THE

Scientific American.

MUNN & COMPANY, Editors & Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW (PARK BUILDING), NEW YORK.

O. D. MUNN, S. H. WALES, A. E. BEACH.

☞ Messrs. Trübner & Co., 60 Paternoster Row, London, are also Agents for the SCIENTIFIC AMERICAN.

☞ Messrs. Sampson Low, Son & Co., Booksellers, 47 Ludgate Hill, London, England, are the Agents to receive European subscriptions for advertisements for the SCIENTIFIC AMERICAN. Orders sent on them will be promptly attended to.

☞ "The American News Company," Agents, 121 Nassau street, New York.

☞ American and Mexican News Company, Mexico, are Agents for the SCIENTIFIC AMERICAN.

VOL. XIV., No. 22. [NEW SERIES.] *Twenty-first Year.*

NEW YORK, SATURDAY, MAY 26, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

SUPPLEMENT.

With the last five issues of the SCIENTIFIC AMERICAN, we have published a four-page supplement, which has been regularly sent to all our mail subscribers, and sufficient copies have been delivered to the American News Company to supply all those who receive their papers through agents. A supplement is also issued with the present number.

LEGISLATION ABOUT PATENTS IN CONGRESS.

Considerable attention is being given to patents in the House of Representatives, On the 16th inst. the Committee on Patents reported a bill for the relief of Delia A. Jacobs, which authorizes the Commissioner of Patents to extend the patent for an improved method of dressing treenails—the original term having expired August 28, 1862. Mr. Myers, who supported the petition, stated that no other persons have been using this patent since its expiration, and that there was a general desire that the widow of the patentee should have the benefit of the extension. A provision was incorporated in the bill that no parties shall be held to account for damages for any use of the invention since the patent expired.

Mr. Myers declared that the widow was now almost entirely supported by the little pittance given her by Wm. H. Webb and James Udall, of New York City. The bill passed by 57 majority—64 members not voting.

Mr Myers, from the same Committee, reported a bill for the relief of William Mann and Jacob Senneff. It appears that Mann obtained a patent July 11, 1852, for improvements in the manufacture of copying paper made of equal parts of manilla and cotton, which will expire July 11, 1866. Being absent in Europe, he was not aware that ninety days' notice must be given of the application for extension. Mr. Washburne opposed the bill, and intimated that if a party "was swelling through Europe it was his own fault," and objected to the way the thing was being done.

Jacob Senneff obtained a patent Jan. 13, 1852, for a metallic heddle, used in looms for passing the warp. This patent expired the 13th of last January, and being in the military service—employed in the hospital and in the volunteer refreshment saloon at Philadelphia, Mr. Senneff thus lost his chance to obtain his extension and only discovered his loss when it was too late to apply to the Commissioner under the general law.

The bills in these cases were simply to authorize the Commissioner of Patents to hear and decide them upon testimony, as in all other extension cases. Considerable debate ensued, and Mr. Washburne hit a vital point when he declared that these parties were only in the same condition with hundreds of others. The bills were passed.

Mr. Bromwell, of Illinois, from the Committee on Patents, reported a bill authorizing the Commissioner of Patents to grant an extension for seven years of the patent issued December 6, 1845, to Thomas D. Burrall, for a corn sheller, and extended for seven years from Dec. 6, 1859, by the Commissioner of Patents. The proposition now is to allow another extension for seven years, which, if obtained under the provisions of this bill would make three terms or twenty-eight years.

Mr. Harding, of Illinois, who opposed the bill, stated that the patentee "has been receiving large rewards for his invention during twenty-one years, and now he wants to continue the same business." Mr. Bromwell declared that the patentee was an exceedingly old man and exceedingly poor, the question being simply whether Congress was willing that the Commissioner of Patents should hear such cases, and decide as he deems right in view of the rights of the public and the inventor. The bill was passed.

We have carefully read the discussion upon these various bills, and while it seems to be very plausible and very just in its general features, we warn our readers that it has a much deeper significance. These comparatively minor bills are brought forward and passed to establish precedents and try the temper of the House; that the larger extension cases will soon come, we have not a doubt.

EXPERIMENTS IN AERIAL NAVIGATION.

Aerial navigation is by no means a subject of modern speculation. Many fabulous accounts of the doings of the ancients in this department of science, have reached us through the traditions of the elders. We are told that they constructed artificial wings, and by attaching them to the body, undertook by muscular exertion to rival the birds of the air.

In the fourth century one Archytas constructed a wooden pigeon that could fly by means of an inclosed spirit; but the author fails to tell us what that spirit was. At a much later period the famous Bishop Wilkins was so confident of success in this art, that he intimates that in future ages it would be as usual to hear a man call for his wings, when going a journey, as to call for his boots. Experimenters in aerial navigation, however, when they came to better understand the elastic properties of the air and the gases, dropped the wing theory, and turned their attention to balloons as the more feasible scheme. The first air balloon was constructed in 1782, by Dr. Black, of Edinburgh, and since that period many ingenious enthusiasts have followed the subject with patient hope and confidence, but as yet without great practical results.

In a lot on the corner of Houston and Greene streets, Dr. Solomon Andrews, of Perth Amboy, N. J., has on exhibition an aerial ship of peculiar construction, which is now nearly completed, and the inventor proposes soon to remove the doubts of all skeptics by an experimental trial.

Many of our readers will remember that in the early part of the war efforts were made to adapt ballooning for the purpose of reconnoitering the position of the enemy. These efforts were but partially successful, no valuable results having been secured, and at the close of the war, among other rubbish, were two army balloons, which found in Dr. Andrews a ready purchaser. These he has used to form the buoyant portions of the Aereon, which resembles in shape a long lemon, and which is covered with a net work, and connected by ropes, cords, and pulleys to a car suspended some twenty feet below the balloon. This balloon, when inflated, will contain 40,000 cubic feet of gas, capable of supporting a depending weight of two tuns.

The car or basket is of wicker-work, and cradle-shaped, about fifteen feet long by two feet wide. Another car, about three feet long, placed on runners, is put inside the basket, and secured by tackle, so that it may be held in any desired position and made to serve for purposes of ballasting.

The inventor's theory is, that as the motion of the balloon will be in that direction in which least atmospheric resistance is offered, it is claimed that it will move, not vertically, as other balloons do in a still atmosphere, but upward and onward in the direction pointed to by its bow on an ascending plane. When sufficient hight has been attained, the aeranaut will open the valve and discharge gas, at the same time stepping forward to the bow end of the basket, which will depress the bow of the Aereon, before elevated. thus guiding her direction on the descending plane. Having gone sufficiently low, still in the same direction, he will throw out ballast and again ascend, and so on, thus progressing to his journey's end in the ziz-zag mode in which a ship tacks against a head wind. On a near approach to the earth, Mr. Andrews says, he has only to step to the middle or rear end of his basket, and thus elevate the bow and check the momentum; then sail horizontally for a short distance, or throw out more ballast, and move on the ascending plane. He further claims that his rudder will turn his vessel as readily, or more so—the medium being less resistant—as a ship is turned in the water.

Dr. Andrews claims, and with justice, that he is at least entitled to the indulgence of the public till he has shown them that the time and the man have come to control the wind and navigate the air, or fail in the attempt to do so.

WHEN STRIKES WILL SUCCEED.

A great many strikes have recently been made among the workmen of this city, and on another page will be found a summary from the *New York Tribune* of the results. It will be seen that in about one-third of the cases the strikers carried their points, and in about two-thirds they failed. It would have been easy in every case for an intelligent observer to decide beforehand whether the strike would succeed or fail.

Wages in the city of New York at the present time range from less than one dollar per week to more than one thousand dollars per week, and throughout the whole range, from the youngest sewing girl or errand boy to the most eminent lawyer, all would like to get more for their services, while the employers would like to obtain the same services for less pay. The employer always offers the lowest rate that he finds will command the special service that he requires, and the employed is always ready to work for some other person at the smallest increase in his wages. The rate is, therefore, adjusted at the money value of each one's labor in the market.

But labor, like other values, is constantly fluctuating. The multiplication of labor-saving machinery, the accumulation of capital, the increased intelligence and thrift of workmen, and many other influences, tend to raise the rate of wages; while the destruction of machinery, manufactories and other kinds of active capital by fire, wars, enforced idleness, and other influences, tend to reduce it. Generally the causes operating to raise wages are more powerful than those tending to lower them, and during the present century wages of common laborers have advanced from seven dollars a month to twenty.

Now, wages are less sensitive to changes in the market rates than most other values. Workmen with families dependent upon them will frequently plod along at the old rates, when there is actually a demand for their labor at higher wages. We are told by the proprietor of a job printing establishment that it is very difficult at the present time to get good journeymen printers—that there is a great scarcity in the market of this kind of labor. If this is true, it shows that the wages paid to journeymen printers is below the market. The phrase, "the demands exceeds the supply," has no meaning except in connection with a specified price or rate. The "market rate" means the rate at which the demand just equals the supply. If the proprietors of job printing establishments would make the proper advance in the pay, the scarcity of journeymen would quickly disappear, and if it is true that print-

ers are working below the market, a strike by them would be certain of success.

The reason why the fifteen hundred car drivers of this city lost their situations by their strike, instead of getting increased wages, was, that there were plenty of other men able and willing to fill their places at the old wages—in other words, they were getting the market rates for their particular kind of service.

We may denounce the natural laws of supply and demand, if we have a fancy for empoying our tongues or pens in that way, but the power of these laws is irresistible—like death, they are something that we must all yield to. Whether a strike for higher wages will succeed or not, depends wholly upon the fact whether the wages being paid at the time are or are not below the market.

THE DECIMAL SYSTEM OF WEIGHTS AND MEASURES.

On the 17th inst., the House of Representatives passed laws which legalize the use of the metrical or decimal system of weights and measures in the United States. The important movement met with no opposition, and it is probable that within a few days the action of the House will be confirmed by the Senate, when the metrical system will become the law of the land. In the beginning the use of the system is not to be compulsory but optional with the people. As soon, however, as it becomes well enough understood, it will entirely supersede the present system. In order to make the system familiar to the people it is proposed to issue one or more new coins which shall represent some weight in grams and measure in a simple fraction of the meter. The post offices are also to be supplied with gram weights, and mailable matter is to be estimated in grams, and a set of standards of the new weights and measures are to be supplied to each of the State capitals. It will be remembered that in the new system all weights and measures are deduced from a single unit, the meter, which is nearly equivalent to the ordinary yard.

WAGES IN PITTSBURG.

The matter of wages is an interesting one. The merchant turns quickly to the markets in the morning paper to see how he stands, and to know what the ruling prices are, and we are sure that our readers will be glad to know the state of the market that regulates their affairs. According to the *Mining and Manufacturing Journal*, published in Pittsburg, the following rates are those now paid to some trades:—Puddlers, $8 per tun; bar rollers, $3 25; bar heaters, $1 25; plate rollers, per day, $7 50; plate heaters, $6; guide rollers, $4 75 per day; sheet rollers, $11; laborers, $2—an average increase of 10·54 per cent over the rates of 1865. Glass blowers are paid highly, it would seem. Vial blowers receive $55 per week, and window-glass blowers $63 per week—their wages have increased 33·23 per cent in one year. At that time the average rate of good workmen (of all trades, we presume) was $2 50 per day—it is now $3 50. Apprentices receive $5 per week. The wages of first-class machinists have advanced 10 per cent in one year.

NEW PUBLICATIONS.

BRASS AND IRON FOUNDING.—D. Van Nostrand, 192 Broadway, New York.

Every person whose interests are in any way connected with the manufacturing arts, must have felt the want of such a work as this. One man cannot carry all the minute details of a trade in his head, and if he does not have recourse to books for the information he needs he will obtain it from friends. We have had many and frequent inquiries from our readers for recipes like those contained in this book, and we hope they will avail themselves of it. Many who are experimenters, with a view to improve certain parts of machines, others who are merely amateurs, and dabble in metallurgy from a pure love of it, will find in this work full details as to the method of procedure in all cases.

Besides the usual formulæ for the compositions of zinc, tin and copper, and other metals used in common work, the author introduces some instructions and recipes, not generally known, as to molling, facing, and similar processes. We extract one recipe which will be useful to many:—

TO CAST IN BREAD PASTE.—Take the inside of fresh bread, and work it up well with vermilion—the longer the better, until it becomes viscid and tough. It is then to be worked well into the mold. After having obtained the mold, it must be fastened down upon a piece of wood, by wetting it so as to prevent it from warping as it dries. After it has been thoroughly dried you may oil it, and then obtain as many casts as you please from it, in plaster, wax or sulphur.

By means of bread paste a traveler may always take a model of any small object of interest he meets with on his journey; and thus a proper knowledge of its mode of use becomes invaluable. Scrolls, ruins of tombs and temples, etc., have often thus been copied and brought home at a trifling cost.

The author is Mr. Jas. Lakin, at one time foreman of the brass foundery in Messrs. Reanie & Neafie's works, Philadelphia, Pa., which is a guarantee for the practical value of the book.

NOVELTIES IN INVENTION.

One day, two years ago, we walked through the outer office of our premises, adjoining the editorial rooms, and saw an interested group about a novel affair. On closer inspection this novelty proved to be a doll that walked. In its body was a train of gearing that through the intervention of eccentrics lifted the feet and propelled the little mockery across the floor. This proved a great success as an invention, and thousands of them were sold.

Soon after this a man brought in a figure of a Sambo suspended by a wire proceeding from his back, and put together, as to his limbs, with great freedom. The feet of Sambo rested on a spring board. When this was played upon by nimble fingers the image danced in a most natural and life-like manner; the heels and toes kept time and raked down "Ole Virginny" in the most approved manner.

This also was a good thing from a pecuniary point of view. Wherever one went the face of Sambo met the eye, with his everlasting grin, and hat like a wash basin crowning the summit of his uninteresting countenance.

Again our attention is requested to another novelty. This time to no black dancing dervish; to no handfull of flowers and lace, but to a cock that crows in the morning, or at eve, when you blow in his tail. The streets resound with the noise of Chanticleer, and one is constantly reminded of that mighty feathered warrior—the bantam—who almost splits his throat in attempts to out do the Shanghai.

This new toy is a little affair, made out of tin, not larger than half a dollar. By a little practice one is able to imitate the crowing of a cock very accurately, and if we may judge by the quantity in the hands of the juveniles, the invention is likely to prove a success.

And all this introduction brings us to the point: There are no inventions which are more successful than those which afford amusement. People like to be tickled, and they flock by thousands to the circus, the theater and the comic lectures, where hundreds go to hear "the weightier matters of the law" expounded. So it is with novelties in the way of invention. A new toy for children sells quickly, and turns into money as rapidly as anything we know of. As the holidays approach we find great activity prevailing in this branch of the Patent Office.

BAIRD'S SIMPLIFICATION OF THE SCREW ENGINE.

In a report to the Secretary of the Navy, dated Nov. 28, 1864, Mr. Isherwood stated that in the machinery designed by him for the navy, "the governing principles have been fairness of parts; strict connections without articulations; simplicity of combination, with such arrangement of the essential organs as to admit of easy access and constant observations; great extent of wearing surfaces in guides, journals, etc., and a strength of parts insuring against fracture from bad materials, workmanship, bad management, and the greatest possible abnormal strains." If we add to these "governing principles" the Isherwood point of cut-off, viz., seven-tenths of the stroke of the piston, we have reduced to a short and convenient rule, for practical men, the results of six years of continued coal-burning experiments. It is very remarkable that the contents of two quarto volumes (compiled at an expense of thousands of dollars of the public money) can be thus clearly condensed into practical shape. Notwithstanding the fact that Mr. Isherwood's "governing principles" are so plain, and have been so completely demonstrated by the extraordinary economy (in some of the screw engines, a horse-power is actually attained with five lbs. per hour per horse-power) and the wonderful speed of screw steamers fitted with his engines, marine engineers refuse to be convinced, and still plod along in the beaten track. No doubt this is caused by that absurd professional jealousy which, unfortunately, exists more or less in all professions; but we are happy to be enabled to chronicle one exception at least to this rule. The eminent engineer, Mr. John Baird, the constructor of the machinery of the U. S. S. *Quinsigamond* and class, appears to have been guided, in planning this machinery, by Mr. Isherwood's teachings in relation to screw-engine construction. In the *Quinsigamond* engines, the bold conceptions of our steam Galileo have been carried into practice by Mr. Baird, the most celebrated constructing engineer of the time, who, on account of the tastefulness of his planning, has been appropriately called the Michael Angelo of steam engineering. Having shown why it is that these engines are regarded with so much interest by the profession, no apology is necessary for what follows.

The *Quinsigamond* is fitted with two independent propellers, each actuated by a pair of engines attached to a right-angled crank shaft, the cylinders of the port propeller are placed on the starboard side, and *vice versa*. They are spread apart sufficiently fore and aft to allow the cast-iron framing, which carries the main bearings of one engine, to be placed between them. This frame for the other engines is, of course, placed on one side, forward, and on the other, abaft, of the two cylinders. Bolted directly to the head of each cylinder are two condensers, with openings cast in them, through which passes the main shaft of the next engine on the opposite side; they also support the main cross-head guide. As the two cross heads are placed between the two condensers, with the ample space of some 20 inches of space between them, the upper guide bar partially covering the opening, they are of course very easy of access.

As there are four cylinders, there are of course eight condensers. This arrangement not only simplifies the machine, but at the same time it adds to its economic performance; for if a good vacuum can be obtained with one condenser, a better one can be obtained with two. Further, if one is fractured by a shot, or otherwise injured, another remains, which, no doubt, has sufficient capacity to perform double duty. If each condenser has, as usual, a bilge, as well as a sea injection, there will be no less than sixteen injection cocks or valves; this is of no importance, for by suitably arranged levers and bell cranks, three or four men can work the whole of them.

The condensers are of the ordinary jet variety. Surface condensers were not adopted, probably, because the cylinders are so proportioned relatively with the boilers that between 40 and 50 lbs. pressure must be carried in order to work off the steam. Surface condensation would no doubt add to the formation of scale; which experience has shown increases in a far higher ratio than the pressure.

In order to add as much as possible to the simplicity, durability, and reliability of the engines, as well as to insure a perfect vacuum, each condenser is fitted with two air pumps, or sixteen in all. Every one will perceive that these sixteen air pumps add greatly to the reliability of the engines, for if one is disabled, there will be fifteen left; if two, there will be fourteen, and so on. Some "uncanny" person may urge as an objection to such a number of air pumps, that it involves additional cost in the construction, and an unnecessary complication of parts, but even a cursory examination will refute this absurd idea. These pumps are operated by means of horizontal rock shafts, which obtain their motion from the main cross heads. By this arrangement, only sixteen pump levers and eight levers for the cross-head links, with their necessary connecting links, are required; thus there will be but 32 links, with 64 journals, for connecting the pump cross heads with their rock-shaft levers, and for connecting the main cross heads with the horizontal rock-shaft levers, but 16 links more, with 32 other journals, are necessary. The journals of the horizontal rock shafts (which are supported by a neat and elegant frame