

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 postage included. \$3 20
One copy, six months postage included. 1 60

Clubs.—One extra copy of THE SCIENTIFIC AMERICAN will be supplied gratis for every club of five subscribers at \$3.20 each; additional copies at same proportionate rate. Postage prepaid.

Remit by postal order. Address

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, postage paid, to subscribers. Single copies, 10 cents. Sold by all news dealers throughout the country.

Combined Rates.—The SCIENTIFIC AMERICAN and SUPPLEMENT will be sent for one year postage free, on receipt of seven dollars. Both papers to one address or different addresses as desired.

The safest way to remit is by draft, postal order, or registered letter. Address MUNN & CO., 361 Broadway, corner of Franklin street, New York.

Scientific American Export Edition.

The SCIENTIFIC AMERICAN Export Edition is a large and splendid periodical, issued once a month. Each number contains about one hundred large quarto pages, profusely illustrated, embracing: (1.) Most of the plates and pages of the four preceding weekly issues of the SCIENTIFIC AMERICAN, with its splendid engravings and valuable information; (2.) Commercial, trade, and manufacturing announcements of leading houses. Terms for Export Edition, \$5.00 a year, sent prepaid to any part of the world. Single copies 50 cents. Manufacturers and others who desire to secure foreign trade may have large, and handsomely displayed announcements published in this edition at a very moderate cost.

The SCIENTIFIC AMERICAN Export Edition has a large guaranteed circulation in all commercial places throughout the world. Address MUNN & CO., 361 Broadway, corner of Franklin street, New York

NEW YORK, SATURDAY, MAY 10, 1884.

REMOVAL.

The SCIENTIFIC AMERICAN Office is now located at 361 Broadway, cor. Franklin St.

Contents.

(Illustrated articles are marked with an asterisk.)

Table listing various articles such as Acid, oxalic; Ball, put, an enormous; Barrels, gun, bursting of; Belts, pulley side of; Bleaching process, bone, new; Brass, properties of; Buildings of prominence, N. Y.; Business and personal; Car, safest part of; Check, door, novel; Cotton, consumption of, future; Deafness, plicarpine for; Developer, photo, improved; Discoveries, Dr. Le Plongeon's; Drill, breast, improved; Dynamite thrown from cannon; Elevator, what it has done; Fishes, deep water; Grate, furnace, improved; Gratifying admission; Handle, tool, improved; Illusions, optical; Inventions, agricultural; Inventions, engineering; Inventions, index of; Inventions, mechanical; Inventions, miscellaneous; Ladder, step, folding; Land, table, unexplored; Lock, permutation, Brooke's; Machine, flying, problem of; Notes and queries; Patent laws, California on the; Patent laws, how Western people regard the; Patents, government purchase of; Pipes, ascension, stopped; Plastering, sawdust in; Plates, photographic, flexible; Porpoise fishing on Atlantic coast; Post, fences, improved; Roots, eucalyptus, water from; Sheep producers, poisonous; Smallpox epidemic, to prevent; Sun spots, maximum of; Walking, running, etc., in England; Winds, Chook; Wires, overhead, suggestion as to; Yucatan, discoveries in.

TABLE OF CONTENTS OF

THE SCIENTIFIC AMERICAN SUPPLEMENT

No. 436,

For the Week ending May 10, 1884.

Price 10 cents For sale by all newsdealers

Table listing contents of the supplement including sections like I. CHEMISTRY AND METALLURGY, II. ENGINEERING AND MECHANICS, III. TECHNOLOGY, IV. ELECTRICITY, LIGHT, HEAT, ETC., V. ART AND ARCHITECTURE, VI. NATURAL HISTORY, ENTOMOLOGY, ETC., VII. PHYSIOLOGY, HYGIENE, ETC., VIII. MISCELLANEOUS.

PATENTS TO FOREIGNERS.—GOVERNMENT PURCHASE OF PATENTS.

Senator James C. George, of Mississippi, has introduced the following resolution, which on motion was referred to the Patent Committee:

Resolved, That the Committee on Patents be instructed to report a bill to prevent hereafter the granting of any patent for any invention or discovery made by any person not at the time of such invention or discovery a citizen and resident of the United States; and the committee is further instructed to inquire into the expediency of providing by law that all patents hereafter granted shall be subject to purchase by the United States for the public use, upon a fair valuation thereof.

By industry we thrive. The object of the law in granting patents to foreigners is to encourage the multiplication and prompt introduction of new industries. What matters it where the residence is of the author of a new and gigantic industry like the Bessemer steel process, from which the nation has already derived many millions of dollars of profit, and thousands of millions are still to follow? Is it generous, is it good policy, to deny to such inventors the pittance of a patent certificate, by means of which, during a short period of 17 years, they may, if they work hard, perhaps realize a small personal reward? We think not.

Mr. George believes that the law should be changed so that patents may be taken at any time, by payment from the national treasury, and made free to the public.

As the law stands, all patents become free to the public at the end of 17 years from date—a period so brief that it is a mere dot in the time-history of a great nation. The reaper and mower, the planing machine, the turning machine, the sewing machine, the electric telegraph—hundreds of other great inventions might be named—all have become free to our people by operation of the present law. It does not seem as if Senator George's proposed law would be an improvement. Take the telephone patent, for example. A low present valuation, perhaps too low to be fair, would be three hundred millions of dollars. The patent has nine years to run. It must be confessed the public is now pretty well served by the telephone owners. Would it be of advantage to the people now to pay three hundred millions of dollars from the Treasury to extinguish a patent that will so soon expire? We doubt it.

The present law provides for the acquisition by the public of all patents that may hereafter be granted on terms much more convenient and at far less cost, we think, than the system proposed by the honorable Senator from Mississippi.

A SUGGESTION AS TO OVERHEAD WIRES.

What shall be done with the wires which, like threads of a huge web, hold the New York streets in a mesh-like tangle, is a question as perplexing as it is important.

The Board of Aldermen says that such of them as pertain to electric lighting plants must be buried after May, 1885; one branch of the Legislature says that both electric light and telephone wires must be underground by June 1, 1885, in cities of 50,000 inhabitants or over. Lastly, the sub-committee appointed by the representatives of the electrical companies, exclusive of Western Union, after considering the subject for several months, have decided that wires of all descriptions should go underground, and suggest that the municipality provide suitable subways for their reception. Singularly enough, neither the Legislative investigating committee nor yet that appointed to represent private interests considered what would seem to be by far the most important point bearing upon the subject in hand, viz., the convenience of the general public.

No reasonable person will deny that electric mains carrying powerful and dangerous currents should be placed out of reach. But telegraphic and telephonic wires are dangerous neither to life nor property, and so far as they are concerned the question would seem to be: Is their unsightliness and the annoyance attendant upon their repair of more importance to the general public than the additional expense of their use which it is but reasonable to look for when the costly subways and tunnels shall have been built?

If the telegraph and telephone were only for the rich, that is, for the few, it would be neither surprising nor illogical if the many should object to the invasion of the streets and the roofs of their houses. But such is not the case. Both services have become generally popular, and already so much used as to have become almost a necessity.

So far as the telegraph is concerned, the public is looking forward to a very decided reduction in the rates, and, considering the conditions under which the service is performed to-day, there seems to be no reason why they should not be gratified. But if no one is willing to be the least inconvenienced for the sake of the general welfare, if no one is willing to have a wire pass his door or cross his roof, he may not reasonably expect at the same time to have a cheap service.

It is much the same with the telephone. Increase the expenses of the companies, and you force them to increase their rates for service. This tends, as a natural consequence, toward limiting its usefulness, for no matter how convenient it may be in the transaction of the ordinary affairs of life, it cannot, if it be expensive, be popular.

If a man objects to the clatter of the milk wagon and the baker's wagon before his door, he can, if he does not mind the additional expense, have his milk and bread brought to him by hand. But it would be manifestly unfair and un-

reasonable to expect that his less fortunate neighbors should incur a like expense that he might not be disturbed. Equally absurd would it be, should he expect his milkman and baker to go to the additional trouble of serving him by special messenger at the same rates, and still worse, to even demand a reduction in these. The fact is, every one should be willing to sacrifice something for the general welfare. With this view, it would seem as though a plan might be devised by which the telegraph and telephone wires could be systematically led over the roofs of the houses, without proving a special hardship or annoyance to any one; and we must confess it seems somewhat surprising that no such plan has, so far as we know, been considered. There is good reason to believe that, with proper supervision by constituted authorities, the general and indiscriminate scrambling over roofs, now indulged in by line men, could be avoided in great measure. The unsightly street poles could be done away with, and the wires now strung on them be laid in the same order over roofs of the houses. When damage of any kind resulted, such as injury to a chimney or roof, those who had general supervision over all the wires could readily decide who was responsible for it, and hence who must repair the injury done.

Nor is it by any means certain that the construction of subways through the main thoroughfares would, though increasing the cost of service, abate the alleged nuisance of stringing the wires over the houses. Telephones and burglar alarms are usually run over the tops of the houses and across the yards and courts, and unless all the side streets, as well as the avenues, were undermined, and so unnecessary and costly an undertaking has not, we believe, even been contemplated, there would be little or no diminution in the number of wires crossing the roofs.

In the plan we have suggested, the telephone and telegraph wires could readily be kept apart, as indeed could be the lines of the various companies.

What most commends this plan is its cheapness and convenience, which characteristics, if we mistake not, are the essentials to every scheme in which the general public is looked for to take part.

The public demands cheap telegraph and telephone service, and that this may be had by any of the recent plans to sink the wires, we must in candor confess there are grave doubts.

THE MAXIMUM OF SUN SPOTS.

The sun is behaving in a strange fashion, and refuses to obey the laws laid down for him by terrestrial observers in regard to his spot producing activity. As is well known, the sun's spot cycle is completed in a little more than eleven years. For two or three years the spots are larger and more numerous, and continue so until the cycle has reached its maximum. They then begin to diminish, and in five or six years reach the minimum; the passage of another six years brings the return of the maximum, and completes the cycle. The intervals are, however, irregular, and the laws of the period are not determined with certainty.

The present irregularity is beyond the usual bounds, and is unaccountable. The last maximum of sun spots occurred in 1870, and the last minimum in 1878. The return of the maximum was, therefore, looked for in 1882, and the return of the minimum is expected in 1889. But the agitation of the solar surface did not diminish in 1883, and the activity continues thus far in 1884.

Astronomers who make solar physics a specialty are hard at work in the effort to find out the cause of this anomalous proceeding on the part of the great day star, and several of them have come to conclusions at variance with each other, as is the case in most theories about the sun.

M. Faye, the distinguished French astronomer, reports as the result of his close observation that the solar activity is actually decreasing. He thinks that the number of days when the sun was free from spots was greater in 1883 than it was in 1882; that the number will be larger in 1884; and that the increase will be still more rapid in 1885, 1886, and so on, until the minimum is reached in 1889. This careful observer is confirmed in his view of the question from the conclusions reached by Schwabe, who systematically observed the sun during a large part of a long life. He determined the periodicity, not by counting the number of spots, but by noting the number of days the sun was free from spots. At the maximum there is scarcely a day when spots are not visible. After its passage there are occasional days when the sun's face is unmarred, the number increasing until the minimum is reached, when the sun is clear of spots for nearly half the year, oftentimes for many days in succession.

M. Wolf, of Zurich, is the renowned astronomer who, making use of the observations of Schwabe, traced back the periodicity to the time of Galileo, and proved its existence beyond a doubt. He partially agrees with M. Faye. According to Wolf's observations, the average of the relative number of spots is greater in 1883, but the greatest monthly average is found in 1882. The number of days without spots is four times greater in 1883. M. Wolf thinks that, with our present knowledge of the sun, there is no means of determining with certainty when the spot cycle passed or will pass the maximum.

M. Tacchini, the Director of the Observatory at Rome, whose views have great weight in the scientific world, holds a different theory. He comes to the conclusion that the solar activity has increased since 1882. He reaches this result by comparing his data collected in 1883 with those

of the preceding year. Although the relative difference in the number of spots was very small, the number of groups in 1883 was much greater, and the extension of the spots was truly extraordinary, being double that of 1882. This was especially the case in the last quarter of 1883; his more recent observations show that the great activity has continued during January and February of the present year. Therefore, M. Tachini asserts that the maximum of spots has not yet been reached.

When skilled observers differ widely, it is safe to conclude that very little is known about the sun. The existence of the sunspot period may be considered as established; but its exact extent and its cause are as yet unknown, and so is its connection with terrestrial phenomena. Auroras and magnetic disturbances are subject to a period nearly corresponding to that of sun spots, and seem to be bound with them by some inexplicable tie, for they are most frequent when sun spots are most numerous. Whether the solar activity is the cause of the earthquakes, volcanic eruptions, cyclones, tornadoes, and the disturbances that follow in their train is a problem yet unsolved. The sun hides his secrets from mortal ken; we do not even know his exact distance or diameter, nor can we expect in the present attainments of science to find out the cause of the spots with which the sun's fair face has been pitted and marred for several years. Observation is the only key to reveal the mystery. This great power is in full and continuous action.

Many astronomers devote their lives to the study of the sun's face and his surroundings. Not a day escapes, when the sun shows his smiling face, that the smallest mote on his surface is not carefully noted, not a spot escapes the eager eye of unwearied observers. Some day when least expected the reward of the persevering workers will be won. The duty and privilege of the present generation, and of generations to come, are to labor and to wait. Meantime, if sunspots are the cause of the recent frightful agitations of the earth's crust and her atmospheric commotions, it is devoutly to be hoped that the period will speedily reach its maximum—if that event has not already occurred—and that the great luminary will subside into quiescence.

California on the Patent Laws.

The influential citizens of California hold no uncertain opinions concerning the patent laws. Here is the memorial of the Manufacturers' Association, lately presented to the Senate by Senator Farley, read, and referred to Committee on Patents:

To our honorable Senators and Representatives from California in the Congress of the United States:

The Manufacturers' Association of California respectfully address you this memorial in relation to the present situation regarding patents for inventions, and earnestly invoke your active opposition to such bills as have been or hereafter may be introduced into either branch of the national Congress hostile to the progress of science and the useful arts by limiting the just protection to their respective discoveries and appliances.

It is with surprise and fear that we have recently learned of bills greatly impairing if not practically destroying the rights heretofore conferred upon inventors having been favorably considered by the House of Representatives, and we view with anxiety the action of the honorable Senate upon them, and with alarm the consequences which may follow their enactment.

We consider the proposed changes radical and unjust, and liable to seriously injure many and great existing interests, and prevent completion of numerous prospective enterprises by withdrawal of capital and confidence, and raising perilous obstacles to our country's inventive, industrial, and manufacturing progress.

We therefore earnestly and most respectfully protest against the proposed changes and all similar provisions which abridge the usefulness of the Patent Office Department or impair the protection heretofore afforded.

In presenting this request and protest we beg to remind you of some great facts of history which are a part of the common knowledge of the world, namely:

That the general advance of each civilized nation in knowledge and intelligence, in enjoyment of increased comforts and luxuries, and accumulation of wealth has been greatest where inventors are best protected, and that this advance is chiefly due to their discoveries and productions.

That the patent laws do not nor have they ever given the inventor anything beyond an exclusive right for limited time to use or sell that which he had himself created; for this reason the country has lost nothing nor can it lose anything by continuing the patent laws, as wisely provided for in the Constitution of the United States, in all their force and integrity.

That the great inventions and useful discoveries made by inventors in the United States have constituted an advance highway on which our country marches, a proud leader of the nations of the world in all that makes a people intelligent, comfortable, rich, happy, and independent.

That under the incentive and protection afforded to inventors by our patent laws, inventions and improvements have multiplied rapidly, furnishing easier and cheaper methods for agriculture, manufacturing, mining, transportation, and travel.

That the hours of daily labor have been reduced, while the means of livelihood, with enlarged comfort in our

homes, have been greatly increased through the changes these inventions have wrought.

The benefits derived by the country from inventive genius and mechanic skill are so immeasurably greater than inventors have gained from the people that comparison ceases.

Referring to these general truths, we send you this memorial protesting against the threatened action inimical to the patent laws, and earnestly soliciting your hearty efforts toward continuing the wise policy which has added so much toward the expansion, prosperity, strength, and glory of our nation, and respectfully express our desire that you will exercise your influence to preserve the body and intent of our patent system, and that all changes be confined to details for correction of abuses and to make it more effective. Respectfully yours,

The Manufacturers' Association of California—A. S. Hallidie, President, Irving M. Scott, Vice-President, N. W. Spaulding, Treasurer, Geo. C. Hickox, Secretary, W. T. Garratt, Arpad Haraszthy, Isaac Hecht, Alanson H. Phelps, A. L. Tubbs, Wm. Harney, S. P. Taylor, David Kerr, Directors.

How Western People Regard the Patent Laws.

It was alleged by the supporters of the hostile patent bills in Congress that a general feeling existed in the Western States adverse to the patent laws, on account of which said laws ought to be repealed or radically changed to meet the popular desires. The allegation was founded in error. The great mass of Western people know that their wealth and prosperity is rapidly augmented by the introduction of new industries, and they are heartily in favor of the patent laws because they exercise such a powerful influence in providing important and profitable manufactures.

As an example of the real sentiment of the people of such States as Illinois, we give an extract of a petition lately presented in the Senate by Senator Logan, which he said had so many signatures that it made a great roll eighty feet long.

To the Senate and House of Representatives in Congress assembled:

The undersigned, inventors, manufacturers, and citizens of Chicago and vicinity, respectfully petition our honorable Senators and Representatives to oppose by all legitimate means the pending legislation in Congress hostile to the progress of American invention.

This petition is circulated in accordance with the following resolutions, unanimously adopted at a meeting of the citizens of Chicago and vicinity, held in this city March 24, 1884.

The resolutions referred to are as follows:

We, as the representative inventors and manufacturers of Chicago, having in view the object and scope of our patent law as now embodied in the statutes of this country and construed by the decisions of the courts, and believing all proposed legislation upon the subject of letters patent now before Congress to be vicious in its end and purpose, and destructive to the rights of all inventors or manufacturers under letters patent; and having in view especially section 2 of an act recently passed in the House of Representatives under suspension of the rules and referred to the Committee on Patents of the Senate, and the same having been reported back to the Senate unanimously that it pass, as follows:

Section 2 of the act: "That when in any case the use complained of was an article or device made by the defendant, or his agent, or employe, for his own use and benefit, and not in the manufacture of an article for sale, the measure of recovery shall be a license fee. If in any such case a license fee shall not have been established under the patent or patents sued on, then in any action at law the jury, and in any action in equity the court, shall ascertain what, under all the circumstances of the case, would be a reasonable license fee: *Provided, however,* That this section shall not apply to machinery held for sale or used for manufacturing purposes." Now, therefore,

Be it resolved, That under the emergency existing for immediate action, we hereby express our condemnation and disapproval of the above act, principally for the reasons that it destroys all vested rights of inventors and owners of patents in their property, or of using the same in any instance for their own protection, and is, in fact, a license and an invitation to all pirates and violators of patent property to appropriate the inventions of others, leaving to the inventors and owners of patents only the bare possibility of collecting an uncertain sum to be determined by the uncertainties of a jury or judge at the termination of a necessarily tedious and expensive litigation; and

Be it further resolved, For the above and other cogent reasons, that there be expressed by petition that the above act, and all other acts now pending of an analogous character, are destructive to the rights of inventors and detrimental in the highest degree to constitutional and guaranteed rights of inventors in the progress of science and the useful arts; also

Be it resolved, That a copy of these resolutions be forwarded immediately to the Representatives and Senators, to be acted upon at once in the spirit of these resolutions; and that petitions be at once circulated among the inventors and manufacturers and all citizens, that they may express their protest against such unjust and class legislation; and that no further Congressional action be taken upon the above act until the will of the people is thus expressed by petition.

Be it resolved, That we have an entire confidence in the high honor, justice, and ability of our Representatives and

Senators, and believe that the above designated and all analogous legislative action has been sprung upon them by designing men, having in view the supposed grievances of the few, without regard to or due consideration of the great interests and principles involved in the issue.

The Pulley Side of Belts.

There are some questions in practical mechanics that never appear to receive a final and authoritative solution under whatever tests. To this class belongs the question: Which side of a leather belt shall run on the pulley face? In some establishments both ways are practiced, and it would seem that under these circumstances, so nearly uniform, the matter might be at last decided. But the foreman or superintendent who prefers the flesh side to the pulley face holds that his belts last longer than those run by the other foreman in another part of the establishment, who "turns his belts inside out." Of course prejudice has much to do in these cases, and probably prevents a fair conclusion.

A writer in a recent number of the *Jour. of Railway Appliances* says: "I advocate running the flesh side to the pulley, for the following reasons: Leather is fibrous, and curiously constructed, as revealed under a microscope, in the form of a triangle, the tender part, or grain, representing the top part of the triangle, being very fine and delicate, whereas the flesh part, or bottom of the triangle, has a coarser and thicker fiber, and if it is properly skived will be just as smooth as the grain, although a great deal tougher, and will, therefore, stand more wear and friction. If you will notice belts that have run grain to the pulley for any length of time, you will find the grain cracked, and you wonder why. It is because you have subjected the tenderest part of the hide to the hardest usage; the friction has burned the grain, the burning brittled and hardened it; you can never restore it. If you let the flesh part do the work, the grain side being elastic, it will bind the coarser fibrous parts and keep them together."

The principal proprietor of one of the oldest and most extensive manufactories of leather belting in the country recently declared himself as positively and unequivocally in favor of running the flesh side to the pulley, as the result of more than thirty years' observation, and he offered, among other reasons, the quaint one that the belt run thus was in the natural position of the hide. *Per contra,* the superintendent of a large establishment, where heavy machine tools are built, runs all his belts grain side to the pulley faces, claiming a much longer life to the belts and a closer contact between belt and pulley face. In his case, however, all the pulleys are of turned and finished iron.

And it is possible that all these disagreements on this question may arise from the differences in the materials of the pulley faces.

Wooden faced pulleys are coming into use again, particularly for pulleys above twenty-four inches diameter, and leather faced pulleys are very common. It is undeniable that there is a difference in the holding force of these differing faces, as there is in their materials.

The Safest Part of a Car.

A party of merchant travelers in a passenger coach were talking over their traveling experience and the danger of accidents, and finally the question arose as to the safest part of the car. Failing to settle the question among themselves, they called upon the conductor, and one of them said to him: "Conductor, we have been discussing the matter of the safest part of the car, and want to know your opinion." "Want to know the safest, eh?" replied the conductor. "Yes, that's it." "Well," replied the conductor, borrowing a chew of tobacco, and looking disappointed because he didn't get a cigar, "I've been on the road for 15 years, and I have been turned over embankments, busted up in tunnels, dumped off bridges, telescoped in collisions, blown off the track by cyclones, run into open switches, and had other pleasant incidental diversions of kindred nature, and I should say, gentlemen, the safest part of the car was that part which happened to be in the shop for repairs at the time of the accident."

An Unexplored Table Land.

According to Mr. Im Thurn, whose travels in British Guiana have recently been published, there is in the far west of that country, or over the Brazilian boundary, where the savanna itself rises 5,000 feet above the sea, a flat table land, the edges of which are more or less perpendicular cliffs 2,000 feet high. No traveler has ever been round it, so that it may be accessible from the other side, and there is a way, as yet untried, which Mr. Im Thurn believes may prove practicable. The summit of this plateau of Roraima seems to be forest covered, and enough is known of the fauna and flora of the district to make it certain that a naturalist would find himself well rewarded for the ascent. There are traditions of strange isolated tribes that live in this inaccessible region.

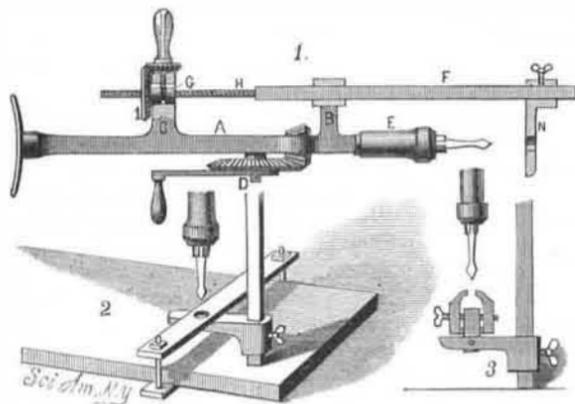
Gratifying Admission.

A gentleman writing from London respecting patent matters, states that he has read the *SCIENTIFIC AMERICAN* for the last twenty years, and that he hails with delight the time when each paper arrives. "I may," he adds, "state that the success of my life has been mainly due to the hints, ideas, and suggestions that I have gathered from the columns of the *SCIENTIFIC AMERICAN*."

IMPROVED BREAST DRILL.

The drill stock, A, is provided with arms, C B, on the side opposite the crank gear, D, which drives the spindle of the chuck. A strong bar, F, slides in one arm, and its upper end, which is screw threaded, fits in a feed-nut, G, in the other arm. On one end of the nut is a toothed wheel that gears with a beveled pinion attached to a thumb bit fitted on a stud projecting from the end of the bracket; by turning the thumb bit the bar can be drawn along the drill chuck, E. The lower end of the bar carries a bracket, N, that serves for a work table, the work being placed on it and forced against the drill by the feed nut, which is turned by the left hand of the operator, who turns the crank gear with the right hand.

When the piece of work is large and heavy, the drill may



HARDISTY'S IMPROVED BREAST DRILL.

be clamped to it by bars, as clearly shown in Fig. 2, or a vise may be secured to the bracket, N, as in Fig. 3, for holding the work by that means. This bracket is fitted to the bar with a binding screw so as to be shifted according to the size of the piece to be drilled. The bars fitted parallel to the stock, so that the bore will be true when the work is placed squarely on the face of the bracket.

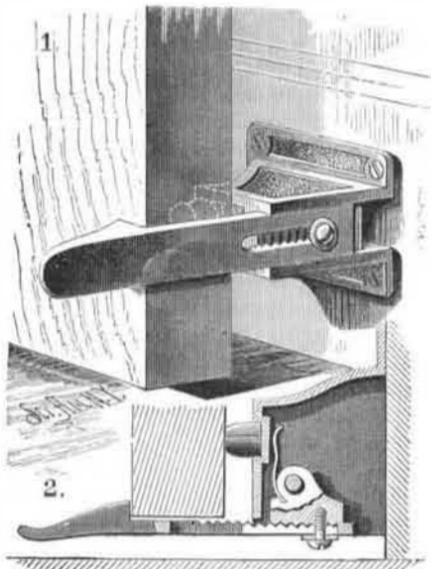
This invention has been patented by Mr. J. F. Hardisty, of St. Joseph, Mo.

New Bone Bleaching Process.

Various chemicals have been used for the purpose of bleaching bones, such as sulphurous acid, chloride of lime, and latterly peroxide of hydrogen; but according to experiments made at the Bavarian Museum of Arts, a very simple and effective method has been discovered, which is said to impart to bones thus treated almost the same appearance as ivory. After digesting the bones with ether or benzine, to remove the fat, they are thoroughly dried and immersed in a solution of phosphorous acid in water containing 1 per cent of phosphoric anhydride. After a few hours they are removed from the solution, washed in water, and dried, when they will appear as indicated above.

NOVEL DOOR CHECK.

The door catch herewith shown automatically engages with the door to hold it open, and can be readily released by a slight pressure with the foot. An ornamental box or case is secured at its back to the base board of the room in such a position that the device will come within range of either the bottom or upright edge of the door. A hook catch, having its rear portion serrated so as to engage with a carrier similarly constructed—shown in the sectional



RALL'S DOOR CHECK.

drawing, Fig. 2—projects from the casing. The catch and carrier are held in engagement by a screw passing through a slot, in the shank of the catch, to provide for the adjustment of the catch to suit doors of different thicknesses. A spring keeps the catch in contact with the door. Projecting from the front of the case is a stop made of some elastic substance which prevents the knob of the door from striking the wall.

This invention has been patented by Messrs. L., G. and E. Rall, and additional particulars may be obtained from M. Lehmann and Rall Bros., of Glasgow, Mo.

Properties of Brass.

The most important properties of brass compared with copper are the following: The color of brass is much brighter, and more approaching to that of gold; it is more fusible than copper, less subject to rust and to be acted upon by the vast variety of substances which corrode copper with so much ease; and it is equally malleable when cold, and more extensible than either copper or iron, and hence is well fitted for fine wire. Brass, however, is only malleable when cold. Hammering is found to give a magnetic quality to brass, and this circumstance makes it necessary to employ unhammered brass for compass boxes and similar apparatus.

The expansion of brass has been very accurately determined, as this metal is most commonly used for mathematical and astronomical instruments, where the utmost precision is required. Mr. Smeaton found that 12 inches in length of cast brass, at 32°, expanded by 180° of heat (or the interval from freezing to boiling water) 0.0225 part of an inch.

Brass wire under the same circumstances expanded 232 parts; an alloy of 16 of brass with 1 of tin expanded 229 parts. The expansion of hammered copper is only 204 such parts, but that of zinc is 253, so that brass holds a middle place in this respect between its two component metals.

Most of the zinc readily burns off from brass when kept melted in a strong heat with free access of air. When the heat is equal to that of melted copper, the zinc takes fire and slowly burns away. At last, little else but copper remains, but still united with a small portion of zinc, which no further continuance of the fire will entirely separate.

Some kinds of very fine brass are said not to be made by cementation, but by a more speedy and direct union of copper and zinc, care being taken to prevent the access of air to the materials while in fusion. Very fine brass may also be made by mixing together the oxides of copper and zinc and reducing them with a carbonaceous flux. Sage gives the following experiment to this purpose: Mix together 50 grains of the oxide of copper, remaining after the distillation of verdigris (which is very pure), with 100 grains of lapis calaminaris, 400 grains of black flux, and 30 grains of charcoal powder; melt the mixture in a crucible till the blue flame is seen no longer round the lid of the crucible, and when cold a fine button of brass is found beneath the scoria, weighing a sixth more than the copper alone, obtainable from its oxide in the same way, but without the calamine. This brass has a very fine color, like gold.

On this experiment M. Sage observes that there appears to be a point of mutual saturation between the two metals, which is when the copper retains one-sixth of zinc, and this portion it will retain however long it is heated, provided the surface of the melted metal be covered to protect the zinc from the action of the air; but if the brass contains a greater proportion of zinc, precisely this excess will escape, even in covered vessels, and will burn when it comes out to the air.

The same chemist also observes that the color is the finest at the above proportion. These experiments seem to require further confirmation, but we may reckon that to be the most perfect brass which is composed of about 14.28 per cent of zinc and 85.72 of copper, and which is not liable to any alteration in its constituent parts by successive or long continued fusions, provided the access of air be prevented.

Analysis shows a vast variety in the proportions of the different species of brass used in commerce. In general the extremes of the highest and lowest proportions of zinc are from 12 to 25 per cent of the brass. Even with so much as 25 per cent of zinc, brass, if well manufactured, is perfectly malleable, though zinc itself scarcely yields to the hammer. M. Dize analyzed a specimen of remarkably fine brass made at Geneva, for the purpose of escapement wheels and the nicer parts of watch making, the perfect bars of which bear a very high price. This metal unites great beauty of color to a very superior degree of ductility. It was found to consist of 75 of copper with 25 of zinc, and probably, too, the copper was Swedish, or some of the finer sorts. The common brass of Paris seems to contain about 13 per cent of zinc, the English probably more.

Brass is applicable to an infinite variety of purposes, is easily wrought by casting and hammering, and by the lathe, its wire is eminently useful, and it takes a high and very beautiful polish. The appearance of brass is given to other metals, by washing them with a yellow lacquer or varnish, a substitution often very much to the detriment of the manufactured article.—*Glassware Reporter.*

A Preventive of Stopped Ascension Pipes.

The manager of the gas works at Deventer, Holland, has adopted, for preventing stoppages in his ascension pipes, an exceedingly simple arrangement, which is described in the *Organe Industriel de l'Eclairage*. The system consists in the insertion in the mouthpiece end of the retort, immediately after charging, of a sheet of iron fitting the retort as closely as possible. This piece of sheet iron has in the middle a hole equal in area to the ascension pipe. The tarry vapors, heavy oils, and carbon dust are for the greater part arrested by this plate, and are thereby prevented from rising a few feet higher, and condensing on the interior surface of the ascension pipe. The office of the plate is simply to arrest as far as possible the matters that in the ordinary way settle at the lower end of the ascension pipe.

FOLDING STEP LADDER.

The invention shown in the annexed cut was recently patented by Mr. George A. Sommer, of 265 Greene Avenue, Brooklyn, N. Y. The side boards, steps, landing, and standard are of the usual form, except that the side bars of the latter are pivoted to the side boards near the landing. To the upper ends of these bars are pivoted the ends of side rails, whose lower ends are pivoted to links joined to the side boards near their lower ends. When the standard is closed against



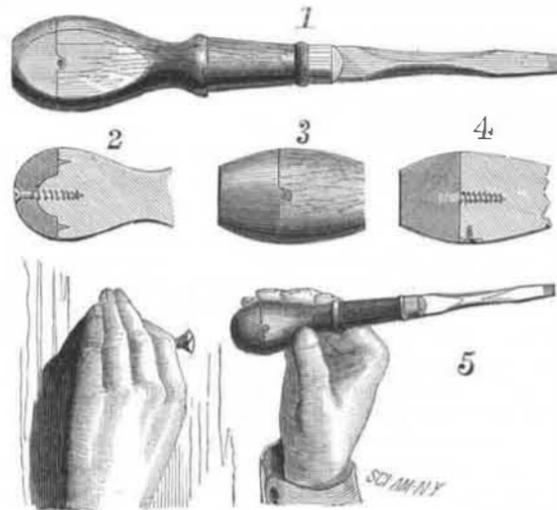
SOMMER'S FOLDING STEP LADDER.

the back of the ladder, the rails are folded down along the side boards; when the lower part of the standard is moved away from the ladder, the rails are extended along the front so as to assist a person to ascend and descend the ladder. The rear edges of the side boards are provided with notched braces that prevent the standard from being swung out too far and that hold the ladder in open position for use. The braces come into position automatically, requiring no attention on the part of the one using the ladder.

AN IMPROVED TOOL HANDLE.

The annexed engravings show a useful improvement that can be applied to the handles of many kinds of tools, and for which letters patent were recently granted to Mr. John A. King, of 2,015 Chestnut Street, St. Louis, Mo. The wooden portion of the handle is provided with a metal cap secured in position in any suitable manner. In the construction shown in Fig. 2, the cap has a recess for receiving a projection on the wooden portion of the handle; it is held on by a screw, and is steadied by pins entering the wood. In Figs. 3 and 4 the screw is made a part of the cap, and turning is prevented by a thin lug on the cap entering a recess in the wood, and being held in place by a screw. The handle may be made with flattened sides as shown in Fig. 1, or with a globular end as in Fig. 5, the form being governed by the work to be done with the tool.

This plan not only increases the durability of the tool by strengthening that part which is subjected to rough usage, but permits the tool to be used for purposes for which it would not otherwise be adapted. In ordinary work the starting of a screw takes time; the change from the screw driver to the hammer and back again having to be gone through with before the turning is begun. In this case all the time consumed is in the turning of the tool end for end, as indicated in Fig. 5. The metal cap perfectly protects the wooden handle.



KING'S IMPROVED TOOL HANDLE.

The various applications of this improvement will be readily perceived by those who have felt the want of such a device.

SALTING WALKS.—The best way, says a correspondent, to apply salt to paths, to destroy weeds, is as follows: Boil the salt in water, 1 pound to 1 gallon, and apply the mixture boiling hot with a watering pot that has a spreading rose; this will keep weeds and worms away for two or three years. Put 1 pound to the square yard the first year; afterward a weaker solution may be applied when required.