

the machine as a commodious rest for short or long material before or after it is planed.

Fig. 2 shows the apparatus arranged as a hand planing machine, to which it can be changed quickly, and while the central cutter head is running.

The feed roller shafts are returned in their sleeves; the large table is slid back and the small one brought forward close to the cutting line of the cutter head. The main support is raised so that the front top, back of the cutter head, is on a level with the cutting line. The machine is then in position for planing material out of wind, squaring, beveling, cornering, chamfering, or tapering. The small front top may be raised or lowered for any desired thickness of cut. A fence or guide, which is adjustable to any desired angle, rests on the back top. By simple changes of the cutter heads, the adjusting of the tables to a common level with the cutting line of the cutter head, and the raising or lowering, parting or closing, of the front tables, all the different manipulations can be made, such as planing out of wind, beveling, cornering, tapering, mitering, rabbeting, jointing, panel raising on both sides at one operation, hand matching, rolling joints, gaining, plowing, circular, elliptical, and serpentine molding, rip and crosscut sawing, etc., doing all the work of the Universal Wood Worker. The tables can both be raised or lowered together, preserving the same position relative to each other; so that the depth of the cut can be changed at a moment by a turn of a crank wrench. For using a rip saw of larger dimension than the distance between the tables, the same are simply lowered below the saw and kept apart at the middle, so that part of the teeth come below the line of the tables.

A patent gaining frame, quickly adjusted for any angle of gain required, accompanies every machine. The back top is provided with holes to fasten the pattern on for cutting circular and elliptical moldings.

In the third engraving, the main support, with the front tables, is shown raised to the height of the adjustable back top, thereby forming one large table; the sidehead is also raised to a height which brings the smaller leather-covered pulley in line with the larger step of the cone pulley on the upright countershaft of the side head. This increases the speed of the sidehead mandrel to 5,000 revolutions.

The speed is now altered for the purpose of running smaller cutters as they are used on friezing and shaping machines, but the motion may be changed now in either direction by the foot lever. The side mandrel may be set at a perpendicular or angular position, and raised or lowered at will while running; cutter heads or knives of different sizes and shapes can be used and will operate in the same manner and for the same purpose as those of the best special friezing or shaping machine. The guide plate or fence, which is so very useful when the machine is operated as a hand planer or Universal Wood Worker, can be used now for many jobs, as well as the groove in which the gaining frame slides. The gaining frame itself is convenient for many purposes.

The illustrations show only one side of the machine with the stickerhead or platen in three different positions, but the opposite side of the machine is also arranged for useful work.

The center mandrel passes through the machine and has on the projecting end a tapered hole suitable for machine auger bits or chuck shanks. A boring and routing table adjustable in perpendicular, horizontal, angular, and rotary position, constitutes the outfit on this side of the machine. Boring or routing may be done while the machine is operated on the front side so that two persons can use the operative power at the same time. The boring table is of a new and novel design. We are informed that the machine is sold with and without the boring arrangement, and is so arranged that the boring table can be put on at any time afterwards by simply fastening a few bolts.

The right to manufacture the device (the last patent on which was taken through the Scientific American Patent Agency, April 7, 1874) within the United States is for sale. For further particulars, address the manufacturers as above.

Comparative Tests of Building Materials.

The superiority of American steels and irons to similar grades of metals of foreign production has been often asserted; and it is now proposed to definitely settle the point, which is of the utmost importance in engineering, mechanics, and agriculture, by a government commission. The suggestion comes from the American Society of Civil Engineers, who deputed a committee to wait on the House Committee on Appropriations, on January 26, to urge the passage of a bill, now before the House, which provides that the President shall appoint a commission, consisting of a representative each from the Engineer, Ordnance, and Navy Corps, the Coast Survey, and four civil engineers, to serve without pay, to institute and carry out such a system of tests upon American building materials, particularly iron and steel, as would result in the adoption of a standard of strength to govern future constructions.

Similar experiments have been made in Europe, and data, for the guidance of architects and for the use of local boards in framing building regulations, have been obtained. Hitherto our scientific men and artificers have had to use these results; but we hope that improved practice, comprehending the well known facts as to the excellence of American metals, will result from the appointment of the proposed commission.

Rock or swamp maple is a better step for a turbine than either lignum vitae or elm. Cast iron is useless.

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PATENT LAW AMENDMENTS.

We understand that the Patent Committee of the House of Representatives have concluded to report the following bill:

To amend the act entitled "An act to revise, consolidate, and amend the statutes relating to patents and copyrights," approved July eighth, eighteen hundred and seventy.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That sections twenty-three, twenty-five, thirty-three, fifty-three, and sixty-four of the act entitled "An act to revise, consolidate, and amend the statutes relating to patents and copyrights," approved July eighth, eighteen hundred and seventy, be, and the same are hereby, amended to read as follows:

"SEC. 23. That every patent shall date as of a day not later than six months from the time at which it was passed and allowed, and notice thereof was sent to the applicant, or his agent; and if the final fee shall not be paid sufficiently within that period to admit of the patent being prepared for issue, the patent shall be withheld."

"SEC. 25. No person shall be debarred from receiving a patent for his invention or discovery, nor shall any patent issued subsequent to March second, eighteen hundred and sixty-one, be declared invalid by reason of its having been first patented in a foreign country; provided the same shall not have been introduced into public use in the United States for more than two years prior to the application."

"SEC. 33. That patents may be granted and issued or reissued to the assignee of the inventor or discoverer, the assignment thereof being first entered of record in the Patent Office; but in such case the application for the patent shall be made and the specification sworn to by the inventor or discoverer, but an assignee of the entire interest in a patent may make application for reissue without the aid or consent of the inventor or discoverer."

"SEC. 53. That whenever the owner of a patent shall make oath that his patent is inoperative or invalid (a) by reason of a defective or insufficient specification, or by reason of the patentee claiming as his own invention or discovery more than he has a right to claim as new, or by reason of two or more parties having made application as joint inventors when, in fact, they were not, or in case of a patent issued to a single party when the invention was joint, or in case the patentee has failed to claim what he had a right to claim, as shown by his original (b) drawing or model, if the error has arisen by inadvertence, accident or mistake, and without any fraudulent or deceptive intention, the Commissioner shall, on the surrender of such patent, and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specifications, to be issued to the patentee, or, in the case of his death, or assignment of the whole or any undivided part (c) of the original

patent, to his executors, administrators, or assigns, for the unexpired part of the term of the original patent (d), the surrender of which shall take effect upon the issue of the amended patent; and the Commissioner may in his discretion cause several patents to be issued for distinct and separate parts of the thing patented, upon demand of the applicant, and upon payment of the required fee for a reissue for each of such reissued letters patent. And the specification and claim in every such case shall be subject to revision and restriction in the same manner as original applications are. And the patent so reissued, together with the corrected specification, shall have the effect and operation in law, on the trial of all actions for causes thereafter arising, as though the same had been originally filed in such corrected form; but no new matter shall be introduced in the application, nor, in case of a machine patent, shall the model or drawings be amended, except each by the other."

"SEC. 64. That upon the receipt of such application, and the payment of the duty required by law, the Commissioner shall cause to be published in the Patent Office Official Gazette, and in such other papers published in the section of the country most interested adversely to the extension of the patent as he may deem proper, for at least sixty days prior to the day set for hearing the case, a notice of such application, and of the time and place when and where the same will be considered, that any person may appear and show cause why the extension should not be granted."

The above bill, about to be reported by the committee on patents in the House of Representatives, contains several important improvements in the present statute, but falls far short of correcting many of the imperfections of the latter. Some of these will now receive a passing notice.

The 25th section of the act of 1870 needs further amendments than those proposed in this amendatory act. He who holds both a foreign and a home patent is now obliged, if the foreign patent was granted prior to the House patent, to keep up the former in order to preserve the latter.

There would be less objection to this if the home patent were to expire only with the natural life of the foreign patent. But in case of a French patent, a hundred francs must be paid every year in order to keep it in existence. A failure to make this payment—no matter for what reason, or whether intentional or not—causes a forfeiture of the French patent, and the American patent expires with it, as the law now stands. Another objection to the section in its present form is that the foreign patentee may allow it to run for ten years or more, unused and unknown in the United States; and when some manufacturer erects expensive works here and commences to manufacture the same thing, the foreign patentee may obtain an American patent within two years thereafter and entirely close up this home manufactory, unless the proprietor of the latter will pay such an exorbitant royalty as may be demanded of him.

The law should require the holder of a foreign patent to take out a patent or to put the thing patented in use here within say one year after it was patented abroad, or the same should become public property in this country.

In section 53, at (a), after the word "invalid," the words "in whole or in part" should be inserted. The law is now generally so interpreted; but this is sometimes controverted and it is contended that the patent in its original shape must be wholly worthless, in order to justify a reissue: and such seems to be the natural import of the language of the statute. It should be the policy of the law to give an inventor the full benefit of his invention, and the Office usually strains a point in order to produce that effect; but the matter should not be left at loose ends in this respect.

Again, at (b), after the word "original," the word "specification" should be inserted. The original specification is quite as reliable as are the drawings or the model in indicating the true invention, and often much more so. But as the section now reads, both here and in lines 62 and 63 of the bill, the specification is entirely ignored in this connection. The same word "specification" should also be inserted before the word "model" in line 62 above referred to.

There is also some correction needed in or about line 46 of the bill, in this same section. After providing for the cases in which a reissue may be allowed, the bill goes on to state that "the Commissioner shall, on the surrender of such patent, and the payment of the duty required by law, cause a new patent for the same invention, and in accordance with the corrected specification, to be issued to the patentee, or, in case of his death or assignment of the whole or any undivided part of the original patent, to his executors, administrators, or assigns, for the unexpired part of the term of the original patent." Now suppose the patentee to have assigned, say the one twentieth of the original patent to John Doe, is it intended to give the said Doe the sole right to obtain a reissue? But such is the provision of the bill as it now stands.

If the words "or any undivided part" were erased, the true intent would be more nearly expressed. But if, after the word "patent" at (d), the words "the surrender of which" were erased, and the words "if an undivided interest in the original patent shall have been assigned, all the assignees must join in the application for a reissue. And in all cases the surrender of the patent" were substituted, the change would be still much better.

But there are some amendments not noticed in the bill which are quite as much needed as any of those which it contains. Some of the most important of these will be briefly adverted to.

As the law now stands, an assignee has ninety days within which to record his assignment. This holds the door open for fraud. An innocent purchaser may have had his assignment on record for 89 days before any other assignment is recorded or suspected to exist, and still he may find it worthless. The registry laws of some of the States in relation to the sale of real estate have had this same provision. But experience has fully demonstrated the superiority of the rule that the first deed on record shall hold the property. It

may work hardship in some cases, but it incites to vigilance, and is, on the whole, vastly preferable. The same would doubtless be the case in relation to the assignment of patents.

But licenses are by the present law not required to be recorded at all. After the most thorough care and vigilance, the purchaser of a patent may find that scores of licences to make, use, and sell the thing patented in every portion of the United States have left the property, for which he has paid his money, comparatively worthless. This ought not to be so. A license should be recorded just the same as an assignment or a deed.

But there is another evil, which, although less in magnitude, is just as palpable and should not be overlooked. The 48th section of the act of 1870 summarily abolishes the appeal from the Commissioner to the courts in interference cases. There is reason to believe that this was the result of accident or mistake. Interference cases above all others should be subject to such appeals. The inquiries involved are just as intricate, and the questions of law and fact call into requisition as high an order of legal acumen, as those which tax to their utmost capacity the most experienced and clear-sighted minds that are to be found on the bench of any court in the republic. And yet, by the law as it now stands, these questions are to be decided, without any right of appeal, by a Commissioner who is wholly inexperienced in such matters, who has never read a chapter of Kent or Blackstone, and who is wholly ignorant of the great legal maxims which underlie all sound judgment in matters of that nature. Such an arrangement is outrageously improper, and should be changed at once.

We shall make only one further suggestion in this connection. After a decision by the Board of Examiners-in-Chief, we see no reason why the dissatisfied party should be obliged to appeal in all cases to the Commissioner before he can make his appeal to the Supreme Court of the District, especially in interference cases. If such a case is appealed from the Board of Examiners-in-Chief, it rarely if ever fails to be taken eventually to the court. It would save much trouble and some expense if the dissatisfied party were permitted at his option to appeal directly to the court. A change in section 48, which would make it read as follows, would accomplish the entire purpose above suggested.

"Section 48. *And be it further enacted* that, if such party is dissatisfied with the decision of the Commissioner, he may appeal to the Supreme Court of the District of Columbia sitting in *banc*. Or the dissatisfied party may at his option appeal directly from the decision of the Examiners-in-Chief to the said Supreme Court without first having appealed to the Commissioner of Patents."

#### CAN ANTS TALK?

No one has studied the habits of "our six-legged rivals" without becoming impressed by their ability to communicate with each other, and the wide range of intelligence which they seem to be able to convey. Information of common danger is quickly spread throughout colonies numbering many thousands, the news being brought by perhaps one or two spies. Hitherto their mode of communication has been a mystery, the most plausible hypothesis being that it was by a sort of fencing with their antennæ. Thus an ant returning from a foraging expedition meets another outward bound. They stop, strike antennæ together a few times, then proceed, No. 1 to the nest, No. 2 setting off on a new course and going straight to the place where No. 1 found her load. It would now appear that the striking of antennæ is merely a sort of salutation, as two neighbors might shake hands, while conversation goes on by other means. At any rate, according to the report of Professor Landois to the Natural History Society of Prussian Rhineland, they are provided with a sounding apparatus resembling that of the sand wasp. To have implies to use; and though its pitch is generally inaudible to human ears, its range of tone may be ample for a fully developed language. We say "generally inaudible," notwithstanding Professor Landois' belief that it is always so, having more than once noticed a faint strident, hissing sound proceeding from columns of large ants when annoyed. The next thing in order is an apparatus for making inaudible sounds audible, as invisible rays are made luminous; then some enterprising student may give us a comparative grammar of formic idioms.

#### THE SEWING MACHINE.

The Committee on Patents of the House of Representatives has recently reported adversely to the application for the extension of the A. B. Wilson sewing machine feed motion patent. As we have previously explained, this patent has been controlled by a coalition of manufacturers, namely, the Wheeler & Wilson, Grover & Baker, Wilcox & Gibbs, Singer, and the two Howe companies, who have made it the means of exacting immense royalties from smaller makers, and thus of distancing all competition, while at the same time of amassing colossal profits from their own large sales. The patent has already been once extended, and this second extension, had it been granted, would have continued the monopoly for a further period of seven years, during which time a score of millions would probably have been added to its already vast wealth. As it is, the invention now becomes public property, and is free to all users. The onerous royalty is thus obviated, the door opened widely for a healthy competition, and the diminution in price of the sewing machine probably to the extent of fifty per cent, will doubtless soon follow.

The history of a successful invention of this kind furnishes a suggestive commentary upon the wisdom of the principles which underlie our system of patent laws. Of these, the ultimate object is, solely and purely, benefit to the

community, not the mere securing of a monopoly to the inventor. But as is exemplified in the instance in point, although the proprietors of this valuable right have been allowed to exercise a species of tyranny for several years, and to exact from the public large sums, still the object has been not to afford means for them to get rich, but to induce them to improve and develop the invention. Spurred on by immense gains, those reaping the harvest have accomplished this development. More than that, they have evolved a new and lucrative industry. Ample opportunity has been afforded them for all this; and now Congress, in declining to continue the same privilege, asserts that the benefits to the public will not be so great in so doing as will be secured by removing the restrictions. Certainly the reward obtained during the period of the monopoly by its owners has been enormous, but it is utterly inconceivable beside the profits which will now accrue to the public.

In brief, for twenty-one years we have submitted to great exactions, but in so doing we were investing sums to secure the prosperity of our descendants. By allowing a few to become wealthy over a couple of decades, we have induced them to develop a great industry which will prove a source of income to millions in years to come.

#### PROSPECTS FOR 1875.

We are gratified to be able to state that the subscriptions to the SCIENTIFIC AMERICAN, for the new year of 1875, are pouring in from all directions as they have never done before. We are now printing, every week, 50,000 copies of our journal, which is undoubtedly more than the combined circulation of all other papers of its kind published in the world.

We hope our friends who have not yet renewed, and all who are engaged in the formation of clubs, will send along their names as rapidly as possible. To prevent the loss of back numbers by those whose remittances are a little tardy, we electrotype each issue and preserve the plates, whereby we are enabled to print new editions of any numbers that may be required.

We recommend persons to patronize their local periodical dealers, when equally convenient for them, in preference to the mail. By receiving the paper weekly from the counter or by carrier, the objectionable creases in the paper, necessitated by the folding for the mail, are avoided; besides, it is commendable to patronize home enterprises in every thing.

We have the most gratifying assurances from all parts of the country that, notwithstanding the hard times among some of our industrial classes, the demand for scientific and mechanical information is increasing. Our subscription books, since the new year, demonstrate this fact.

#### SCIENCE RECORD FOR 1875.

We have much pleasure in announcing the issue of the volume for the current year, which we believe will, on examination, be found fully equal in merit to any of the preceding books of the series. The SCIENCE RECORD for 1875 contains about 600 pages, and such is the wide scope and variety of contents that the index alone fills some ten closely printed pages. The index of references is also extensive, designating nearly one hundred and fifty scientific publications that have been more or less consulted in the compilation of the work.

In the department of Chemistry and Metallurgy, which covers nearly sixty-eight pages, we have accounts of all the leading improvements, discoveries, and suggestions in these important branches, made public during the year just closed. All who are interested in either of these departments of Science, or who desire to be concisely informed as to the latest progress therein, will find the records to be of value.

The department of Technology, occupying nearly one hundred and fifty pages, contains a very large amount of new and useful information, illustrated by a variety of engravings. The new alloys, new recipes, and new processes in the various arts, here collected and condensed, are of great value, and probably not attainable in any other one work. Among the illustrated articles is the latest form of machinery for the artificial manufacture of ice: also the methods and apparatus used in gathering natural ice. Here we find described the many uses of paraffin, new methods for the ornamentation of metals, nickel plating, iron welding, new imitations of silver and other precious metals, directions for the practice of several new and simple arts, photographic improvements, waterproofing of paper, manufacture of carbonic acid, solvents for rubber, protection and ornamenting of iron, preparation of bronzes, uses of mica, production of artificial leather, artificial manufacture of precious stones, tempering of steels, and a multitude of other subjects, all useful, interesting, and desirable for reference.

Under the head of Electricity, Light, Heat, and Sound, covering fifty pages, we have descriptions and engravings of recent telegraphic apparatus, new electric motors, new machines for producing the electric light, several forms of new batteries, an engraving of the apparatus used for the new artificial light called the Bicarbon Light, said to be equal to the oxyhydrogen but cheaper and superior, better also than the electric or magnesium light. An electrical barometer, a simple little instrument, worked by electricity drawn from belts in machine shops, is represented, and a great number of other improvements and new suggestions.

The department of Mechanics and Engineering, occupying nearly one hundred pages, embraces a great variety of articles of special interest to the mechanic and engineer. The latest improvements in ships are here given, with engravings. The Bessemer steamer is illustrated, also the Castalia twin ship. Diagrams of the most recent ordnance are given. There is a chapter on the propulsion of cars and vehicles by

springs, with engravings. The latest railway improvements and structures are shown, and among them the new car of Giffard, of injector fame, which moves without oscillation.

The departments of Rural Economy, Botany, Horticulture, Agriculture, etc., are full and interesting. The latest egg hatching machine is illustrated; so are the habits and form of the Colorado potato beetle, etc.

Under *Materia Medica*, Therapeutics, Hygiene, we have a large amount of new and important information, from the most reliable sources, profitable to every reader.

Pisciculture is an interesting department, containing engravings of the most recent methods for hatching and cultivating fish, with descriptions. The farming of fish is rapidly growing in importance, and there is evidence of more profit, with less labor, to be made from the streams that flow through the land than from the adjoining land itself.

The department of Natural History and Zoology will be found especially interesting, as the amount of new information acquired during the past year, from various expeditions, is large and important.

In the department of Geography, the past year has been prolific of new and interesting information. A series of views of the remarkable cañons of the Colorado is given, which convey an idea of the astonishing natural formations that exist in our West.

Astronomy is full of useful interest; some of the results of the Transit of Venus observations are given, together with a mass of new and valuable matter.

The department of Biography is illustrated with the portraits of several eminent men of science, and will be found unusually interesting.

Taken altogether, the SCIENCE RECORD for 1875 is a book of unrivalled importance and value. All who desire to have before them, in condensed form, the year's progress in Science should possess a copy. Sent by mail, prepaid. Price \$2.50. Published by Munn & Co., office of the SCIENTIFIC AMERICAN, New York.

#### AN ANCIENT METRIC SYSTEM.

The library of Assurbanipal, King of Assyria, found during Mr. Layard's excavations at Nineveh, shows that Science had made no little progress in Asia twenty-five hundred years ago. This curious library consisted of flat, square tablets of baked clay, having on each side a page of closely written cuneiform cursive letters, which had been impressed on the clay while it was yet moist. The great majority of these tablets are now in the British Museum, and have been found to contain the remains of an immense grammatical encyclopædia. There are also fragments of many mathematical and astronomical treatises, with catalogues of observations, tables, calculations of eclipses of the moon, and observations of solar eclipses, the earliest of which occurred nearly a thousand years before the beginning of the Christian era. There are also fragments of law books and legal records, books of chronology, manuals of history, accounts of Assyrian and other divinities, collections of hymns in the style of the Psalms of David, a geographical encyclopædia, works on natural history containing lists of plants and animals, of timber trees employed in building and furnishing, of stones fit for architecture and sculpture, etc. Perhaps the most interesting of all these lists is a classified catalogue of every species of animals known to the Assyrians, showing a scientific nomenclature similar in principle to that of Linnæus. Opposite the common name of each animal is placed a scientific and ideographic name, composed of two parts, a family name and a characteristic epithet denoting the species.

A still more remarkable indication of the scientific advancement of the ancient Assyrians appears in their system of weights and measures, in which, as in the French system, all the units of surface, capacity, and weight were derived from one typical linear unit. The basis of the system was the cubit (equal to 20.67 inches). This was divided into sixty parts, corresponding with the minutes of the degree. The cubit, multiplied by 360, the number of degrees in the circle, produced the stade, the unit for large distances. The fundamental unit for areas was the square foot, the square of a measure bearing to the cubit the relation of 3 to 5, or 12.4 inches of our measure. The cube of the foot was the metreta, the standard of all measures of capacity; and the weight of a cubic foot of water gave the talent, the fundamental unit of weight; the sexagesimal division of the talent gave, first the mina (= 510.83 grains), and second, the drachma (= 8.51 grains).

The sexagesimal system was employed throughout their mathematics, the unit being invariably multiplied or divided by sixty, the result again by sixty, and so on to infinity. "This, it is very evident," observes Lenormant, "was the result of a wise combination of a very practical character, intended to combine the advantages of the two systems of dividing unity that have been in dispute at all times and among all nations—the decimal and the duodecimal." We still follow this Chaldeo-Assyrian system in the divisions of the circle and in our divisions of time.

Water glass deserves more extended household usage. Mixed with paint or whitewash it gives increased durability and a fine gloss, it is an excellent fireproof cement, and when dry is also waterproof. It is a good adhesive mucilage for mending china, glass, or wood, and made into a wash is the best coating for brick vaults.

Dr. GUTTCHEIT recommends rubbing warts, night and morning, with a moistened piece of muriate of ammonia. They soften and dwindle away, leaving no such white mark as follows their dispersion with lunar caustic.