feet in a second; an eagle, 130; and a locomotive, 95. We thus perceive the nervous fluid has no very remarkable rate of speed—a fact which, among many others, serves to indicate its non-identity with electricity.

Prof. Donders, of Utrecht, Holland, has recently been making some interesting experiments in regard to the rapidity of thought, which are likewise interesting. By means of two instruments, which he calls the noematachograph and the noematachometer, he promises some important details. For the present he announces that a simple idea requires the brain to act for sixty-seven one thousandths of a second for its elaboration. Doubtless the time required is not the same for all brains, and that, by means of these instruments, we may obtain definite indications relative to the mental caliber of our friends. What invaluable instruments they would be for nominating caucuses for vestries, for trustees of colleges, for merchants in want of bookkeepers; in short, for all having appointments of any kind to make.

For the eye to receive an impression requires seventy-seven one thousandths of a second, and for the ear to appreciate a sound, one hundred and forty-nine one thousandths of a second are necessary. The eye, therefore, acts with nearly twice the rapidity of the ear.—*Galaxy.*

PUBLIC RIGHTS AS AFFECTED BY OPERATIONS OF RAILROAD MONOPOLISTS.

It is well that recent attempts of certain stock-jobbing cliques, headed by men notorious on account of vast wealth, and acknowledged superior skill in controlling the stock market to enrich themselves, have begun to enlighten the people in regard to the extent to which such abuses may be carried, and to demonstrate the wisdom of limiting the powers hitherto granted by legislative action to railroad corporations. They have obtained their power by the abuse of franchises originally obtained from the representatives of the people, through companies in which, by a series of adroit manipulations, they have succeeded in obtaining a controlling interest.

The general indignation which pervaded the public mind, when certain arbitary restrictions in regard to the shipping of freights over the New York Central railroad were inaugurated, seems to indicate that further imposition might exceed the limit of that forbearance which appears to have been so confidently relied upon in the management of railroad and and express monopolies in this country. We are greatly deceived, however, in our estimate of the character of the men who originated and developed the gigantic schemes which have recently created such wide spread apprehension, if the apparent present suspension of attempts to carry out the original plan in all its essential features shall prove to have been finally abandoned. We believe, therefore, that measures should at once be adopted that would immediately and permanently stop all attempted encroachments upon the rights of the public, by the acts of these financial autocrats.

The following exhibit of the manner in which the capital stock of the Hudson River railroad was increased from its original amount, and also of the way in which it was proposed to increase the capital stock of the Harlem and New York Central railroads, is taken from the *Atlantic Monthly*:—

Present capital,—Hudson	$14,000,000
Bonds outstanding Jan. 1, 1868	5,000 000
Present capital,—Harlem	6,800,000
Bonds outstanding Jan. 1, 1868	5,000,000
Present capital,—New York Central	28,990,000
Bonds outstanding Jan. 1, 1868	11,347,000
Giving in sum total	$71,137,000

The fourteen millions credited to Hudson in the above summary represents only ten and a half millions of actual money, and owes its creation to one of those peculiar financial expedients by which shrewd American capitalists acquire the enviable title of railroad kings. When the head of the dynasty which now dominates over the three affianced companies made his first move by securing possession of the river route, he inaugurated a system of economical management, special traffic arrangements, and vast construction outlays which afforded a specious pretext for augmenting the capital stock. It was therefore voted that the then capital of seven millions should be increased to fourteen by an issue of bonus shares at fifty per cent. Each stockholder paid in fifty dollars, and received scrip, the par value of which was one hundred, but which sold in Wall street at forty-five premium. This splendid maneuver, by which the company obtained three and a half millions for the construction and repair fund, while the stockholders doubled their money, presented features too large and captivating to lapse into desuetude. It was now proposed to repeat the same operation along all the lines, which at the same time were to be consolidated. The scrip dividend in this second scheme was to be 33⅓ per cent.

This would give:—

Fresh capital,—Hudson	$6,000,000
" " Harlem	3 200,000
" " N. Y. Central	9,663,000
With previous sum total of capital	71,137,000
Capital of consolidation	$90,000,000

In order that dividends might be realized upon this large increase of stock, the restrictions upon the shipping of freights above alluded to were initiated, and an increase of rates for passenger travel and upon goods in bulk was determined upon. To compel the public to submit to such exactions, it was necessary to destroy competition, and to this end the securing control of the Erie Railroad was deemed necessary. The battle for supremacy was hotly waged between the two greatest stock operators this country has ever known, Messrs. Drew and Vanderbilt. Small operators who had not the good sense to shun danger were mercilessly crushed, and the financial interests of the country were greatly disturbed by the conflict. After days of suspense it at last became apparent that Mr. Drew was more that a match for Mr. Vanderbilt and the latter executed a masterly retreat, which left him apparently little worse for the conflict, and, we are confident, disposed to renew it whenever the opportunity seems favorable.

The developments of this celebrated struggle were such as to give birth to great apprehensions for the future welfare of the commercial interests which so largely depend upon the proper and just management of all the avenues of trade which radiate from the city of New York and connect it with the other commercial centers of the Union. It was seen that legislatures and courts were made the instruments of these powerful organizations, and that corruption had been carried to an unparalleled extent by unscrupulous agents of the opposing powers. Not these only were found to be adopting such means to attain their ends, but an examination of the contingent expenses of different railroad companies revealed the fact that astounding sums were paid for the manipulation of legislative bodies. "The Union Pacific paid not less than $500,000 for services rendered to the company by lobbyists at Washington. It recently cost the Missouri Pacific Railroad $192,178 to secure the possession of that road by State legislation. The New York Central credits $250,000 to the contingent fund for expenses at Albany in 1866–67. In view of these facts it seems just to modify the popular prejudice against the Camden and Amboy Railroad, which has certainly attained its ends in congress and at Trenton by a far more economical expenditure."

It is much easier to find fault with the existing state of things than to suggest the proper remedy. We believe that the present system of granting charters to corporations is mischievous in its effects so far as it relates to franchises which involve such large and general interests as public highways, canals, and railroads. At least the government should retain the power to assume the control of all such internal improvements by paying the companies their real value, at any time that their defective management seems to call for such a procceding. A railroad thus removed from the control of those who desire to make it the means of public extortion might be conditionally leased to another company, or operated by the government itself. We admit that certain objections might be raised against this system, but we think that when compared with the advantages which would be derived from it, they would be found neither so numerous nor so formidable as might at first be anticipated.

Some means must be devised by which officials can be cured of their speculative tendencies; we care not what, so long as they answer the purpose, and provide for the proper punishment of any railroad official who deals directly or indirectly in railroad scrip. The suffering of a road to become so shamefully out of repair as the Erie has notoriously been, should be sufficient cause for the removal of its officials and the appointment of suitable persons to fill their places by the government.

That the existing laws under which railroads are organized and operated need thorough revision, seems the inevitable conclusion of a candid and careful consideration of the subject. That delay is fraught with danger also seems certain. We trust that the public will be aroused to timely action upon this matter, and that the possibility for any one man to obtain hereafter the control of any internal improvement, which affects directly every individual in the commonwealth, shall be forever terminated.

Science Familiarly Illustrated.

Gunpowder---Its Manufacture and Uses.

Gunpowder is a solid, explosive, mixture, composed of niter, sulphur, and charcoal, reduced to powder, and mixed intimately with each other. The proportion of the ingredients varies very considerably; but good gunpowder may be composed of the following proportions:—seventy-six parts of niter, fifteen of charcoal, and nine of sulphur, equal to one hundred. These ingredients are first reduced to a fine powder, separately, then mixed, intimately, and formed into a thick paste. This is done by pounding them for a long time in wooden mortars, at the same time moistening them with water, to prevent the danger of explosion. The more intimate is the mixture the better is the powder; for, since niter does not detonate except when in contact with inflammable matter, the whole detonation will be more speedy the more numerous the surfaces in contact. After the paste has dried a little, it is placed upon a kind of sieve, full of small holes, through which it is forced. By that process it is divided into grains, the size of which depends upon the size of the holes through which they have passed.

The powder, when dry, is put into barrels which are made to turn round on their axis. By this motion, the grains of gunpowder rub against each other, their asperities are worn off, and their surfaces are made smooth. The powder is then said to be glazed. The granulation and glazing of the powder causes it to explode more quickly, perhaps, by facilitating the passage of the flame among the particles.

When gunpowder comes in contact with any ignited substance, it explodes, as is well known, with great violence. This effect may take place, even in a vacuum. A vast quantity of gas, or elastic fluid, is emitted, the sudden production of which, at a high temperature, is the cause of the violent effects which this substance produces. The combustion is, evidently, owing to the decomposition of the niter by the charcoal and sulphur. The products are, carbonic oxide, carbonic acid, nitrogen, sulphurous acid, and, probably, sulphureted hydrogen. Mr. Cruikshanks has ascertained that no perceptible quantity of water is formed. What remains, after the combustion, is potash, combined with a small portion of carbonic acid, sulphate of potash, a very small proportion of sulphuret of potash, and unconsumed charcoal. But that water is produced by the explosion of gunpowder is proved by its presence in the piece after it has been fired. A sufficient quantity is developed to moisten and foul the bore of the piece, and necessitate its cleansing, and to hold *in transitu* the unconsumed portions of the charcoal, or other ingredients. Every practical gunner or expert with the rifle or pistol knows that every discharge of common gunpowder develops more or less of water; else why the cleansing of cannon or gun barrels, after successive discharges, when they become fouled by the remains of the discharges? Explosion releases the water held in combination with the components of gunpowder, as well as the lighter gases. The explosion of gunpowder is as surely a means of liberating the combination of hydrogen and oxygen as of liberating the nitrogen and carbonic acid.

We need a gunpowder, or something to take its place, which will not develop miosture to foul the bore of the gun. Such a discovery we believe to be within the limit of inventive talent.

The elastic fluid which is generated when gunpowder is fired, being very dense, and much heated, begins to expand, with a force at least one thousand times greater than that of air under the ordinary pressure of the atmosphere. And, allowing the pressure of the atmosphere to be fourteen and three fourths pounds upon every square inch, the initial force or pressure of fired gunpowder will be equal to at least fourteen thousand seven hundred and fifty pounds upon every square inch of the surface which confines it. But this estimate, which is that of Mr. Robins, is one of the smallest which has been made. According to Bernoulli, the initial elasticity with which a cannon ball is impelled is, at least, equal to ten thousand times the pressure of the atmosphere; and, from Count Rumford's experiments, it appears more than three times greater than this.

Gunpowder, on account of its expensiveness, and the suddenness and violence of its action, is not employed as a regular moving force for machinery. It is chiefly applied to the throwing of shot, and other projectiles, and the blasting of rocks.

When a ball is thrown from a gun, the greatest force is applied to it, by each particle, at the moment of its explosion. But, since the ball cannot at once acquire the same velocity, with which the elastic fluid, if at liberty, would expand, it continues to be acted upon by the fluid, and its motion is accelerated, in common cases, until it has escaped from the mouth of the piece. The accelerating force, however, is not uniform; and hence, the following circumstances deserve attention:—1. The elasticity is, inversely, as the space which the fluid occupies; and therefore, as it forces the ball out of the gun, it continually diminishes. 2. The elasticity would diminish, in this ratio, even if the temperature remained the same; but it must diminish in a much greater ratio, because a reduction of temperature takes place, both from the dispersion of the heat, and the absorption of it, by the fluid itself, during its rarefaction. 3. The fluid propels the ball, by following it, and acts with a force that is, other things being equal, proportionate to the excess of its velocity, above the velocity of the ball. The greater the velocity the ball has acquired, the less, therefore, is its momentary acceleration. 4. From this change of relative velocity, there must be a period when the velocity of the ball will exceed that of the elastic fluid; and, therefore, the proper length for a gun must be that in which the ball would leave the mouth at the time when the velocities are equal; and all additional length of the piece, beyond this, can only serve to retard the ball, both by friction and atmospheric pressure.

The force of fired gunpowder is found to be very nearly proportionate to the quantity employed; so that, if we neglect to consider the resistance of the atmosphere, then the hight to which the ball will rise, and its greatest horizontal range must be, directly, as the quantity of powder; and, inversely, as the weight of the ball. Count Rumford, however, found that the same quantity of powder exerted somewhat more force upon a large ball than on a smaller one.

Correspondence.

The Editors are not responsible for the opinions expressed by their correspondents.

Explosive Gases in Steam Boilers.

MESSRS. EDITORS:—Almost every one practically conversant or theoretically acquainted with steam boilers, has his theory of the cause of explosions, which he adapts to any and all cases; and this may account for the singularly contradictory evidence given before coroners and judges in cases where the explosion of a boiler is one of the items in the cause. The testimony of practical engineers, however, who have no personal interests at stake, and who have given their personal attention to an examination of exploded boilers, generally agrees as to the proximate cause of explosion. This seems to tend to prove the fact that boiler explosions, under ordinary circumstances, may be accounted for, and the subject is one of very great importance. But occasionally there may be cases which puzzle the heads of the most capable engineers.

One of the theories of boiler explosions is, that when the water gets low, leaving fire or heating surface exposed, or covered only with steam—a poor conductor of heat—the iron becomes heated, and will produce a decomposition of the steam, liberating its gases and absorbing the oxygen of the iron. This produces the combination known as oxy-hydrogen gas, highly explosive. It is rarely that enough of oxygen is eliminated, however, to make the mixture dangerous;

but an admission of oxygen from the atmosphere by the leakage through the feed or water pipe. may suffice to make the mixture of gases really dangerous.

A case within the writer's knowledge seems to give color to this hypothesis. On a Saturday afternoon the supply pipe of a boiler refused to deliver water, and the engineer prudently drew his fire and stopped his engine. The pump was overhauled and repaired, but, being late, the boiler was not fired up again. On Sunday, twenty-four hours after, the engineer opened the man-hole at the end of the boiler, to see if any damage had been done by overheating. The interior being dark, he introduced a lighted lamp, when an explosion occurred, sending the engineer through a wooden partition ten feet away, burning his skin and scorching his hair.

What did it? Not steam. Was it gas, and if so, how was it generated, and how did it accumulate in a cool boiler? An answer from thorough-going engineers is solicited. We need facts, not speculations; the results of practice, not the vagaries of theory. PRACTICAL ENGINEER.

Mechanical Distribution of Electricity.

MESSRS. EDITORS:—Your correspondent, Mr. G. Wright, when asserting, page 21, that the established theory is wrong, —which teaches that only the outside of conducting bodies can be charged with electricity,—overlooks the fact that when he brings into the inside of a charged body one end of a conductor, of which the other end projects outside this body, the electric charge must flow towards the outward projecting end, which is now further from the center than the outside of the body itself. This is exactly conformable to the established theory, which teaches that the electric charge is always distributed in such a way that the greatest amount is further from the center of the body, or from the common center of any number of bodies which are in electric communication. Hence an equal distribution takes place only on a globe; in an elongated body it is accumulated at the ends, and more so in proportion that these ends are further apart. Experiments teach that when a body charged with electricity is touched in its interior by a conductor, so small that no conducting portion extends outside, but is attached to a non-conducting handle, then this conductor will receive no charge whatever, in fact this is one of the common lecture room experiments which I have performed hundreds of times, before my classes in physics. On this experiment, and on many other well established facts, the common theory is founded. But when Mr. W. attaches his test ball (in place of an isolating handle) to a small wire, as he states, he of course can not only draw sparks from the inside of any body charged with electricity, but even discharge it entirely, if he keeps the wire in his hand. These facts are familiar to every person more or less acquainted with electrical experiments.

It has never been claimed by electricians, that a body could not be wholly or partially discharged from its inside by a good conductor, which is in electric communication with other conductors outside; and this is all that Mr. W. has done. When he tries the experiment in the right way, and attaches his ball to a glass rod or silk cord, in place of a wire, and then tries to charge his ball by touching alternately the inside and the outside of a hollow body charged with electricity, and then tests the charge of his ball by means of a gold leaf electrometer, he will see the difference, and it will give him a better understanding of the established theory.

The fault is, that our common text books on natural philosophy are not explicit enough on many points, and this gives rise to misunderstandings of different kinds, the best remedy for which is the study of more extensive works, in which we find the results of experiments and researches which it would take us a life-time to find out ourselves.

P. H. VAN DER WEYDE, M. D.

New York city.

Loss of Gas--Wet Meters.

MESSRS. EDITORS:—A correspondent, whose letter is published on page 10, Vol. XIX., of the SCIENTIFIC AMERICAN, says in regard to errors which may occur in wet gas meters:

"When the consumption is large, and the working of the axle easy, a momentum will be acquired by the drum, so that the buckets will be only partially filled as they pass over to the supply pipe. The register records the same as with full buckets."

I think this could never occur in a well constructed meter, as the "*vis inertia*" of the fluid in which the drum revolves, would always compensate for the momentum which would be acquired by rapid motion. Besides, meters, if properly constructed, will not permit such a rapid flow of gas as would make any assignable error in the rotation of the drum.

S. L.

Brooklyn, N. Y.

Inventions Needed.

MESSRS. EDITORS:—I read your notices of "Inventions Needed," in a late number of the SCIENTIFIC AMERICAN, and was pleased to see you stimulating the inventiveness of the country. In imitation of your example, I wish, with your permission, to suggest one or two machines and inventions which might be of service to the inventor. I expect, at no remote day, to put up an indefinite number of bushels of desiccated potatoes. To prepare them for the dry house they should be washed carefully, so as not to bruise them, and not a few at a time, but by the wagon load, or by machinery. In the next place, they must be cut up into pieces not over three eighths of an inch thick, and all of a uniform thickness, so that the drying process will be uniform. If a machine automatically fed and worked with great speed, and not too costly, can be produced, it will pay. Among the parties producing vegetable cutters, no one has yet struck at an apparatus of this sort. If any one is produced we would like to try its working powers. Address C. KIMBALL.

Baltimore, Md.

For the Scientific American.

USE OF RAW AND COOKED FOOD.

The design in cooking food is not only to make it more digestible (many varieties being as easily digestible raw as when cooked), but the principal use of cooking is the destruction of microscopic seeds and eggs, often existing in raw food, which would produce vegetable and animal parasites in the system. The last are called entozoa, and the study of them, with the injury they produce in man, now constitutes a peculiar branch of medicine.

The most interesting of these are two species of the tapeworm, one of them originating from raw pork. Swine are subject to a disease called measles, and such diseased pork is full of the germs of future tapeworms in men. When human beings are thus affected they discharge daily thousands of microscopic eggs. When one of these—which may become dry as dust without losing its vitality—enters the stomach of a pig with its food, it produces again the measles in this animal. This explains why Jews are rarely affected with tapeworms—cooks and butchers often. Even raw beef has produced tapeworms by being cut with a knife also used for pork. Cooking, thorough salting, and smoking destroys the germs, but cleanliness, of course, is essential. It is only at present that the sanitary measures prescribed by Moses for the Israelites have been fully appreciated.

Dr. Fleming, last year, read a paper before the British Association on the prevalence of tapeworm in Birmingham, Eng. He supposed it was caused by the water containing sewage contamination. If this is so, it would appear that tapeworms may be propagated by impure water as well as by unclean pork. It is a hint to us to take precautionary measures to have our drinking water as clean as possible. Without containing germs of tapeworms, it may contain many other impurities and parasitical eggs. Cooking, of course, destroys all these, and this is one of the reasons why the general moderate use of coffee and tea has been universally productive of increased health. Simple water becomes flat and unpalatable by cooking, as the heat drives out all the air which it contains in solution; therefore a perfect filter, or melted clear ice, is the best thing for obtaining good drinking water when it cannot be obtained from a deep pure well or spring, purified by natural filtration.

The trichinæ are another class of parasites, affecting the human system even more frightfully than the tapeworm. They are also produced by the use of raw meat, but there has lately been published so much on this subject that the mere mentioning of it will be sufficient.

The distoma, or fluke, called by the French douve, is a large class of parasitical worms, of which more than two hundred species have been studied. One of them is very common in the liver of the sheep and horse, and infests also the human liver. The polystoma, an allied genus, has also several species, two of which are sometimes found in the human body, one inhabiting the veins.

We will only mention the ligula, which infests the abdominal cavities of birds and fishes, and proves fatal to them; the hydatids, which are often found in enormous abundance in the abdomen of quadrupeds, especially of the ruminant order; the cænurus, common in the brain of sheep, destroying the animal by pressure on that organ; the different entozoa, by which cats and dogs suffer in different parts of their bodies; and, finally, the snake-like worm occasionally developed in the interior of the eyeball of the horse.

Now, as regards the origin of these animals, spontaneous production is out of the question. Every living being is produced from an egg; therefore, the only possible explanation is, that the microscopic small eggs are taken into the system with the food. When their vitality resists the digestive power, these eggs are absorbed, enter in the circulation with the blood, and are developed at that part of the body where the conditions are favorable for their growth. This idea is verified by the latest microscopic examinations about the origin of the infusoria, by which it is proved that the very dust of the air is full of myriads of eggs of all kinds, only waiting a favorable opportunity to be developed into the corresponding animal.

The most common of all human internal parasites are the ascarides, of which the largest species have nearly the shape of a common earth worm, attaining sometimes the length of two feet, and cause alarming symptoms. The small variety is very common in children, and is supposed by some to originate from the eggs of flies deposited on or in the food. Most animals of this class are at first worms, the eggs being laid in some dead animal, meat, cheese, or other article, which gives nourishment to the growing worm, which afterward passes through the regular transformation into a fly. When these eggs are hatched in the intestines, under very different circumstances, they are developed into an animal which differs greatly from that developed in the air.

In healthy, vigorous children the digestive powers will resist the hatching of these eggs, and even the worms themselves will be digested, when accidentally hatched or otherwise introduced in the system. Only those of weak digestive powers are subject to worms, and this observation has lately given rise to a different medical treatment successful in many cases of these infantile troubles, namely, in place of administering to the little sufferers vermifuge and purges (which only give temporary relief and do not remove the cause, when this cause is weakness, but even weaken the system still more), tonics and a strengthening diet are prescribed. In this way the primary cause (the weak digestion) is removed, as in healthy, strong intestines worms cannot exist, but are at once digested.

Occasionally persons are found who have the peculiar notion of frequently eating raw meat and who give it to their children, with the idea that it possesses more nourishing qualities. But, even if this idea be correct, it is more than fully counterbalanced by the perils we have indicated, and experience teaches us that those persons who have apparent good health are subjected to more diseases than others. Freshly cooked food, therefore, is preferable for the reasons above given. M D.

Glyphography.

Having recently made trial of the process of glyphography in connection with the reproduction of engraved plates from photographs, and having obtained a considerable measure of success, we shall describe the process, if not in complete detail, at least so minutely as to enable any of our readers to practice engraving by the process in question with a fair degree of success.

A polished plate of copper, such as is usually employed by engravers, is blackened by being washed over with sulphide of potassium, sulphide of ammonium, chloride of platinum, or other means. The plate is then washed and dried, and is evenly coated with a mixture of wax, resin, and sulphate of lead, the thickness of the coating not exceeding a thirtieth of an inch. This coating is white and smooth, and the plate when thus prepared is ready for being sketched upon, or, as was the case in our trials, for being photographed upon. The details of our method of effecting the photographic part of the operation shall form the subject of another communication.

On the figure thus photographed, or traced by pencil, the artist proceeds to make his drawing with little tools like needle points, fixed in wooden handles. These tools should vary in size, or rather in the thickness of point, according to the nature of the work intended to be accomplished. It will be found most advantageous to use tools one side of which has been filed flat, and a curve given to them near the point by bending them while heated in the flame of the gas. Every touch or stroke of the artist should penetrate through the waxy varnish to the surface of the plate, which, being black, reveals every touch—the work thus appearing black on a white ground, in the same manner as if it were effected by pen and ink on white paper.

The coarseness or heaviness of the lines depends upon the tool by which they are cut; hence broad lines require a tool flattened at the point like a chisel. The drawing must be made as in nature, or non-reversed.

When the picture is examined and found to be right, it is dusted over with plumbago, which, by means of a bushy camel's-hair pencil, is distributed through every line and over every part of the surface. Although we find that other conducting substances, such as bronze powders, act better than plumbago, we have very beautiful pictures produced by Mr. Palmer, in which the coating is the same as that here described.

The plate thus prepared is immersed in an electrotype cell, and a thin tissue of copper is deposited on it by the battery. When the plate has been immersed at night, we find in the morning that the deposit of copper is sufficiently thick to allow of its being removed. The battery we use is Smee's, and the depositing solution is the sulphate of copper, rendered decidedly acid with sulphuric acid.

The cast thus obtained must be backed up with soft metal, *sec. art.*, and in this state it will, if printed from as a wood engraving, yield an exact fac-simile of the original drawing.

If it be required to lower broad masses of white, this can be effected in one or other of the following ways:

After the drawing has been finished, and before it is brushed with black lead, paint over the broad masses of white with melted wax, and let the thickness of the mass thus painted on the surface be determined by the area of the white portion, care being taken not to approach too closely to the lines of the drawing. This having been done, proceed with the plumbago as already directed.

Another way by which to lower the broad whites is to take a cast in plaster of Paris from the original plate, and in this cast to lower any part required by means of a suitable gouge-shaped tool. From the plaster block thus trimmed may be obtained, by means of recasting in plaster and stereotyping, any number of metal blocks in a condition ready for printing.

We have in our possession some pictures which have been obtained from surface blocks prepared nearly as described, and which are so fine and delicate as to warrant any person unacquainted with the method of their production in believing that they were printed from engraved copper or steel plates.—*British Journal of Photography.*

Another Invention Wanted.

Some small, neat thing, to be worn with watch seals, or as a ring, or anywise one pleases, with which to cut open envelopes when one receives letters from the post office, is greatly required. What pulling, tearing, looking for knives, scissors, paper folders, or thrusting in of finger nails, or ripping open and rending by main strength, is daily practiced. Some neat, simple, convenient instrument can be supplied and presented that will sell to nearly every body, and I know the SCIENTIFIC AMERICAN will do the business well, if employed.

K.

ELECTRO-MAGNETIC machines are perhaps the least likely of all inventions to supersede the steam engine. The consumption of a grain of zinc, as Mr. Joule has shown, though much more costly than a grain of coal, does not produce more than one-eighth of the same mechanical effect