Scientific American.

ESTABLISHED 1845.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

No. 361 BROADWAY, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS FOR THE SCIENTIFIC AMERICAN.

One copy, one year, for the U. S., Canada or Mexico.....$3 00
One copy, six months, for the U. S., Canada or Mexico..... 1 50
One copy, one year, to any foreign country belonging to Postal Union. 4 00

Remit by postal or express money order, or by bank draft or check.
MUNN & CO., 361 Broadway, corner of Franklin Street, New York.

The Scientific American Supplement

is a distinct paper from the SCIENTIFIC AMERICAN. THE SUPPLEMENT is issued weekly. Every number contains 16 octavo pages, uniform in size with SCIENTIFIC AMERICAN. Terms of subscription for SUPPLEMENT, $5.00 a year, for U. S., Canada or Mexico. $6.00 a year to foreign countries belonging to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throughout the country. See prospectus last page.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year, to any address in U. S., Canada or Mexico, on receipt of *seven dollars*. To foreign countries within Postal Union, *nine dollars a year.*

Building Edition.

THE ARCHITECTS AND BUILDERS EDITION OF THE SCIENTIFIC AMERICAN is a large and splendid illustrated periodical, issued monthly, containing floor plans, perspective views, and sheets of constructive details pertaining to modern architecture. Each number is illustrated with beautiful plates, showing desirable dwellings, public buildings and architectural work in great variety. To builders and all who contemplate building this work is invaluable. Has the largest circulation of any architectural publication in the world.

Single copies 25 cents. By mail, to any part of the United States, Canada or Mexico, $2.50 a year. To foreign Postal Union countries, $3.00 a year. Combined rate for BUILDING EDITION with SCIENTIFIC AMERICAN, $5.00 a year; combined rate for BUILDING EDITION, SCIENTIFIC AMERICAN and SUPPLEMENT, $9.00 a year. To foreign countries, $11.50 a year.

Spanish Edition of the Scientific American.

LA AMERICA CIENTIFICA E INDUSTRIAL (Spanish trade edition of the SCIENTIFIC AMERICAN) is published monthly, uniform in size and typography with the SCIENTIFIC AMERICAN. Every number of *La America* is profusely illustrated. It is the finest scientific, industrial trade paper printed in the Spanish language. It circulates throughout Cuba, the West Indies, Mexico, Central and South America, Spain and Spanish possessions—wherever the Spanish language is spoken. $3.00 a year, post paid to any part of the world. Single copies 25 cents. See prospectus.

MUNN & CO., Publishers,
361 Broadway, New York.

☞ The safest way to remit is by postal order, express money order, pratt or bank check. Make all remittances payable to order of MUNN & CO.

NEW YORK, SATURDAY, OCTOBER 4, 1890.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 770.

For the Week Ending October 4, 1890.

Price 10 cents. For sale by all newsdealers.

PLATINUM.

The price of platinum has recently advanced very greatly, until now it is nearly equal in value to gold. In July, 1889, the price was $8 an ounce, six months ago it was $14, and at this writing it is $20 an ounce, while gold is quoted at $20.70. This rapid rise in the value of the metal is due to the steadily increasing demand from the manufacturers of electrical apparatus. Every incandescent electric lamp requires about one inch of platinum wire, and nothing has yet been found to take the place of it. Large sums of money have been expended in the prosecution of experiments having for their object the discovery of a substitute for platinum wire in the manufacture of electric lamps, but without satisfactory results. In the Edison incandescent lamp the copper conductor is attached to a short piece of platinum wire as it enters the glass pear-shaped globe, and the platinum joins the carbonized bamboo loop. The reason why platinum is so indispensable is that that metal and glass expand at very nearly the same temperature. If this were not the case, and there was an unequal expansion from the heat of the lamp, the seal of the glass globe would be broken and the light soon extinguished. The history of this metal is most interesting, and its characteristics are very remarkable.

During the first half of the sixteenth century it was observed that the gold ore from the mines at Darien, in South America, included grains of a whitish metal which was deemed to be a noble metal, and yet it differed in a marked degree from silver. The fact of the discovery of this metal was not made known by the Spanish government, because they found that it furnished an excellent material for adulterating gold, and none of it was allowed to be exported. It was only at about the middle of the last century that the metal began to find its way into Europe, where it became known as a curiosity under the Spanish name of platina del Pinto (the little silver from the river Pinto). The principal source of the supply of platinum is from the Ural Mountains, but it has also been found in the provinces of Choco and Barbacos, New Granada, and in Brazil. It occurs also in San Domingo, on the island of Borneo, in Honduras, among the sands of the Rhine, and in the County Wicklow, Ireland. It is also met with in California, at Rogue River, Oregon, in Rutherford County, North Carolina, and in Canada.

The Ural Mountain deposits were discovered about 1823, and they have been worked by the Russian government since about 1828. According to Daubre, the Ural ore was embedded originally with chrome iron in a serpentine derived from olivine.

Platinum ore is found in alluvial districts in the *debris* of the earliest volcanic rocks. It is generally found in small grains, but masses of considerable size have been discovered, and several of these have been preserved as curiosities. The Demidoff museum contains a native platinum lump weighing 21 pounds troy. Humboldt brought a piece from South America weighing 1,088 grains and having a specific gravity of 18·94 and deposited it in the Berlin museum. In 1822 a specimen from Condato was placed in the Madrid musuem which was 2½ inches in diameter and weighed 11,641 grains. When found in its native state, it is in rounded grains or nuggets, or in flattened scales worn smooth by attrition in the gravel of river beds.

On the northern coast of California, a mixture of gold and the platinum metals in extremely small scales is washed from the beach sand, and from this mixture the gold is removed by amalgamation.

From observations made of the rocks and minerals found with platinum in deposits, the theory has been formed that the metal is chiefly derived from the disintegration of serpentine rock.

Nearly all the native platinum is more or less magnetic. There were several specimens of this kind in the collection sent to the Paris exposition, in 1867, by Prince Demidoff, upon whose estate in Russia there are a number of places where large masses of the ore have been found.

Platinum was coined by Russia to the extent of $2,500,000 between 1826 and 1864, when the coinage was discontinued.

Almost all platinum contains iridium, which greatly increases its hardness and durability without impairing its power of resisting chemical agents, and it has been termed the metal of the chemist. Liebig said that "without platinum crucibles, which share the infusibility of porcelain with the chemical inertness of gold ones, the composition of most metals could not have been ascertained, and chemistry could not have come to its present level." The unalterability of this metal at high temperatures, and its power of resisting the action of most chemical agents, makes it invaluable for crucibles, evaporating dishes, forceps, and foil for blowpipe experiments. One of its most important uses is for large evaporating stills for the concentration of sulphuric acid. A still of this kind valued at $19,000, exhibited at Vienna in 1873, was capable of concentrating 20,000 pounds of sulphuric acid daily. A well known oil-refining company located in New York City paid $24,000 for a still of this kind to be used in their business. The joints of these stills are autogenously soldered, thus giving them entire uniformity of material, and making the whole vessel of one piece. It would not, however, be possible to produce such large homogeneous vessels without the aid of the blowpipe.

As early as 1837, Dr. Hare, of Philadelphia, proposed to melt platinum and he succeeded in melting 28 ounces into a malleable, homogeneous mass. MM. Deville and Debray have conducted a number of successful experiments with platinum, so that ingots of large size can now be made.

Still another use to which platinum has been put is in the manufacture of jewelry. Its dull, steel-gray color prevents it from being ornamental in itself, but it is plated with gold, and large quantities of it have been used in this way. If the prevailing high price is maintained, however, platinum can no longer be used in this line of manufacturing. It is thought by some that the prevailing high price will stimulate the production of the metal in Russian fields, where large deposits are believed to exist.

NICKEL-STEEL PLATES FOR OUR WAR VESSELS.

The remarkably short time it took for Congress, after the final results of the recent trials at Annapolis were known, to make the large appropriation of $1,000,000 for the purchase of nickel to be used in the manufacture of nickel-steel plates for armoring our war vessels is something phenomenal. The very great superiority of such plates over the English compound plates, such as used on most of the armorclads of the British navy, was so plainly shown at the trials as to admit of no question, but the superiority of the nickel-steel over the all-steel plates was by no means so decided, and there appears at first to have been some difference of opinion on this point. On the final trial, however, when only one shot was fired at the center of each of the plates from an eight-inch gun, the superiority of the nickel-steel plate was plainly demonstrated.

The projectile used was an English Firth shell weighing 210 pounds, the shell having a tempered point and a softer base than the 100 pound shells used in the previous trials. The first shot was fired at the all-steel plate, which the projectile penetrated into the oak backing, and rebounded, the shell being broken up. It had made in the plate a ragged orifice with splintered edges, and four narrow cracks radiated from the center hole to each corner of the plate, through the holes which had been previously made by the six-inch projectile. The next shot was at the center of the nickel-steel plate, which was penetrated, the shell burying its point therein, while the base of the shell was broken into small pieces and scattered in all directions. There were, however, no cracks in the plate, whose structure seemed to be uninjured except where it had been struck by the five different projectiles. The last shot, and the fifth on the Cammell compound plate, broke the latter all up, penetrating both plate and backing and scattering large and small pieces in all directions, while the projectile itself was apparently uninjured.

The result of these trials was to induce Secretary Tracy to make immediate application to Congress for the large additional appropriation, and it has been many years since a call for so large a sum for any similar purpose has met with so prompt and satisfactory a response. It is announced that the contractors for armor plates have consented to introduce the nickel alloy, without change of contract, into all plates already not too far forward in process of manufacture to prevent this, and thus it is seen that one advantage of the very first importance has been obtained by the deliberation and thorough care thus far manifested in the construction of our new navy. The armor plates used thereon will be far superior to those already in place on the armorclads of all present war vessels.

The question of alloying steel with nickel, to give greater strength, is not, however, a new one, for experiments in this direction have been conducted by prominent firms for some years past, both on armor plates and gun barrels. The amount of nickel used in the Creusot plate recently tested is said to have been three and a half per cent, but is by no means considered settled that this is absolutely the best proportion to use, and if it proves to be the best for armor plates, it may not be the best for other uses. It is safe to say, however, that the trials so successfully conducted at Annapolis will give a great impetus, not only to further improvements in armor plates, but also to a corresponding progress in the manufacture of guns and projectiles.

How to Sweep a Store.

We don't use a leaky old sprinkling pot to sop the floor all over in puddles when we sweep. No, sir! We have wet sawdust, and I put a row of it across one end of the store and sweep that right along to the other end, just like a regiment marching across a ten acre lot. It catches all the dirt and carries it along. If it gets a little dry, I add some more. Some folks scatter sawdust all over the floor, but Mr. Vanders says that's no good; that the reason for using sawdust is to avoid wetting the floor all over and to have something that will absorb the dust.—*Com. Enquirer.*

Water Power at Geneva.

The river, as it passes through the city, is divided into two channels hy an island covered with buildings. Col. Turrettini proposed that the right arm of the river should be reserved for running off the water, while the left arm, transformed into an industrial canal, was to conduct the water into a building to be constructed in the bed of the river, and in which would be placed, as they were required, twenty turbines with 4,400 net horse power. The whole of this work is now done, except that only half of the turbines are in use. The method of distributing the motive power gave rise to a good deal of discussion, but, as Geneva does not possess any large manufactories for which transmission by cable is suitable, the system of transmission by hydraulic pressure was adopted, and the municipality decided to make two canalizations, one with low and the other with high pressure, the latter with an ascending force of 460 ft.

A curious feature of this work was the successive emptying of the two channels of the river. While each was dry nearly the entire population of the city flocked into it, led by curiosity. Several great public banquets and other festivities were held in each of the river beds. The channels were then made deeper and a uniform slope made from the mouth of the lake down to the turbines. Opportunity was also taken to construct upon the banks of the stream large sewers, which run along the two banks of the lake and of the Rhone for a distance of more than three miles. These sewers empty into the Rhone below the town, and thus prevent the water, which is used by the inhabitants, from being contaminated. From a hygienic point of view, this has been most successful, the number of deaths from typhoid fever last year being only nine out of a total population of 73,000.

As an industrial enterprise the work is a great success. At the commencement of this year there were no less than 216 industrial motors with a force of 1,565 horse power. All kinds of trade and industry make use of the water power, while the amount of force varies very much, the minimum being a third of a horse power for sewing machines, and the maximum, up to the present, 625 for an electric light company. The total cost of the work has been $1,420.000, of which about $1,000,000 has been for the account of the municipality, while the gross return upon the sale of water in 1887 reached $115,000, or 150 per cent more than it was nine years before, which, after deducting all the cost of maintenance, staff, interest, and paying off the capital invested, leaves a clear profit of $37,500. The demands for more motive power are steadily increasing, and it is anticipated that in a few years' time all the turbines will be in use, and that the municipality will have to fall back on the opportunity of obtaining, at an island some way down the Rhone, a fresh motive force of 7,000 horse power, and transmit it to Geneva by electricity.—*New York Tribune.*

The Relation of Patents to Exports.

A subscriber asks how it is, when wages are higher here than in almost any other country, that the United States can find a market abroad for so many articles of hardware and machinery, in competition with the active business rivalry of England and Germany. As *Hardware* recently asserted, the secret of the extent of our exports under such circumstances lies in the excellence of American manufactures—they sell upon their own merits. To be more explicit, the sale of such goods as are now exported from the United States is not governed by the price. When the Japanese can buy rope-making machines in Boston by the hundred, and get them operated in their own country by laborers hired at three dollars per month, it is not likely that the United States will soon be distinguished in foreign markets for offering goods cheaper than native labor can produce them. American hardware is exported to-day because it is better than the goods of the same class made elsewhere, and the people who buy it are willing to pay the price rather than buy undesirable goods for less money. Either this is the case, or the articles exported are patented specialties which cannot be manufactured abroad because of the protection secured by patenting the inventions all over the world.

This question of patents is the most important one to be considered in connection with the future foreign trade of this country. In Germany, for instance, our inventors, manufacturers, and merchants were welcomed under the empire. An American brand upon an implement was its highest recommendation. Depots and agencies were established there for the sale of American goods until there were probably fifty in different parts of the empire, all doing an active business. That was little more than ten years ago, but now nearly all the agencies are closed. The extremely clever German machinists set at work promptly to imitate our hardware, stoves, agricultural implements, hoot and shoe machinery, and sewing machines, even copying some of the American trade marks. These imitations, though not equal to the originals, were far cheaper in price, and the sale of American goods was greatly checked. The trouble was that the latter had not been protected by patents in Germany.

It is not too late to take warning from this. Our consul-general at Frankfort, Mr. Frank H. Mason, writing of the Electro-Technical Exposition to be held there in 1891, writes thus strongly:

"Let it be understood at the outset that it is useless to bring here for general sale any invention that is not severely protected by a German patent. If it is valuable, it will be assuredly copied unless the patent is vigorously defended."

The case is cited of a meat-cutting machine, manufactured in Philadelphia, which was introduced in Germany a few years ago and was at once copied, as it was an article that immediately became popular. But the American makers went over, defended their patent before the courts, stopped the infringement, and now have a heavy and steadily growing trade. But a grating machine, sent over from Massachusetts, has been copied on a large scale in Berlin, and as the patent has not been defended, the original machine has been driven out of the German market.

The best-selling American goods in foreign markets to-day may at any time be imitated so successfully as to stop the demand from this country. It is so with nearly everything we try to sell in China and Japan. Even bicycles and expensive scales are imitated in the latter country and sold very cheaply. Our manufacturers cannot begin too soon to study the patent laws of the Old World, but meanwhile there is no reason to relax their efforts to sell their products in every land under the sun.—*Hardware.*

Metal Sleepers for Railways.

In a "Preliminary Report on the Use of Metal Track on Railways as a Substitute for Wooden Ties," published under the auspices of the United States Department of Agriculture, by Mr. E. E. Russell Tratman, C.E., a very interesting summary is given of information concerning the use of metal ties as a substitute for wood in the construction of the permanent way of railways. Although the Department of Agriculture is not directly concerned with the management of railways, this investigation comes legitimately within its province, since it is in the interest of forest preservation. Mr. Tratman is surprised that American engineers, who are usually in the van of any great step in the profession, should have paid so little attention to this important matter—important both as to the financial economy and the practical efficiency of the track. In his opinion steel ties should be used as the standard for first-class track, and not merely as a substitute for timber when the latter becomes scarce or expensive. One of the most interesting parts of Mr. Tratman's report is his full account of the steps taken in other countries with regard to the question of metal ties. He states that experiments with steel ties have been made in England for several years, but with unsatisfactory results, owing to the form of the rail used. The most extensive and valuable trials have been made in Holland under the direction of M. J. W. Post, engineer of permanent way of the Netherlands State Railway Company, who began his experiments in 1865, and has continued them until the present time. The steel tie designed by Mr. Post, and improved by him from time to time in the light of practical experience, has been adopted upon this system. In the early part of 1888, 91 miles of track had been laid with these ties. Of 10,000 ties laid in 1865, 9,550 were still in the track in 1888, and were expected to last twenty years more, although they were of the earlier type of the tie which has since been improved upon. As to breakages, out of 162,634 ties laid, not one had broken. In the early part of 1888, there were in use in various countries about 730,000 ties, or 36,500 tons, of this one type. On the state railways of Germany a number of different systems of metal track have been tried for several years. In 1887, the state railway system had 3,131 miles laid with metal cross ties and 2,399 with metal longitudinals, making in all 5,530 miles of metal track. The experience with iron longitudinals and cross ties was very favorable, but still better results have been obtained since steel was introduced. Ties of wood are still used in great numbers, partly on account of their lower first cost and partly on account of the policy of the German government to keep up the supply of timber by domestic cultivation and forest management.

Austria has about 200 miles of longitudinal systems of metal track, which have been laid in small sections, year by year, since 1876. In Switzerland the Central Railway had 109,000 metal ties in use at the end of 1884, and proposed to lay 30,000 per annum till its whole system had been thus laid. The Western and Simplon railways began using metal ties in 1883, and have been very well satisfied with them. The Gotthard Railway uses them very extensively, and they have also been adopted on the Mount Pilatus rack railway. In India 300 miles of the state lines are laid with steel ties, and there are over 1,600 miles laid with cast iron tracks of different types. In Queensland, Australia, a few miles of railway have been laid with the Phillips type of metal tie. This is a steel cross tie intended for prairie work, where the track is laid on the surface of the ground, and is designed to be used without ballast, being simply packed with surface soil. In the Argentine Republic the Buenos Ayres Great Southern Railway, which began operations in 1865, has 13¾ miles of double track and 819½ miles of single track laid with cast iron sleepers. The Central Argentine Railway has 246 miles laid with cast iron track. The American inventor has not been idle, although his labors have not found favor with engineers. From 1839 to February, 1889, no less than 256 patents for metal tracks were issued. Among the American railways which are reported as having made experiments with metal ties are the Boston and Maine, the Maine Central, the Long Island, New York Central, and Pennsylvania.

Mr. B. E. Fernow, chief of the Forestry Division of the Agricultural Department, who has compiled the report, is of opinion that there cannot longer be a doubt that it is possible to construct a metal tie which will be superior in all respects to wooden ties; yet to bring its first cost down to such a figure that the future saving in its maintenance need not enter into consideration, but may be taken as an agreeable surprise in the cost of management, is what railway companies are most bent on obtaining. Especially in the United States, where the present accounting outweighs in importance all future possible profits, this consideration alone, of reduced first cost, may be sufficient to work a revolution in the use of railroad ties. On the other hand, the bugbear of cheapness, which is often taken for an equivalent of economy, is apt to mislead the inventor into risking the factors of safety and strength in order to attain cheapness.

Artificial Meerschaum.

The following is given in the *Zeitschrift fur Angewandte Chemie* as a new process for preparing artificial meerschaum.

The following precipitates are prepared by means of a solution of soluble glass: (1) of silicate of magnesia by precipitating it through a solution of sulphate of magnesia; (2) of silicate of alumina by precipitating through a solution of alum; (3) of silicate of lime by precipitating through a solution of chloride of calcium.

All these solutions are diluted, one part of salt being used for 10 parts of water. In order to precipitate the solutions, the operation is performed at 20°, except in the case of the silicate of alumina, for which the solutions have a temperature of about 50°. (4) A solution of fused chloride of calcium (1 part to 15 parts of water) is precipitated at between 15° and 20° by a solution of sulphate of soda (1 to 15). The precipitate of sulphate of lime is first dried and then freed of the larger part of the water that it may contain by compressing it and exposing it upon hurdles in a stove. Finally, it is totally dehydrated by heating it in a very clean iron kettle. The sulphate of lime thus prepared is in the form of a very fine and very white powder. It is carefully preserved in boxes that are kept in a perfectly dry place.

Into 33 pounds of water at 40° are put 19 pounds of precipitate (4) in 20 successive and nearly equal portions. The mixing should be done with much care and with rapid stirring. There are afterward added to the mixture the following substances, weighed in advance:

7¾ lb. of precipitate.....(1)
3⅜ " " " .....(2)
5½ " " " .....(3)

All these precipitates should be mixed with water, and then the mass, which is in the form of a thin *bouillie*, is immediately introduced into a vessel through a No. 20 brass sieve, and thence into wooden boxes that rest upon large slabs of plaster covered with canvas, and about four inches in thickness.

In about from 15 to 25 minutes the mass may be detached from the sides of the frame by means of a blunt blade of brass, and the frame may be removed.

The mass is left upon the slabs of plaster until it is sufficiently dry to be sawed into small blocks of various dimensions, according to requirements. These blocks are more thoroughly dried upon hurdles in a stove. Then they are worked with a knife or in a lathe, and are waxed and polished as in the case of objects made of genuine meerschaum.

It should be remarked that, on introducing the hot mixture into the frame, care should be taken not to introduce air bubbles at the same time.

Varying proportions of precipitates (1), (2), and (3) may be used. The larger the proportion, the harder and heavier will be the final mass.—*Moniteur Scientifique.*

THE range and penetrating power of the modern rifles are tremendous. The six-inch rifle will hurl its projectile through ten and a half inches of wrought iron a thousand yards from the muzzle. The eight-inch rifle will pierce sixteen and three-tenths inches of iron at the same distance. The ten-inch rifle that the rejuvenated Miantonomoh will carry will send its missile through twenty-one inches of iron a thousand yards away. The twelve-inch rifle, of which we are to have a supply in the future, will penetrate twenty-eight inches of iron at a range of three thousand feet.

War Ballooning.

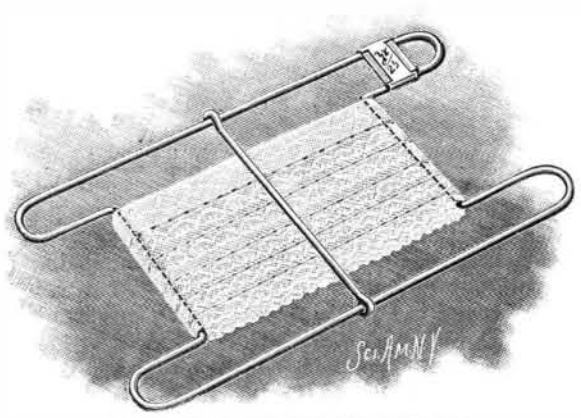
A correspondent of the London *Times* writes:

"During the last sixteen or seventeen years, the Dutch government have been carrying on a more or less active war with certain tribes in Acheen, a district of Sumatra, the third largest island of the world, and with this view have dispatched a military ballooning contingent, under the direction of Mr. Percival Spencer, an English aeronaut, to Kota Rajah, the fortified capital of the unconquered regions, where it is proposed to establish a permanent balloon reconnoitering corps to watch and, if possible, circumvent the strategical movements of the enemy. A preliminary trial ascent having been made by Mr. Spencer, in company with Major Haver Droeze, of the Dutch Royal Engineers, and in the presence of Colonel Van Zuylen, in command of the Engineers, and the highest military authorities in Batavia, and found satisfactory, no time has been lost in sending the expedition to the seat of war, and it will be interesting to learn the result of the experiment. Mr. Spencer's balloon is almost spherical in shape, with a capacity of 15,000 feet. The cable by which it is attached to the earth is made of hemp, and is 400 meters in length, while the gas used for its inflation is manufactured by portable apparatus of his own invention. The climate of Sumatra is admirably suited for ballooning observations, as dead calms prevail, and there is no mist to intercept the view of the land beneath."

NOVEL LACE OR EMBROIDERY HOLDER.

The engraving shows a simple and efficient device for holding and displaying lace, embroideries, insertions, braids, and similar goods, and for handling such goods for sale.

The holder, as will be seen, consists of a wire frame with inset ends upon which the material is wound. The joint at the ends of the wire is completed by a metallic plate, which is bent over the two branches of the wire, and the intermediate edges of the plate are bent over toward each other, forming a receptacle for a price ticket or for other memoranda. A cross wire or keeper bar, furnished at one end with an eye for receiving



LACE OR EMBROIDERY HOLDER.

one side of the frame, and at the other end with a hook for engaging the opposite side of the frame, is provided for preventing the unwinding of the lace or other material.

This device is new, simple and cheap, and well calculated for the use to which it is applied.

Further information regarding this invention may be obtained by addressing the inventor, Mr. W. C. Quigley, Lake Geneva, Wisconsin.

A Great Loom Suit Ended.

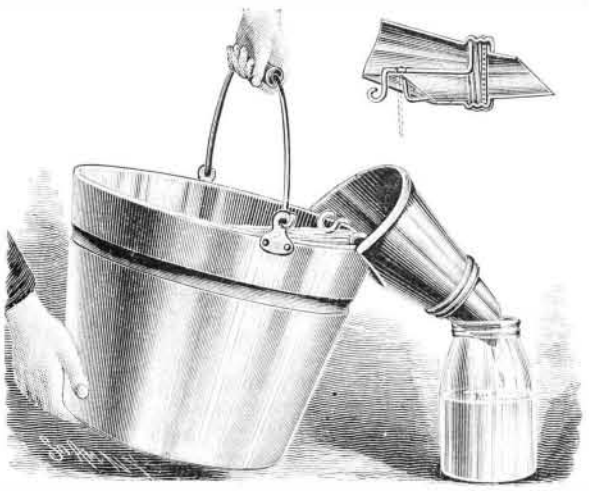
The suit brought by the Webster Loom Company against E. S. Higgins & Co., the carpet manufacturers, has been decided recently in the United States Circuit Court in this city. It has been pending since 1874, and by the terms of the decree the plaintiffs are entitled to only six cents damages. The first move was made before the Supreme Court of the United States, on an appeal by the Webster Loom Company from the decision of the Commissioner of Patents that the company's patent was invalid. The Webster Company won this suit, and the case was sent to the circuit court to determine the amount of damages due them for the infringement of their patent.

The original claim was $30,000,000, the Webster Company declaring that E. S. Higgins & Co. had, by use of the infringing device, prevented others from using their patent, and thus destroyed the market. The royalties lost by this were alleged to be about $30,000,000. Afterward the Webster Company reduced the amount of their claim to something over $2,000,000, which they charged was the amount of profit made by E. S. Higgins & Co. The machinery in dispute is known as the "wire motion," and contains a device for inserting and withdrawing the wires which form the "pile" in tapestry carpets.

Last year the master to whom the case was referred to estimate damages, John A. Shields, rendered a report allowing nominal damages to the Webster Loom Company. This was excepted to by the plaintiffs, and the exception argued before Judge Shipman, who reversed the decision of the master on technical points of law. The defendants secured a reargument before Judges Wallace and Shipman, which resulted, as before mentioned, in a decision confirming the master's report, and allowing nominal damages, namely, six cents.

COMBINED STRAINER AND FUNNEL.

We give perspective and sectional views of an improved strainer and funnel recently patented by Mr. Otto E. Lake, of Topsfield, Mass.



LAKE'S COMBINED STRAINER AND FUNNEL.

The body of the funnel is made in two parts connected together by a spun or pressed screw joint, which also clamps the strainer in place. The mouth of the funnel is adapted to fit the side of the pail, near its rim, and the funnel is held at the required angle by a bracket attached to the upper part of the funnel and adapted to bear against the side of the pail. Above the screw joint in the upper part of the funnel is formed a circumferential groove into which is sprung a wire, the outer ends of which are curved to form spring hooks to catch upon the rim of the pail and hold the funnel securely in the position of use. The lower end of the funnel is tapered and cut away obliquely to facilitate the discharge of the milk or other liquid.

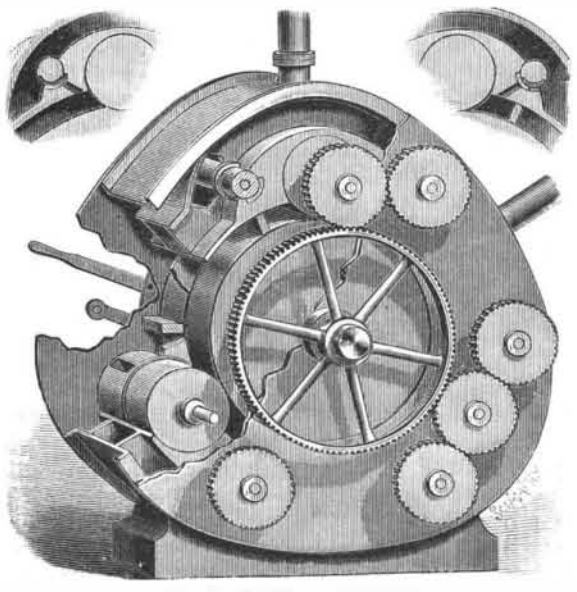
The funnel when attached to the pail in the manner described, can be used until the pail is emptied, without readjustment. The screw joint which clamps the two parts of the funnel together permits of readily taking the funnel apart for cleaning.

Further information in regard to this invention may be obtained by addressing the inventor as above.

IMPROVEMENTS IN ROTARY ENGINES.

The novel rotary engine illustrated by our engraving is the invention of Messrs. Samuel J. Holt and Daniel Kinney, of West Plains, Mo.

This engine is provided with a rotary piston furnished with a central circumferential groove into which projects a flange from the interior of the cylinder, practically dividing the cylinder into halves, each half containing a rotary piston. Each piston carries wings which are fitted to the interior of the cylinder, and at three points in the circumference of the cylinder are arranged rotary abutments which are adapted to pass the wings as the piston turns. The rotary abutments receive motion from a spur wheel on the main shaft of the engine, and rotary valves on either side of the abutments control the supply and exhaust of the steam. Each division of the cylinder is provided with throttle valves, and all of the throttle valves are operated by a system of levers connected with a single wheel or circle,



NEW ROTARY ENGINE.

which, being turned, operates all the valves simultaneously. By means of this construction, also, the engine may be reversed. The details of the rotary valves and of the abutments are shown in the small views in the upper part of the figure.

This engine is very simple, and as all of its parts are rotary, it must necessarily run in balance.

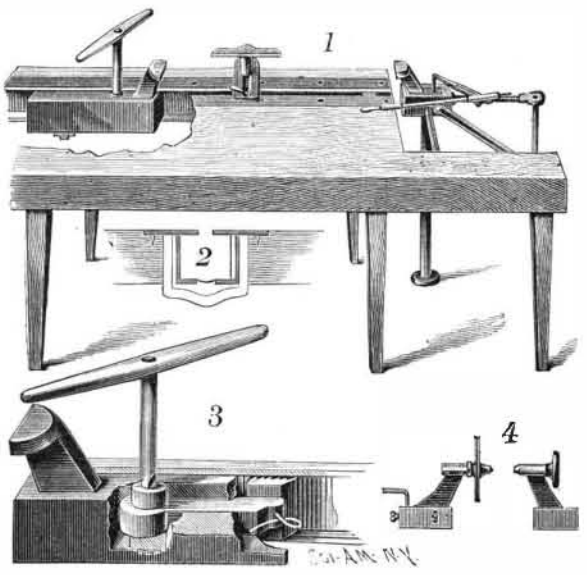
Railroad Earnings.

The gross earnings of 154 railways operating 88,560 miles of road for the month of August, 1890, according to statistics collected by the *Financial Chronicle*, are $40,634,120, as compared with $39,052,895 for the corresponding month of 1889, an increase of 4·05 per cent. The per cent increase is much smaller for August than for any other month of the current year, it being less than one-half that for June, the next smallest. A considerable number of the larger roads show losses. Considering the roads by groups, the Southern roads lead all others in the general favorable character of their earnings. Of the Southwestern roads, the Atchison, Topeka & Santa Fe and the Denver & Rio Grande show large gains, as heretofore, and several of the other lines also show improved results. On the other hand, the Chicago, Rock Island & Pacific shows a loss of $165,953, and several of the other lines have losses of greater or less amounts. The Northwestern lines, with one or two minor exceptions, exhibit increases. The Middle Western group shows more decreases than any other. This is attributed largely to the short winter wheat yield, and in the case of the New York Central & Hudson River Railroad and tributary lines, to the recent strike.

A NOVEL VISE.

The annexed engraving illustrates a new vise recently patented by Mr. George H. Squier, of Trempealeau, Wisconsin, which is adapted to a large range of work, and is also convertible into an efficient lathe.

In the work bench to which this improvement is applied is formed a longitudinal slot, the sides of which are lined with channeled iron bars, as shown in Figs. 1 and 2. The bar at the front of the bench is serrated, and to the space between and within the channeled bars is fitted a sliding block carrying one of the jaws of the vise. In the block is journaled a cam or eccentric, adapted to reciprocate a serrated jaw which engages the inner surface of the serrated channel bar. To the



SQUIER'S IMPROVED VISE.

eccentric is fitted a key with a cross arm which may be inserted whenever it is desired to revolve the eccentric and thus move forward the jaw. In this movable block is inserted one of the jaws of a vise. The other jaw of the vise is supported by a standard at the end of the bench, and is adjustable by a screw. The jaws are both removable, and may be replaced by jaws of other forms and by other attachments.

The inventor has provided a lathe head and tail block, shown in Fig. 4, which may be used in place of the jaws, and the tool rest shown in Fig. 1 may be used in connection with the head tail block, for turning wood or metal, or for boring or light sawing.

This invention will prove useful to all wood workers, and may be used advantageously by workers in metals.

Liquid Gutta-Percha.

This useful preparation is to be found in the United States Pharmacopœia, and is made thus: Gutta percha in thin slices, 1 oz.; chloroform, 8 fl. oz.; carbonate of lead, in fine powder, 1 oz. Add the gutta-percha to 6 fl. oz. of the chloroform in a stoppered bottle and shake them together frequently until the solution has been effected. Then add the carbonate of lead previously mixed with the remainder of the chloroform, and, having several times shaken the whole together, set the mixture aside and let it remain at rest until the insoluble matter has subsided. Lastly, decant the clear liquid, and keep it in a well-stoppered bottle. One part of this solution in 10 by weight of chloroform produces an excellent and convenient preparation for painting over cuts or wounds. It readily acts as a styptic and protective to the wound, and causes neither tension nor pain. If pure iodoform be added, about 10 per cent, it further enhances the value of the styptic, and can be used in veterinary surgery with marked success for applying to cuts and abrasions, as it arrests hemorrhage, forms a coating over the wound, and promotes a healthy cicatrization.