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Contents:

(Illustrated articles are marked with an asterisk.)

END OF VOL. XVIII.---BEGINNING OF A NEW VOLUME

The present issue of the SCIENTIFIC AMERICAN completes Volume XVIII., new series. Probably there never was a time when greater activity was displayed in the sciences and arts than the present. And this activity is not confined to this country, but our foreign exchanges afford us, weekly, many items of interest to the scientist, mechanic, and farmer. From these sources we glean everything which can interest our readers, in whatever walk of life, and every important improvement in mechanics or discovery in science, which is made in this country, receives an early and prominent recognition. Thus the SCIENTIFIC AMERICAN is literally a compendium of all that is new and valuable in the arts and sciences.

In other departments we believe it to be equally valuable. Its pages contain correspondence from all parts of the country and the world, on subjects which cannot fail to interest all classes. They are frequently the productions of our most eminent scholars and engineers, while the hints, suggestions, and directions of our working mechanics find place in our columns. These are always interesting, and not seldom exceedingly valuable.

The answers to correspondents are always instructive. We endeavor in framing them not only to convey the information sought by the individual inquirer, but to instruct others. In fact, this department is intended to give such items of information succinctly as do not require a column of editorial. The contributors to this department are men who are practically conversant with the subjects upon which they profess to treat.

Our descriptions, accompanied with illustrations, give our readers accurate information of the latest and most important inventions. The engravings are not equaled by those published in any other country, and the descriptions, for terseness, clearness, and conciseness, are certainly not surpassed.

Our weekly list of patent claims are received direct from the Patent Office in Washington. They are full, accurate, and alphabetically arranged for convenience of reference. They are invaluable to the mechanic, inventor, and capitalist.

Editorially, we believe the SCIENTIFIC AMERICAN will compare favorably with any journal devoted to similar objects. The writers are gentlemen of long experience and undoubted ability, and they aim rather at presenting facts and practical suggestions than mere conjectures and speculative theories.

That we have succeeded in making a popular scientific and mechanical journal, our constantly increasing list of subscribers fully demonstrates. What the paper has been in the past it will be in the future; encouraging the struggling inventor, instructing the unlearned mechanic, informing the scientific student, interesting the young and the old. It will fearlessly expose unwarranted pretension, and rebuke charlatanism, while it faithfully records the improvements made by inventors and mechanics.

THE INDICATOR AS A FIXTURE TO THE STEAM ENGINE.

The steam engine indicator has received occasional notices in our columns, in which its construction and operation have been described and its uses partially enumerated. We have shown that it gives exact information of the working of the valves, the admission, expansion, and pressure of the steam, its action at all parts of the stroke, transferring these points to paper and forming a diagram which is a basis of the calculations to ascertain the force expended and the power exerted.

But there are other offices and uses of the indicator. By it the relative value of the lubricants used can be ascertained and the best mode of applying them; the amount of steam required to work the attached machinery as compared with the work done, consequently the saving that can be made in changing machinery to do the same work. Another important office of the indicator is to compare the power developed with the amount of fuel used. This is a check upon the carelessness of the fireman or of the engineer; for if it is known that an engine can be run with an expenditure of two and a half or three pounds of coal per hour for each horse power on one day, there can exist no reason, except carelessness or heedlessness, why, other things being equal, it should not do the same on another day. It also determines the quality of the fuel. Suppose the last invoice of coal gave one horse power for every two and a half pounds consumed per hour. On one day four thousand pounds are used, but on another day, four thousand five hundred pounds. The indicator shows on both days the same amount of power exerted and that the engine is in the same condition. Then the question is narrowed down to the neglect or carelessness of engineer or fireman, or to a difference in the quality of the coal. If, on weighing the ashes and clinkers it be seen that on one day they exceeded in amount those made on the other day, it would be plain that the difference in results arose from difference in the quality of the fuel. The incombustible portion of anthracite coal varies from six per cent to thirty per cent. The proof of its quality can be determined in no way so well as by the indicator combined with the scales.

Every engine—all large engines—should have a pair of indicators permanently attached, and an engineer should be employed who can intelligently use them. A pair of diagrams should be taken twice a day, say at 9 P. M. and 3 P. M. Let every pound of coal be weighed and also the ashes and clinkers, and a tabular statement of these facts and the results of the indicator diagrams be made out daily on blanks furnished for the purpose, and a balance struck each week. Thus the proprietor will know at a glance the condition of his engine, the efficiency of his machinery, and the value of his fuel—in fact the cost of all his expenditure of power as compared with the work done.

This may be objected to on the ground that few engineers can be found who can use the indicator, and that some firemen cannot read the scale of the weighing machine. The objection refutes itself; if men are not competent to perform these duties they are not competent engineers or firemen. The use of the indicator can be acquired by the study of such elementary books as "Porter on the Indicator," "Paul Stillman's Treatise," "King's Notes on Engineering," "Bourne's Handbook," etc. By the aid of these and practice with the implement any intelligent engineer can readily become an adept in the use of the indicator.

Such education will tend to raise the status of mechanical engineers, reduce the cost of power, insure better work, and induce superior mechanics to adopt practical engineering as a vocation.

CAPITAL AND LABOR AS AFFECTED BY LABOR-SAVING MACHINERY.

It was thought in former times that the introduction of labor-saving machinery into any department of manufacture, would be the means of throwing large numbers of operatives out of employment, yet the result has shown those fears to be unfounded. The introduction of any improvement that enables individual productions to be made with less manual labor, and at a consequently reduced cost, has always made an increased demand for labor in that department. *Labor creating machines* would be a more significant term, so far as the effect of such inventions upon the amount of production is involved.

To illustrate this idea, let us suppose a machine to be invented that would enable an operative to make two hats while he now can make one. Let us further suppose the cost of producing hats by manual labor only, to be $3 00 apiece, one half the cost being for labor and the other being for the materials of which each is made. Allow a profit of one dollar, which will make the price of the hat to the purchaser $4 00, so long as manual labor alone is used. Upon the introduction of the machinery, which doubles the amount of production, the cost for labor would be reduced one half. The profit for a single hat, estimated at the same rate of percentage, would be less than a hat costing $3 00, so that the price of hats would thus be reduced, say one third. Further, suppose the reduction in price to increase the demand for hats, so that three hats would be wanted where one was desired previous to the improvement in their manufacture. It will now be apparent that the introduction of machinery, while it has reduced the manual labor connected with the production of a single hat one half, has increased by one half the amount of labor needed for the entire production of hats.

How has the relation which capital bears to labor been affected by the constantly increasing use of machinery in all branches of manufacture? Manifestly they have been brought nearer together, until now it is somewhat difficult to determine which has the balance of power. Operatives complain of insufficient remuneration, and are continually embarrassing large manufacturing interests by combinations and strikes. On the other hand, capitalists complain that, in view of all the risks and complications attendant upon fluctuations of trade and unreasonable demands of employés, that capital cannot be embarked in any manufacturing enterprise with a certainty that it will return the legal interest upon the amount invested.

These complaints, though in some measure sustained by facts upon both sides, are essentially without a solid foundation. Capital and labor are interdependent, and are only rendered antagonistic when either disregards the just claims of the other. Both suffer from the withdrawal of either; but when they mutually and harmoniously coöperate, all classes prosper.

We cannot admit, however, that of late capital has obtained any undue advantage over labor. That money has been made in certain branches of manufacture cannot be denied; but if we deny the right of capital to accumulate by legitimate use, we strike a blow at the very root of sound social organization. But where any remarkable instance of profit by manufacture, within the last ten years, can be pointed out, it will doubtless be found that the question of capital is involved with other elements, which should not be allowed to escape observation. If, for instance, an individual with limited means is enabled to commence the manufacture of a patented article, and, by virtue of the intrinsic value of the invention, can obtain a very large advance on cost of production, sufficient to allow him to realize a fortune in a short time, it is not the capital involved, nor the labor, considered singly or together, that are the cause of profit; it is the brain which devised, and the skill which developed the means for the acquisition of wealth. For employés to demand, in such a case, an increase of wages, on the ground that the employer is making money so fast, is equivalent to demanding of him a share of the privileges which are granted to him by letters patent, in addition to the market value of labor, at the time the demand is made. Notwithstanding the evident truth of this proposition, such demands are often made. In fact, the sole cause of discontent among operatives at the present time, is the desire to enjoy the luxuries and privileges, which in former years were only the accessories of wealth. It is not the gratification which such things are capable of imparting of themselves alone, which is sought, but the avoidance of the unhappiness generated by the lack of them.

We intend in a future number to show that the effect of the introduction of labor-saving machinery has been to constantly increase wages, and to prevent any permanent reduction, and that, from the nature of the case, such must be its effect in the future. If we establish this proposition, it will follow that the whole machinery of "Trades Unions," and combinations of a similar character, are only attempting to secure that which is inevitable, and to prevent that which can never come to pass.

THE LATEST NOVELTY IN PHOTOGRAPHY.

Perhaps the most curious invention of the present day is the new kind of photographs, made on a so-called phosphorescent surface, of which absolutely nothing can be seen in the daylight, but which is distinctly visible in the dark. Many years ago, compounds were invented which had the property of shining in the dark many hours, and even days or weeks, after an exposure to sunlight for only a few seconds. These phosphoric compounds, called after their inventors Canton's, Baldwin's, Bolognian phosphorus, etc., were formerly of no use whatever, but it was hoped that they might eventually reveal something concerning the nature of light; and such has indeed been the case, as the phenomena connected with these experiments are a strong argument in favor of the undulatory theory, and the correlation of forces.

An English photographer lately conceived the idea of covering a sheet of paper or glass with a layer of such a phosphorescent substance, and then treating it in a similar manner to paper or glass sensitized in the ordinary way for taking a photograph. Pictures taken in this way seem, by daylight, to have no existence, but the places where the light has acted upon, become phosphorescent or luminous in the dark, the shadows remaining invisible, the semi-tints slightly luminous, and the result is such a change in the surface that the picture is only perceptible in a dark room, by an unearthly glow of a greenish, blue, red, or purplish tint, according to the preparation used.

We notice this invention only by reason of its oddity, and not for its utility. The only practical use we see for it, would be to terrify the uninitiated by the exhibition of luminous images of skulls, skeletons, demons, and similarly cheerful subjects suddenly appearing on the walls, window panes, curtains, or other unexpected localities at the moment the lights are extinguished. It is very easy to make such pictures. A sheet of albumen paper is moistened to make it sticky, and then equally covered with a thin layer of the finely powdered phosphorescent substance, or a pane of glass is covered with a thin coating of paraffine, to which also, when warmed, the powder will stick; then the prepared surface is treated as in taking an ordinary photograph, either by placing it in the camera, or exposing it for a few seconds under a positive to the rays of the sun, or the magnesium or electric light.

The only thing remaining to state is the preparation of these phosphorescent substances. One of the cheapest is Canton's phosphorus, and it is made by burning oyster shells for half an hour, powdering and mixing with an equal weight of sulphur, and heating again for one hour in a covered crucible. The produced substance must of course be preserved in the dark, and protected from moisture in a well closed bottle. Wach found that the luminosity is much increased by moistening the mixture of shells and sulphur before the second heating, with a solution of sulphide of arsenic in liquid ammonia. The powder thus obtained emits so strong a light of blue color that it does not require perfect darkness to perceive its glow.

Baldwin's phosphorus, mentioned above, is prepared by dissolving chalk in nitric acid, then heating and grinding it to powder. The Bolognian phosphorus is made by simply heating a mixture of powdered heavy spar with the white of eggs, gum water, or a solution of tragacanth. Fluor spar is naturally such a phosphorescent substance, some specimens however more than others, and diamond appears to be the best; but the expense of the powder would hardly admit of its employment for the above mentioned purpose. Experiments have proved this property, in some degree, to exist in a great number of substances not suspected to possess such a singular quality; for instance, many natural compounds of lime, baryta, strontia, and magnesia; besides corals, fossil bones, and teeth; the shells of eggs, oriental pearls, dry bleached linen, white paper, and even the stones extracted from the human bladder.

Grott has found that the same luminous rays—the blue and violet—which produce the photographic pictures, also produce this effect, and that the rays which have no photographic powers—red and orange—not only do not produce it, but extinguish the existing luminosity. However, this is not because it is easily extinguished, as handling and even immersion in water will have no effect upon it, neither plunging the body in different gases. Groszer found that the luminosity was not even in the least impaired in a perfect vacuum.

Some philosophers have already, and with apparent good grounds, mentioned their suspicion that in nature the same phosphoresence may take place on a larger scale, that we see in different minerals, fossils, and preparations on a small scale, and if so, planets and comets are luminous partly by light reflected from the sun, and partly by phosphoresence of their own. That comets possess such a light of their own has been proved by Arago's conclusive observations by means of polarized light; and perhaps the peculiar appearance of the moon during its eclipse is due, besides the refraction and absorption of light in our atmosphere, to such a phosphoresence; even ice shows luminosity in the dark for several hours, when suddenly withdrawn from sunlight exposure to a dark room. The periodical obscuration taking place during the moon's phases is so slow that no phosphoresence can show itself, but on the occasion of an eclipse the obscuration is so rapid that any phosphoresence on its surface persisting for an hour or half an hour must become visible.

Practical Researches in Sugar Refining.

M. Monnier, of France, has recently published his researches in sugar refining from which we publish some interesting facts:

If sulphurous acid gas is conducted into a chamber containing coarse sugar, the latter is promptly bleached, and about three-fourths of the coloring matter is entirely destroyed, while the sugar undergoes no change whatever in composition. After this treatment the sugar smells strongly of sulphurous acid, which presents no inconvenience in the process of refining. To bleach sugar in this manner; for 1000 parts by weight of sugar about four parts of sulphur must be burnt and the gas conducted into the chamber. When the operation is once set going, the proportion of sulphur may be notably diminished. The sulphur is converted into gas by combustion in a little furnace placed at the side of the chamber. When the action is complete, the sugar is dissolved in water and its sulphurous acid neutralized by a small quantity of lime. This lime may be previously converted into sucrate of lime by M. Peligot's method, that is, by crushing it with a little sirup; for 1000 pounds of sugar three or four pounds of lime are requisite to obtain this sucrate.

M. Monnier has been at great trouble to ascertain whether the sulphurous acid gas thus used modified the sugar so as to produce a certain amount of grape or non-crystallizable sugar, and he has convinced himself that sugar bleached in this manner undergoes no change whatever. The quantity of non-crystallizable sugar, found by analysis after the operation in question, was in each case exactly equal to the amount which the sugar contained before being bleached; namely, on the average, about 2·15 per cent. In all these experiments the sugar was exposed about forty-eight hours to the bleaching action.

The above process gives most striking results with exotic sugars, which are highly colored; with lighter-colored samples, the bleaching is not so marked; but in the former case, two thirds to three-fourths of the heterogeneous coloring matters are eliminated completely.

The author took the same opportunity of examining into the action of chlorine gas, and precisely in the same manner. But the result was very different. In destroying the coloring matters present in the sugar, chlorine is converted into hydrochloric acid, which at once renders a certain amount of sugar non-crystallizable even at the ordinary temperatures. A specimen was taken for experiment which contained two per cent of non-crystallizable sugar; it was submitted to the action of chlorine for twenty-four hours only, and then a fair specimen of the whole bulk was taken and analysed. It showed no less than nineteen per cent of uncrystallizable sugar. If it were not for this enormous loss, the action of chlorine as a bleaching agent would be preferable to that of sulphurous acid, for its action is more rapid and complete; but it does not appear possible to prevent its destructive action upon the sugar itself.

It was lately hinted in London that ozone was going to be used as a bleaching agent in sugar refining, and we believe one or more patents were taken out for this purpose. We should be glad to learn whether anything really practical has been done in that direction, and whether ozone will prove to be a more economical agent, or more complete in its action, than sulphurous acid gas, used as indicated above.

New Grain Warehouses of Liverpool.

The city of Liverpool is justly celebrated for its magnificent docks, which extend a distance of seven miles along the river Mersey. With a view to the proper handling and storage of the immense shipments of grain, the Harbor Board at Liverpool and Birkenhead have constructed some new warehouses, which we recently visited, the most perfect buildings of the kind in the world. On the Liverpool side the new warehouses, which are fire-proof, comprise three blocks, forming a quadrangle, within the margin of which is the dock. The total length of the building is 1,485 feet by 70 feet in width. Beside the quay floor there are five stories available for storage, and a sixth, which is appropriated as a machinery floor.

The aggregate clear internal area, including the quay floor, is 11¾ acres. The hight of the building from the quay to the top of the cornice is 82 feet. The stores, with the exception of the quay floor, which is 15 feet 3 inches high, are 9 feet three inches from the surface to the underside of girder above. Every attention has been paid to the relative strength of each part of the structure, the breaking strain of the beams and girders being three times the load they are intended to carry. An idea of the vast capacity of the warehouses may be gained from the fact that the total weight of grain upon the floors when fully loaded will amount to not less than 77,660 tuns. The clear aggregate storage area of all the floors, exclusive of the quay and silo spaces, is 48,918 square yards, affording storage capacity for 196,000 quarters of grain. A quarter is equal to 8 bushels. Rails are laid within the warehouses, forming a communication with the main dock line.

Throughout the building the machinery for hoisting and distributing the grain is worked by hydraulic power. There are five self-acting, traversing, rocking cranes, for raising the grain in tubs from the hold of the ship. Each crane is capable of raising a tun of grain at a time at the rate of 50 tuns per hour, through an extreme distance of 136 feet. Having brought the grain to the machinery floor at the top of the warehouses, the cranes discharge it into hoppers, from which, after being freed from dust, it is weighed by a single operation in one tun lots, and then transmitted by a most ingenious arrangement to any part of the warehouses. This work of transmission is effected by means of endless bands, of which there are two running the entire length of the three stacks of warehouses. The bands are of vulcanized india-rubber, 18 inches wide, and traverse at a speed of about 500 feet per minute. They are capable of transmitting grain from end to end of the warehouses at the rate of 50 tuns per hour. There are chutes for passing grain from one floor to another, into the holds of vessels, or into wagons beneath. Beside the cranes there are eleven hoists for barrels and sacks, and twenty jiggers for lowering purposes.

The Birkenhead warehouses are in many respects similar to those on the Liverpool side of the water, and are fitted up in the same manner. Their storage capacity is 212,800 quarters of grain. They are not fire-proof. When completed, the warehouses on both sides of the Mersey will be handed over by the dock board under a ten years' lease to the Liverpool Grain Warehousing Company. We may here add that the imports of grain during the year 1867 into Liverpool were as follows: Wheat, 1,805,044 quarters; barley, 93,918 quarters; malt, 7,418 quarters; oats, 201,018 quarters; beans, 209,495 quarters; peas, 132,549 quarters; Indian corn, 913,855 quarters; oatmeal, 153,445 loads; flour, 382,572 sacks and 132,040 barrels—making a total of 3,363,293 quarters, 153,445 loads, 382,572 sacks, and 132,040 barrels; or about one-fourth of the entire grain imports of Great Britain.

A Royal Railway Train.

The Queen of England, with a numerous suite, recently left Windsor to pay her annual visit to Balmoral, in Scotland. It will interest our readers to know some of the particulars in regard to the style in which Her Majesty travels.

The directors of the Northwestern Railway Company were commanded to prepare a special train for the purpose, consisting of fourteen carriages. The Queen's carriage was fitted with a perfect system of electric communication with the guard—a thing which has bothered the English a good deal. This apparatus consisted of a small, square, gilt box hollowed out in front, and furnished with a glass handle, by the pulling of which the Queen could at any moment bring the train to a dead stop. When once the handle was drawn out, it could not be replaced by persons occupying the car. An experimental trial proved that the plan operated very perfectly. This same system has been applied to a Birmingham train, and in two instances it has been called into use—once for a joke, by a young officer, and in the other case by a medical man, whose curiosity led him, when the express was approaching a station, to pull out the handle. To his great consternation and chagrin, the train was immediately pulled up, and he heard the bell in the guard's van ringing loudly. As the handle of the "communicator" remained out, the culprit was at once detected, and nearly lynched by the excited passengers, who were, of course, much surprised at the sudden stopping of the train, and annoyed at the loss of time occasioned by the foolish freak.

Her Majesty's saloon, in addition to the eelctric communication with the guard, was likewise fitted with an electric dial and index, for the purpose of calling the royal dressers and personal attendants, for whose accommodation a new saloon, expressly built by the directors, and was placed in a position in front of and directly adjoining the Queen's saloon. A time table was expressly arranged for running the train 591 miles, which was made in about nineteen hours.

The Pneumatic Dispatch.

We learn that the Governor has approved of the act to facilitate the transmission of letters and merchandise by means of the Pneumatic Dispatch, and that our citizens now have the promise of soon enjoying the most improved and rapid means of intercommunication. The act authorizes the laying down of the pneumatic tubes under the streets of New York and Brooklyn, and also under the waters of the North and East rivers.

The present enterprise contemplates the connection of the Brooklyn, Jersey City, and all our sub-post offices, with the general post office, and also the erection of pneumatic letter-boxes in place of the present lamp-post boxes, so that letters and parcels will be both collected and delivered by air pressure acting on cars, which will fly along at the rate of thirty miles an hour. The mails will go back and forth between the New York and Brooklyn and Jersey City post offices in from three to five minutes. Letters deposited in any of the street letter-boxes on the pneumatic line below Forty-second street will be carried to the general post office, or to any intermediate station, in from three to six minutes. Our citizens can easily understand the great benefit that will accrue to business transactions from this arrangement.

The introduction of the Pneumatic Dispatch is due to the efforts of our enterprising neighbor, Mr. Alfred E. Beach, of the Scientific American, and we congratulate him upon his success before the Legislature. The Pneumatic Dispatch was first put into practical operation last October, at the American Institute Fair, and a full account of its construction and operations was then given in our columns. We understand that it is the intention of the grantees to put a short line of the Pneumatic Dispatch into operation within the next ninety days. The exact route has not yet been determined, but it will probably extend from the post office, corner of Nassau and Liberty streets, to the City Hall Park. If this short line is found to operate as well as is expected, the pneumatic tubes will then be laid down extensively in many different directions.—*New York Sun.*

THE SALE OF PATENTS IN OHIO.

The General Assembly of Ohio, at its last session, enacted a law regulating the sale of patent rights in that State. The law renders it necessary for the patentee, or his authorized agent, to produce his documents to be examined by the Judge of Probate of the county, who issues a certificate authorizing the sale of rights, providing he is satisfied of the good faith of the parties. It is questionable whether any State has the constitutional right to impose restrictions upon the sale of patents granted by the United States government, but as the law was enacted for the purpose of preventing swindling, it cannot affect unfavorably legitimate and honorable enterprises.

Commissioner of Patents.

A recent telegram states that a movement is going on at Washington to secure the appointment of Hon. Elisha Foot—now of the Appeal Board—to the office of Commissioner of Patents. Judge Foot has a thorough knowledge of the patent law, and is well versed in mechanical science. The selection would be an excellent one.

Editorial Summary.

Breech-loaders in Italy.—The Commission appointed by the Italian Government for examining into the comparative merits of the different breech-loading rifles known, have decided in favor of the Prussian needle gun. This is the only instance of its having been approved by a non-German state, all other countries having endeavored to construct an even more perfect weapon. More general recognition has been bestowed upon the Prussian breech-loading cannon. Having some time ago been adopted by Russia, Belgium, and for fortress and naval artillery, by Austria also, it is now about to be introduced into the Italian service.

The Spectrum Reconstructed.—Prof. Listing, of Gottingen, considers the solar spectrum as made up of nine colors, in the following order: brown, red, orange, yellow, green, blue, indigo, violet, and lavender. He has also calculated the number of vibrations of each, and has found that their numbers constitute an arithmetical progression; the interval between one color and the next always being 48,524 billions of vibrations per second. The number of vibrations constituting the two extreme colors are represented by 364 trillions for the brown, and 801 trillions for the lavender.

The London local post office is one of the best conducted institutions in the world. It employs 1,152 letter carriers, who distributed 76,000,000 letters in 1863, and in 1868 it is estimated will deliver 90,000,000; that is, 1,730,000 letters per week, and 288,000 per day. Carriers are paid about twenty-five shillings per week—nearly $8 75—and the expense of the department is estimated at £120,000. The net profit amounts to nearly £300,000, or two millions of our money.

At a meeting of the Société de Photographie, Paris, M. Civiale made some observations upon the employment of sulpho-cyanides in toning and fixing. He stated that in the summer of 1867 he fixed about 700 positive proofs by means of potassium and ammonium sulphocyanides. A print, one half of which had been protected from the light, the other unprotected, and which had been exposed for three months, showed only a uniform tint.

Remedy for Chafing.—Obese persons suffer greatly, especially in warm weather, from chafing. We know of nothing better than a wash of alum dissolved in water, and applied with a linen or cotton rag.

Soundings have been made in the sea to a depth of six thousand feet, without finding bottom, within 1½ miles of the shore of the island of Santa Cruz, W. I. This island is the apex of an immense submarine mountain.

The grasshoppers, having survived rain, fire, snow, and frost, during last fall and winter, have hatched out thicker than ever on the prairies of Iowa and many other western States.

Never leave file marks on a turning tool. It greatly weakens the material. The grindstone, in this case, is a better finisher than the file.