prosperous, and he claimed that this state of affairs was greatly dependent on the protective policy of the government. The revenue year by year had been increasing until, from having a deficiency of \$200,000 in 1879, the treasury had a surplus of over \$400,000 for the twelve months ending last July. In 1879, government had proposed and parliament had agreed to remodel the tariff so as to protect native industries, and to-day, as a consequence, the factories were running full time and extending their premises and machinery; people were fully and remuneratively employed, money was plentiful, the ability of the people to buy was greatly increased, and, as a consequence, the volume of imports kept the revenue flourishing. He proved from statistics that the result of the tariff was largely to increase imports from Great Britain, and that the trade in breadstuffs between Canada and the United States had

increased from 8,500,000 bushels in 1877-78 to 12,143,000 bushels in 1880-81, proving the groundlessness of the predictions of the opposition as to the results of the operation of the tariff.

**Electric Lights in Philadelphia Post Office.**

A Philadelphia paper says that there are seventy-five small incandescent lamps at present in use in the City Post Office, supplied by the Maxim Electric Light Company. Each lamp is run to twenty-four candle power, though the power can be more than doubled. When the lamps were first placed some trouble arose in the machinery, in breaking globes, and in the carbons burning out; but the two latter difficulties have been overcome. The carbons are supposed to burn from six hundred to seven hundred hours. Theoretically there is no reason why they should ever burn out, but experience demonstrates, in the Post Office at least, that the carbons rarely last over three hundred or four hundred hours of actual service. The base of the Maxim lamp is of



**KUM'S BELT STRETCHER.**

vulcanite rubber and metal, and the work of removing the exhausted carbon and substituting a new one requires but a few minutes. Postmaster Huidekoper expresses himself very much pleased with the lamps. When they were first introduced some of the employes thought the light hurt their eyes and they wore shades, but, with two or three exceptions, these protectors have been discarded.

**EFFECTS OF HEAT UPON STEEL.**

The illustration shows the effect of heat upon steel. To produce these effects take a bar of steel of ordinary size, say about an inch by a half, and heat six or eight inches of one end to a low red heat, and nick the heated part all around the bar at intervals of half to three-quarters of an inch, until eight or nine notches are cut. This nicking is done at red heat, to determine the fracture at the nicks. Next place the end of the bar in a very hot fire and heat it white-hot until it scintillates at the extreme end, leaving the other parts enough out of the fire to heat them only by conduction. Let the end remain in the fire until the last piece nicked is not quite red-hot, and the next to the last barely red hot.

Now, if the pieces be numbered from one to eight, commencing at the outer end, No. 1 will be white or scintillating hot, No. 2 will be white hot, No. 3 will be high yellow hot, No. 4 will be yellow or orange hot, No. 5 will be high red hot, No. 6 will be red hot, No. 7 will be low red hot, No. 8 will be black hot.

As soon as heated, let the bar be quenched in cold water and kept there until quite cold. After cooling, the bar should be carefully wiped dry, especially in the notches. An examination by the file will reveal the following, if high steel has been used:

No. 1 will scratch glass; Nos. 2, 3, and 4, excessively hard;

Nos. 5 and 6 well hardened; No. 7 about hard enough for tap steel; No. 8 not hardened. In breaking off the pieces over the corner of the anvil they should be caught in a clean keg or box, to keep the fractures clean and bright.

No. 1 will be as brittle as glass; Nos. 2 will be nearly as brittle as glass; Nos. 3, 4, and 5 will break off easily, each a little stronger than the other; Nos. 6 and 7 will be very strong, and much stronger than No. 8, or the bar unhardened.

Place the pieces in the order of their numbers fitting the fractures, then upend each one, beginning with No. 1, and following with each in the order in which they lie, and the result will be fractures as shown so beautifully in our illustration, each differing from the other.

No. 1 will be coarse, yellowish cast, and very lustrous; No. 2 will be coarse and not quite so yellow as No. 1; No. 3 will be finer than 1 or 2, and coarser than No. 8, and will have fiery luster; No. 4, like No. 3, not quite so coarse, yet coarser than No. 8; No. 5 will be about the same size grain as No. 8, but will have fiery luster; No. 6 will be much finer than No. 8, will have no fiery luster, will be hard through and very strong. This is what is called **REFINING** by hardening. No. 7 will be refined and hard on the corners and edges, and rather coarser, and not quite so hard in the middle. This is about the right heat for hardening taps, milling tools, etc., the teeth of which will be amply hard, while there will be no danger of cracking the tool. No. 8 illustrates the original grain of the bar.

In nine cases out of ten the bar will crack along the middle to the refined piece. In the illustration the crack shows very plainly in No. 4, but we have never known this crack to extend into the refined piece, although we have repeated the experiment many times. We learn from this experiment the following:

**FIRST, "a"** Any difference in temperature sufficiently great to be seen by the color will cause a corresponding difference in the grain. **"b"** This variation in grain will produce internal strains and cracks.

**SECOND,** Any temperature so high as to open the grain so that the hardened piece will be coarser than the original bar will cause the hardened piece to be brittle, liable to crack, and to crumble on the edges in use.

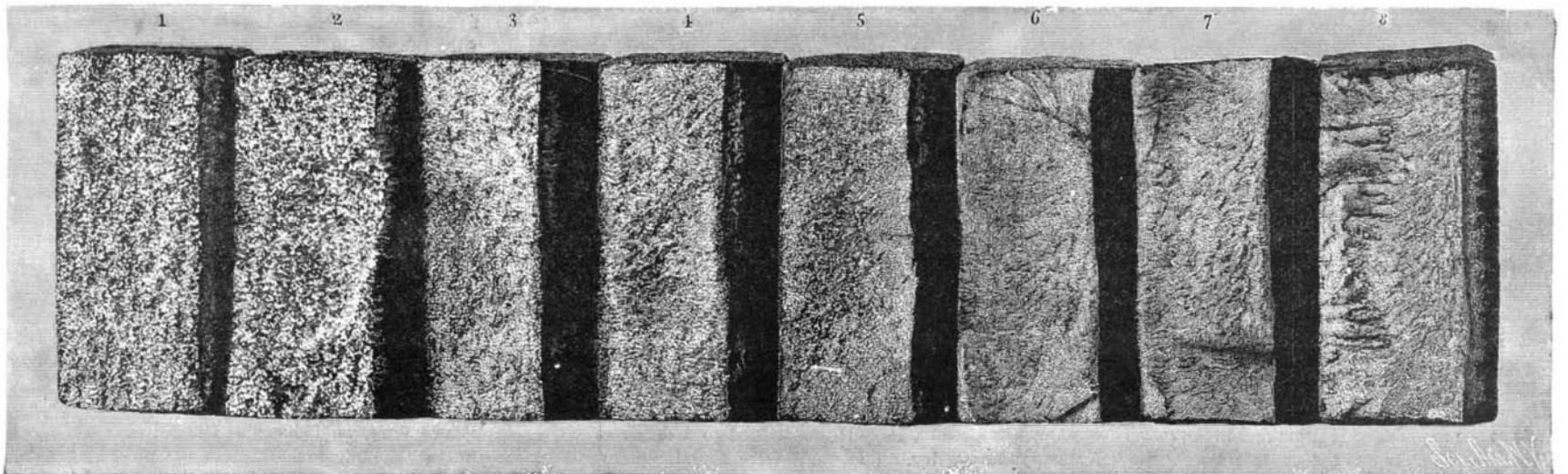
**THIRD,** A temperature high enough to cause a piece to harden through, but not high enough to open the grain, will cause the piece to **REFINE**, to be stronger than the untempered bar, and to carry a tough, keen cutting edge.

**FOURTH,** A temperature which will harden and refine the corners and edges of a bar, but which will not harden the bar through, is just the right heat at which to harden taps, rose-bits, and complicated cutters of any shape, as it will harden the teeth sufficiently without risk of cracking, and will leave the mass of the tool soft and tough, so that it can yield a little to pressure to prevent the teeth tearing out. These four rules are general, and apply equally well to any quality of steel or to any temper of steel.

Steel which is so mild that it will not harden in the ordinary acceptance of the term will show differences of grain corresponding to variations in temperature.

To restore any of the first seven pieces shown to the original structure, as shown in No. 8, it is only necessary to heat it through to a good red heat, not to a high red, allow it to stay at this temperature for ten minutes to thirty minutes, according to the size of the piece, and then to cool slowly. If upon the first trial the restoration should be found incomplete, and the piece upon being fractured should still show some fiery grains, a second heating continued a little longer than the first would cause a restoration of fracture. This property of restoration is not peculiar to any steel, and its performance requires no mysterious agencies beyond those given above.

It should be distinctly borne in mind that a piece restored from overheating is never quite as good as it would have remained if it had never been abused, and we strongly advise that no occasion should ever be given for the use of this



**THE EFFECTS OF HEAT UPON STEEL.**