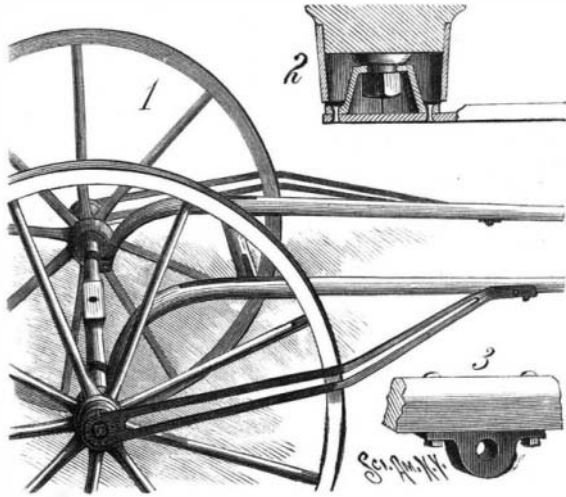


**A GUARD RAIL FOR VEHICLE WHEELS.**

A device to be attached to the thill and axle of a buggy or other vehicle, not to interfere with the free turning of the wheel, to prevent damage from collision with other vehicles by the wheels becoming interlocked, has been patented by Mr. John C. Tatman, of Mount Vernon, Dakota Ter., and is illustrated herewith, Fig. 2 showing a horizontal sectional view of a portion of

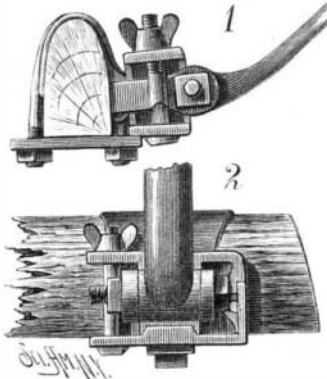


TATMAN'S GUARD RAIL FOR VEHICLE WHEELS.

the axle with the guard rail in place thereon, and Fig. 3 a view of the thill attachment. The guard rail has a circular opening in its rear end, behind which is a hollow or cup-shaped boss, adapted to fit upon the usual screw-threaded spindle of the axle. The guard rail thence extends forward and slightly inward, with a gradual sweep to a suitable point on the thill, where, through a transverse hole in its end, it is bolted by a pin to a drilled lug or web upon the under side of the thill. This guard rail not only precludes danger of the wheel becoming injured by collision or interlocking, but braces and strengthens the vehicle.

**AN IMPROVED THILL COUPLING.**

A simple and inexpensive thill coupling, designed to prevent rattling and be durable, is illustrated herewith, and has been patented by Messrs. Henry and John Knupp, of Warren, Pa. Fig. 1 shows a side view in section and Fig. 2 a front view, there being combined with the pivoted thill iron an elastic or compressible anti-rattler, placed next the thill iron eye. A clamp comprising opposite plates, hinged together at one side, bears upon the anti-rattler, and a screw passing through the opposite plates holds it in position. One of the clamp plates has a lug overlying the head of the thill iron pivot, and all the parts are cheaply and easily made, though forming a most efficient coupling.

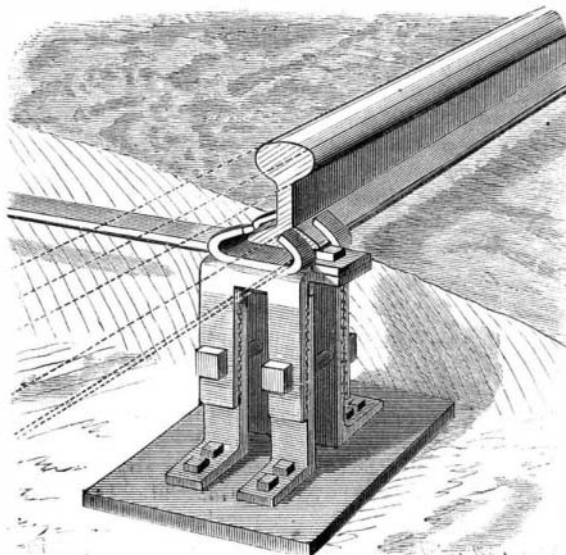


KNUPP'S THILL COUPLING.

rattler, and a screw passing through the opposite plates holds it in position. One of the clamp plates has a lug overlying the head of the thill iron pivot, and all the parts are cheaply and easily made, though forming a most efficient coupling.

**A COMBINED RAILWAY RAIL CHAIR AND TIE.**

A railway rail support that is designed to be durable, stable, adjustable, elastic, and economical is illustrated herewith, and has been patented by Mr. Nicholas M. Marks, of Quannah, Texas. The base plate has its edges turned down to form flanges, and to the upper face of this foundation seat are secured four upwardly extending standards, in the form of angle irons, the outer faces of the standards being ribbed, the upper faces of the ribs extending outward from the standards at



MARKS' RAILWAY CHAIR AND TIE.

about right angles. To these standards are connected a rail support, formed from a blank having a central section with apertures, with arms bent down to extend at right angles from the central section, the space between the arms being such as to freely admit the standards, the arrangement being such that the rail support may be adjusted toward or from the base to such position as may be required to bring the rail to a proper level. Two such supports are connected by a cross bar, the ends of which are wider than its main portion, in such way as to make an exceedingly firm connection between the parts, but so that a proper adjustment of the supports and the parts by which they are carried may be readily made. The construction is such that the foundation, once in place, need not afterward be disturbed, but vertical and lateral adjustments can be easily effected.

**Magnesium in Electric Batteries.**

M. Heim, of Hanover, has lately made a series of observations on the increased electromotive force obtained by substituting magnesium for zinc in various well known cells. As anticipated, from the known fact that the heat of combination of magnesium with oxygen is greater than that liberated on the oxidation of zinc, the electromotive force of the cells in which the substitution was made experienced in every case a notable increase. Thus the electromotive force of a Daniell cell, the positive electrode of which was a copper plate immersed in a solution of sulphate of copper, was measured, first, when the negative electrode was a zinc rod plunged in dilute sulphuric acid; secondly, when a magnesium plate was substituted for the zinc, the solution remaining unchanged; and, thirdly, with a magnesium electrode in a solution of magnesium sulphate, and under these conditions the following figures were obtained: 1.185 volts, 2.033 volts, and 1.93 volts—results which were very favorable to magnesium. Nearly as striking figures were obtained in making the charge in a Bunsen cell, the positive electrode of which was a rod of arc lamp carbon. In this case, using both metals under similar conditions, the electromotive force was 22 per cent greater with the magnesium than with the zinc plate. With a Leclanche cell the electromotive force was raised by the charge from 1.5 volts to 2.3 volts, or upward of 53 per cent. These facts seem to show that considerable advantages would follow the use of magnesium in primary cells generally, if the metal could at any time be produced at a cost approximating to that of zinc.

**Preserving Telegraph Poles.**

Telegraph poles are preserved in Norway by making an auger hole, about an inch in diameter, in each post, about two feet from the ground, and pointing down at a small angle till the center of the stick is reached. From four to five ounces of sulphate of copper, in coarsely powdered crystals, is inserted, and the opening is stopped with a plug, which projects so that it can be pulled out to admit of replacing the charge every three or four months. The chemical is gradually absorbed by the wood, which, it is said, permeates to the very top of the pole, the whole outside surface assuming a greenish tint, due to the presence of copper in the pores. This simple means of preservation suggests the application of the same material to other purposes than telegraph poles.

**The New Gas, Hydride of Nitrogen.**

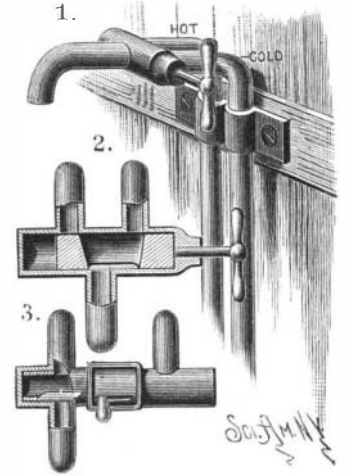
The discovery of a new gas is reported in Germany by Dr. Theodore Curtius, who has succeeded in preparing the long sought hydride of nitrogen, amidogen, diamide, or hydrazine, as it is variously called. This remarkable body, which has hitherto baffled all attempts at isolation, is now shown to be a gas perfectly stable up to a very high temperature, of a peculiar odor—differing from that of ammonia—exceedingly soluble in water, and of basic properties. In composition it is nearly identical with ammonia, both being compounds of nitrogen and hydrogen.

**AN IMPROVED MASON'S FLOAT HANDLE.**

A handle which may be detached from one float and attached to another in a short space of time, but one tool being required to make the transfer, has been patented by Mr. Edward M. Van Duzer, of No. 98 Thomas Street, Newark, N. J., and is illustrated herewith, in perspective and transverse sections. The handle has the usual grip and standards, with ears integral with the ends extending outward at right angles, the ears being apertured between the ends and the standards. A screw passes loosely through the aperture in each ear, and is provided with a winged lock nut having a centrally rectangular recess to receive the rectangular head of the screw, the nut to act as a wrench or lever to turn the screw. The other end of the screw is flattened and beveled upon opposite sides to form a wide cutting edge, wider than the diameter of the aperture in the ear. This handle can be readily and expeditiously detached from a mason's float that is unfit for use and attached to a new one, or with such handle a new float can be quickly and efficiently made from a rectangular board of suitable size.

**AN IMPROVED FAUCET.**

A faucet especially adapted for use with stationary basins, whereby either hot or cold water, or both, may be made to flow from one spout and be controlled by one handle, has been patented by Mr. William B. Rodman, of Norfolk, Va., and is illustrated herewith, Fig. 2 showing a partial vertical and longitudinal section and Fig. 3 a front elevation, partly broken away, of a modified form of faucet. Separate inlets are provided for cold and hot water, with a single outlet upon the opposite side, there being an interior pin near the forward end, and a plug having a reciprocating and rotary motion, provided with an elongated diametrical aperture having tapering ends adapted to register with the inlets, singly or collectively, and with the outlet, there being a segmental peripheral recess adapted to receive the pin. By this device the flow may be increased or diminished as desired, or any wished for proportion of hot or cold water be obtained.

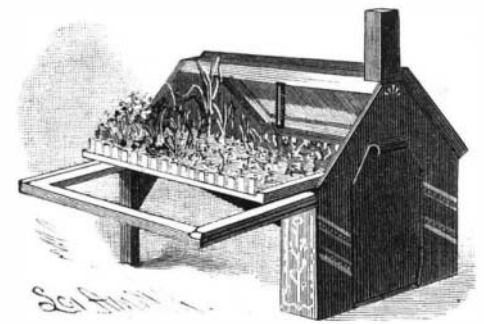


RODMAN'S FAUCET.

there being a segmental peripheral recess adapted to receive the pin. By this device the flow may be increased or diminished as desired, or any wished for proportion of hot or cold water be obtained.

**AN APPARATUS FOR TESTING SEEDS.**

An apparatus for determining the vitality or germinative qualities of seeds, to enable both the dealer and the purchaser to judge more accurately than is ordinarily possible, has been patented by Mr. Henry A. Goetz, of New Albany, Ind., and is illustrated herewith. It has a lamp chamber at one end, and a flue leading therefrom in such way as to diffuse an equal warmth through the compartment in which is located the seed pan. The seeds are placed in the pan on a bedding of cotton or other fibrous material, in rows which are properly labeled, and then water is poured in the pan at one edge of the cotton, so as to float the cotton and the seed placed thereon, the compartment

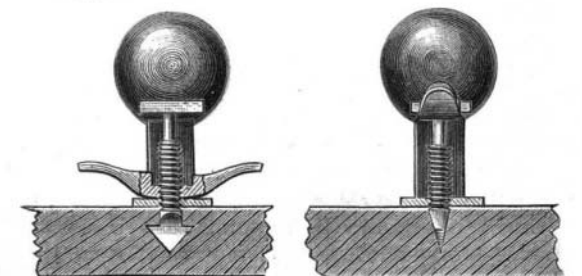
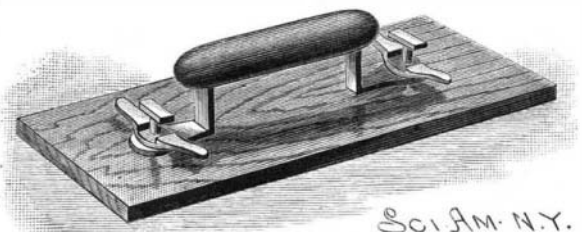


GOETZ'S SEED TESTER.

being closed by glazed doors to allow of raising the temperature as desired. The moisture supplied to the seeds at the same time assists the heated air in the chamber in causing the good seeds to sprout, while the operation has little or no effect on poor and worthless seeds.

**Total Eclipse of the Moon.**

Our readers must not forget the eclipse of the moon which will occur on January 28, beginning at 5:30 P. M. The full data will be found in our issue of January 7, 1888, page 2, of the present volume, to which we refer for particulars of the different phases. The interest of the phenomenon will be enhanced by the fact that it occurs at so convenient an hour.



VAN DUZER'S MASON'S FLOAT HANDLE.

### Fire Precautions as to Woodworking Shops in Berlin.

The police authorities of Berlin, Prussia, have published the following orders regulating the arrangements where fires are used in woodworking shops in that city. These orders are founded on the building inspection ordinance of January 15, 1887, for Berlin and its environs.

1. The wood shops must have solid principal walls of brick or stone.

2. When there are persons dwelling over woodworking shops, the floors of such dwellings must be fireproof (*feuerfest*), and any wooden floors must have ceiling below piped and plastered, and the plaster covered with corrugated sheet iron.

3. In arrangements for heating woodworking shops during winter, or for drying purposes, no kind of metallic stoves or pipes for the same shall be used. Stoves must be of stone or tiles, and so arranged that they can be supplied with fuel on the outside only of the workrooms, or in a fireproof projection at least 59 inches in height and 20 inches in depth. Any iron covers which may be upon such stoves must be protected with at least two thicknesses of tiles or slates laid in mortar. For conducting smoke from stoves to chimneys, only flues built in walls shall be used. Woodworking shops having in one or in several rooms a superficial area of 9,700 feet must conform to the following prescriptions:

(a.) Among dwellings, woodworking shops and the needful storage room therefor shall be permitted only when they are entirely isolated from the dwellings that may be located above them, by fireproof floors (as before stated), and when the dwellings have one or more staircases separated from the workshop by substantial walls.

(b.) The stairways to such workshops must be fireproof, and doors leading therefrom to interiors made of iron. Doors must open outward, and be self-closing. Such doors are not to have wooden cases, or other wooden supports.

(c.) For each workshop there must be a separate glue heating room, having thick brick walls, ceiling vaulted, and floor and ceiling below of non-inflammable materials. There must be an iron door at the entrance to this room, and between the door, when open, and the heating furnace a distance of at least 20 inches. So-called "glue heaters" are not permitted.

(d.) Every workshop must have a separate shavings bin, located in the cellar, or upon solid ground outside—constructed on the four sides of thick walls, vaulted above. This bin must have a separate entrance from the courtyard, closed by an iron or an iron-plated door.—*Assecuranz (Vienna)*.

### The Baku Naphtha Springs.

Although within the last two years intelligence has frequently reached Europe of extraordinary outbursts of mineral oil on the Apsheron peninsula, near Baku, nothing has yet equaled the astonishing outbreak which the Northern Telegraph Agency telegraphed a few days ago. Their telegram was to the effect that near the petroleum works of a certain M. Arafeloff a fountain of oil was throwing out over 2,400 tons daily, that this had been continuing without intermission for four weeks, and that more than the half of this enormous output was going to waste. It is to this loss of the oil that attention is now being directed. Not only at Arafeloff's fountain, but at almost every large fountain in the Balakhan-Sabuntchin district the waste of this most valuable product has been enormous. Millions of pools of oil have been lost, owing to the inefficient way in which it is reserved and stored. It is now understood that the government will take immediate steps to prevent this ruinous waste and to compel the owners of oil springs to adopt more scientific methods of boring, collecting, and storing.

### Reciprocal Influence of Sense Organs.

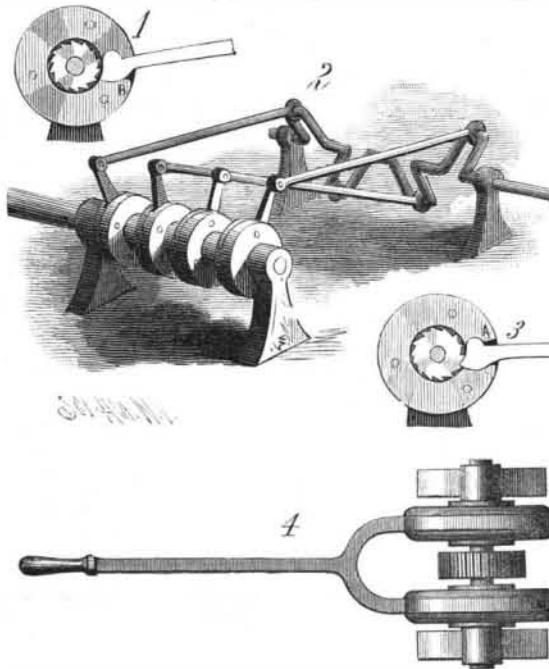
Some interesting experiments on the reciprocal influence of organs of sense have been recently made by Herr Urbanschitsch, of Vienna. His general conclusion, says *Nature*, that any sense excitation has for result an increase of the acuteness of other senses. Thus, sensations of hearing sharpen the visual perceptions. If colored plates are placed at such a distance that one can hardly distinguish the colors, and various sounds are then produced, the colors become generally more distinct the higher the sounds. Similarly, one can, while a sound affects the ear, read words which one could not read before. Again, the ticking of a watch is better heard when the eyes are open than when they are closed. Red and green increase auditive perceptions; but blue and yellow weaken them. Several musicians, however, were agreed that red, green, yellow, and blue caused an intensification of sound about one-eighth; while violet had a weakening effect. Taste, smell, and touch are under like laws. Light, and red and green color, increase their delicacy; while darkness, blue, and yellow diminish it. Under the influence of red and green, taste extends from the anterior border of the tongue to the whole surface. On the other hand, a strengthening of smell, taste, or touch

exalts the other sensitive perceptions. Specially interesting is the reciprocal influence of touch and the sense of temperature. If one tickle the skin with a hair, and plunge the hand in hot water, the tickling sensation ceases; on the contrary, if the hand be placed in cold water, and a part of the body tickled, the temperature is felt more vividly. Herr Urbanschitsch finds in this reciprocal action an explanation of supposed double consecutive sensations on excitation of one sense.

### AN IMPROVED RATCHET AND LEVER MECHANISM.

A device, consisting of a ratchet sleeve or teeth held on a shaft and operated upon by one or more ratchet levers, with a pawl held in a ring or carrier through which the ratchet sleeve passes loosely, has been patented by Mr. John Bayet, of O'Fallon, St. Clair County, Ill., and is illustrated herewith, Figs. 1 and 3 showing sectional views of the carrier and pawl, and Fig. 4 a plan view of a modified form of the improvement.

The shaft carries one or more ratchet sleeves, or the teeth of the ratchet may be directly cut on the shaft, a lever or pawl being provided with a head, which has its bearing in a recess formed in a carrier having a removable front plate, so that the head of the lever can



BAYET'S RATCHET AND LEVER MECHANISM.

easily be placed in the recess. On the head of the lever is a semicircular projection which is the fulcrum of the lever, and on the head is also formed a jaw adapted to engage or disengage the teeth of the ratchet sleeve. The motion of the ratchet lever is limited by the peculiar shape of the recess, so that it is practicable to impart a partial rotary motion or a continuous rotary motion to the shaft, increasing at the same time the power of the latter. The number of levers and ratchet sleeves can be varied according to the work to be done, and the length of the levers is determined according to the space in which they are to be used or the amount of power they have to communicate.

The device is applicable to a wide variety of shop machinery, and may also be used in running thrashing machines and for other purposes.

### Effect of the Atmosphere on Bricks.

Atmospheric influence upon bricks, tiles, and other building materials obtained by the burning of plastic clays depends very much on the chemical composition of the clays and on the degree of burning. Thus any distinct portions of limestone present in them would be converted into quicklime in the kiln, and when the bricks were thoroughly wetted would expand in such a manner as to disintegrate the mass. If the clay used is too poor—that is to say, if it contains an excess of sand—the bricks will not become sufficiently fused, and upon exposure to the weather their constituent parts will separate. It is to be observed that in bricks, as in stones, decomposition does not take place with the greatest rapidity where constant moisture exists, but rather where, from the absence of capillarity, variable according to the moisture furnished by the atmosphere, either directly or indirectly, a series of alternations of dryness and humidity prevail.

The foundation walls of buildings do not in fact suffer so much in the parts immediately upon the ground as they do in those at a height of from one to three feet, according to the permeability of the materials employed. When bricks made of clay containing free silica are laid in mortar, and moisture can pass freely from either one or the other, it may be observed that the edges in contact become harder than the body of the bricks. No doubt this arises from the formation of a silicate of lime and alumina, the lime being furnished by the passage of the water through the bed of mortar.—*G. R. Burnell, in the Architect (London)*.

### The German Corn Laws.

The German Reichstag has, after a long and extremely animated discussion, in which the Free Trade party made its influence strongly felt, raised the import duty on cereals, in response, says *Industries*, partly to the clamor of the agriculturists for further protection, and partly in satisfaction of a revengeful feeling evoked by the fiscal policy of Russia toward Germany. The annual consumption for the whole of the German empire has now reached, in round numbers, 400,000,000 cwt. Down to the year 1866, the home production exceeded the requirements, but since that date an important import trade has sprung up, and has grown so rapidly that German agriculturists have been driven into adverse circumstances.

In the period between the years 1881 and 1884, inclusively, the imports of cereals, about one-half of which were derived from Russia, increased, on an average, by 40,000,000 cwt. annually, or about one-tenth of the total consumption. As the tendency of this foreign trade manifestly was to grow at a still more rapid rate, the agricultural party became alarmed at the prospect, and raised an outcry against the insufficiency of the existing tariff laws. Pressure was brought to bear upon the government to raise the duty on wheat to 3s. per cwt. The result is not quite up to this high level, but the compromise that has been effected between the extreme and the moderate parties fixes the duty henceforward at 2s. 6d. Under these amended laws, Germany has the highest import duties for cereals of any country in Europe. The following is a comparative table of the rates now in force per cwt.:

	Wheat. s. d.	Rye. s. d.	Barley. s. d.	Oats. s. d.
Germany.....	2 6	2 6	1 15	2 0
France.....	2 0	0 73	0 73	1 26
Spain.....	1 9	1 35	1 35	1 35
Austria.....	1 6	1 6	0 9	0 9
Italy.....	1 26	1 26	0 56	0 97

### The Sewers of Paris.

The idea of a pleasure excursion through a sewer must seem to a denizen of any of our large cities, who has never visited Paris, a most singular event.

A visit to the catacombs which extend under a large section of the city, and an excursion through the sewers, which a correspondent of a Chicago paper very faithfully describes, affords to strangers probably as much interest as anything they will see in the great French metropolis.

We started, says the writer, from the Palace Chatelet at three o'clock, and descended a little winding staircase, the steps and walls of which were covered with a green cloth fringed by a red border. There was not the slightest danger of soiling our clothes or of encountering the least disagreeable odor. On arriving at the foot of the stairs a fine display of fruits and vegetables was the first thing to greet our eyes. These products were from Gennevilliers, and were grown in gardens that are watered by the sewers. We got into a wagon in which were seats for twenty persons. Off we went, shoved along by solid-looking fellows, all neatly dressed. Above us was a mass of tubes and pipes. They are the water pipes, the two largest containing our drinking water from the Vanne and the water from the Ourcq, which latter is used for washing the streets and sidewalks. Then there were the pneumatic tubes, in which we could hear the rattle of the dispatch boxes.

Soon we reached the crossing of the Pont Neuf. This tunnel was lighted from end to end with garlands of colored lamps. The effect was fairy-like. The same effect was produced under the Rue de Louvre, the Rue de Richelieu, and the Place des Pyramides, where precisely under the statue of Joan of Arc appeared in luminous glass the arms of the city of Paris. We passed along, still following the Rue de Rivoli, where each house has its number in the sewer, just as in the street, until we reached the Place de la Concorde. There the electric lights, crossing the fires with the reflection of the Venetian lamps, turn the square into a sort of ball room. Nothing was wanting, not even music. We all got out of the wagons to embark in boats, furnished with cushioned seats. The music was in the first boat, which was decorated with flags and lamps. The boats were started. We followed the entire route of the Rue Royale by the light of fifty dazzling electric lamps. After a quarter of an hour in this boat we landed at the foot of a staircase, which we mounted, and in three minutes we were above the ground at the Madeleine.

THE Billings & Spencer Co., of Hartford, are using from two to three tons of copper monthly in making drop-forged commutator bars and segments for electric generators and motors. Among the electric light companies for whom they are furnishing this line are the Edison, Thomson-Houston, Westinghouse, Waterhouse, Fort Wayne, Jenney, Electro-Dynamic, Richter, and Western. They have recently brought out carbon tongs for handling the carbons in arc lights, which are being largely used, and are furnishing drop-forged eye bolts in ten sizes, from three-eighths up to and including two inches diameter of shank.