A WEEKLY JOURNAL OF PRACTICAL INFORMATION, ART, SCIENCE, MECHANICS, CHEMISTRY, AND MANUFACTURES.

|  | NEW YORK, JUNE 28, 1879. |  |
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## A NEW SWITCH CONTROLLER.

The frequently recurring accidents caused by misplaced switches have suggested a field for invention, to which-especially since several notable accidents due entirely to this cause-inventors have turned their attention, and with considerable activity have produced devices for avoiding these accidents. Per haps the simplest of these devices is the switch controller shown in the accompanying engravings, and recently patented by Mr. Henry Greenway, of Brooklyn, N. Y.
In this apparatus the entire manage ment of the switches is placed in the ment of the switches is placed in the
hands of the engineer, who controls hands of the engineer, who controls
them by means of a simple lever in the cab of the engine. So far as the fitting of the engine are concerned they are of the simplest character. A lever in the cab, which is provided with a curved rack and detent much like the reversing lever of the engine, is connected by a rod with a lever at the upper end of a short vertical shaft, journaled in suit short vertical shaft, journaled in suit
able boxes in the cross piece of the pilot


## GREENWAY'S SWITCH CONTROLLER.

 able boxes in the cross piece of the pilo$\mathrm{E}^{\prime} \mathrm{E}^{\prime}$ the rails of the main track. The movable switch rails, termines the direction to be taken by the locomotive by mov $\mathbf{D}^{\prime}$, are pivoted at the frog and connected so that they ${ }^{\prime}$ ing the switch rails to the right or left through the levers, D D', are pivoted at the frog and connected so that they
move together. Between the switch rails there are two levers,
ing B. The tender is fitted with a contrivance similar to that $B C$, which are pivoted to the tie beams and jointed together. $\begin{aligned} & \text { on the engine, so that when the engine runs with the ten- }\end{aligned}$ arrangement of the levers, rods, and the rudder is shown in the inverted plan view, Fig. 4. F is a lever at the forward end of the tender, which is connected with the rudder lever, G, by two rods, $a$. In this case the rudder has a movable portion, $H$, and a fixed portion, I. It will be seen that the entire control of the switch is in the hands of the engineer, who has more anxiety as to the safety of his engine and train than any one else could have. It is the belief of the inventor that witch tenders under the existing systems have either too much or too little to do. Having too much, he is liable to become confused; having too little, he is liable to become negligent. In all motors, with the exception of the loco motive, the power of guiding has been lever, A, whose forward end is tapered and somewhat the lever, $C$, extends into a notched buffer block placed on $^{\text {a }}$ vested in the driver or pilot. Mr. Greenway has attempted rounded, while its rear end is shorter and somewhat one of the ties midway between the rails of the main track. to give locomotive engineers the same power, so that there ever th, whis
The track, the arrangement of which is also very simple, At this point in the lever, C , a stud stands up high enough
to be engaged by the rudder, A, as the pilot truck of the be no mistakes as to the direction to be taken by the
engine. Mr. Greenway has a very pretty working steam to be engaged by the rudder, A, as the pilot truck of the
locomotive approaches the switch. Moving the rudder, A, Greenway has a very pretty working steam
model for exhibiting his invention at his office, No. 34 Park is shown in plan in Fig. 2. E E are the branch rails, and one way or the other by means of the lever in the cab, de- Row, room 30, New York city.


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## SIX MONTHS OF SCIENTIFIC PROGRESS

The scientific and industrial record of another half ycar is completed with this issue of the Scientific American. It is believed that no scientific enterprise of popular interest, no notable occurrence, no great industrial undertaking, no important discovery or invention-in short, nothing pertaining to the world's best thought and action during the past six months has failed of timely notice in these pages, while in character and number the illustrations which have given instruction as well as pleasure to our readers are such as to compare favorably not only with those of the preceding volumes of the Scientific American, but those of any other popular journal ever published.
When Volume XL. was begun there still prevailed in many quarters no little doubt and misgiving with regard to the immediate industrial future. The confidence expressed by the Scientific American in the continued improvement in American industrial affairs has been happily justificd; and there is every reason to belicve that the prediction that the ceuntry was entering upon an era of unexampled prosperity will but feebly express the ultimate fact. The threatened derangement of our manufacturing industrics, through the alteration of the patent laws in a way to affect injuriously the rights of inventors and patentecs, was fortunately averted, we trust permanently, by the failure of the obnoxious Senate bill 300; and we hope that the public sense of justice and sound policy which frustrated that scheme will prevent renewal of the attempt next winter.
The steady improvement in the American export trade has been almost as marked a feature of our recent history as the marked improvement in domestic trade. Particularly noticeable has been the outspoken acknowledgment of the superiority of many American products by English and European statesmen and manufacturers, and the frank admission by them that the industrial supremacy of the world lies in the near future with America.
Among the notable improvements in the arts brought forward recently, mention may be made of Barff's process of obtaining a protective coating to iron, Holloway's utilization of the sulphides in ores as fuel, and the new composition for the lining of Bessemer converters, making possible the use thercin of phosphorus bearing ores.
The completion of the Sutro Tunnel, the progress on the tunnel of St. Gothard, and the completion of the Joseph II. Mining Adit, are perhaps the most notable achicvements in engincering that will occur to our readers. The mecting of the International Interoccanic Canal Congress at Paris promises to mark an important date in the history of termined better a dozen years hence.
In pure science there is nothing more important than the investigations of Prof. Crookes with regard to the behavior of electrified molecules in vacuo. His observations are certainly curious, his methods are extremely delicate and skillful, and the results obtained a:e wonderfully suggestive. What more may come of them the future only can deermine.
Among the more important inventions our readers will recall Cowper's writing telegraph and Edison's loud speaking electro-chemical telephone.
Six months ago popular attention was very strongly drawn to the development of the electric light, and something of a panic prevailed among the holders of gas stocks. That flurry has blown over. The electriclight has not fulfilled its promises, and Mr. Edison's assertion that his latest lamp is a complete success falls on indifferent cars. The world is not so cager for the change as it appeared, and on all sides the disposition is to await developments patiently. Possibly after all the " light of the future," suggested by the Scientific American several years ago, and recently worked out practically by Molera and Cebrian, may prove the final solution of the problem.
Among the false lights of the immediate past mention may be made of the extremely confident but suddenly extinguished pretensions of the Hosmer and Gary motors. In stead of revolutionizing the industries of the world by force self-generated, they have dropped out of sight with the thousand other motors of the impossible sort. To which class we may properly add also Mr. Kecley's machine for the utilization of " inter-molecular etheric substance.
In this hasty glance at the salient features of the work of the past six months notice may be taken of two or three which we are confident have added not alittle to the interest and value of the Scientific American. These are the series of illustrated articles on our leading industries; the papers on ama teur mechanics, with their practical suggestions and numerous illustrations; and the specially admirable illustrations of natural history. Nothing finer than the last have ever been given in a popular periodical. It is perhaps needless to add that the constant aim of the publishers of the SCIENtific American is and will be to make this paper, so far as practicable, a perfect and impartial record of scientific and industrial progress the world over.

## CITRIC ACID-FROM THE LIME AND LEMON.

The source of profit in the cultivation of the lime and lemon, which we have recently had occasion to point out (p. 339), has evidently attracted the attention of many of our southern fruit growers, judging from the number of com-
munications and inquiries we have since received respecting the industry.
For the bencfit of those interested in the matter we give
the following outlines of the process for obtaining the citric acid from these fruits
After removing the seeds and peel, the fruit is subjected to strong pressure-a good cider press answers very well on a small scale. The expressed juice is then evaporated in copper or leaden pans (porcelain enameled iron vessels would be less objectionable) at a temperature not exceeding $150^{\circ}$ Fal. until it has a density of about $1 \cdot 23$, when it is a dark, thin sirupy liquid containing from 27 to 32 per cent of citric acid.

An instrument termed a citrometer is sometimes used to measure the amount of citric acid in the fluid, but the method cannot be relied on, owing to the variable amount of saccharine and other matters present and to the fact that a small portion of the acid is almost invariably decomposed during the concentration. The concentrated juice usually comes into market in casks containing about one hundred gallons.
To obtain the citric acid from the juice it is first clarified by filtration, heated to about $200^{\circ}$ Fal. in a lead lined vat, by means of steam circulating in a coil of leaden pipe arranged around the inner side of the vessel. Powdered whiting (lime carbonate, chalk) is then gradually added until the acid is fully saturated, a point readily determined by its ceasing to effervesce. The whiting must be added in small quantities, suitable to the amount of liquor under treatment, and the mixture kept constantly agitated by machincry until the whole of the acid present is converted into insoluble calcium citrate. The mixture is then allowed to settle, after which the supernatant liquid is drawn off and the residue repeatedly washed with warm water, by decantation, the agitating apparatus being set in motion after each addition of fresh water.
The washed citrate is then transferred to a similar vessel, where it is agitated with hot dilute sulphuric acid in the proportion of about $91 / 2$ parts of strong acid diluted with six imes its weight of water, to every 10 parts of whiting previously used. By this treatment the calcium citrate is decomposed, sulphate of lime and free citric acid being formed. The mixture is drawn off into a settling tank in which the heavy sulphate subsides, while the clear solution of citric, acid is drawn off into lead lined vacuum pans, where it is concentrated by steam heat. The concentrated solution of citric acid is then passed through canvas bag filters usually containing a small quantity of boneblack, previously freed from phosphate of lime by dilute hydrochloric acid. The filtrate runs into crystallizing pans placed bencath, in which it stands until the crystals cease to form.
The mother liquors are run back into the crystallizing pan, and the crystals are dried in a centrifugal machinc, or by other suitable means.
The article thus obtaincd is sufficiently pure for ordinary purposes, and represents the citric acid of commerce.
It is largely used by the dye calico printer as a "resistant" for iron and alumina mordants. When required for other purposes it is necessary to purify it by recrystallization.
Citric acid to be used for medicinal purposes or for effervescing drinks, etc., should be prepared in vessels of earthenware, porcelain, or porcelain-cnameled iron, as it is apt to contain traces of lead if prepared in leaden vessels.

## THE TIDE WATER OIL PIPE LINE COMPLETED.

The first flow of oil from the Bradford oil district reached Williamsport, Pa., June 4. Only a fcw trifling leaks have been discovered in the entire length of the pipe, or over a hundred miles. The line starts at Williamsport and runs slightly north of west over the mountains into Potter county and on to Coryville, or Frisbic, the initial point, in McKean. It passes over a high range of mountainsmear the village of Waterville, at the forks of Pine creck, where great difficulties were overcome in laying the pipe.
There are tanks at Coryville and a pumping station. The next pumping station is at a point about four miles from Coudersport, where tanks have been put up and buildings erected for the engine, ctc. The distance from Coryville to pump station No. 2 is $221 / 2$ miles; from there to Williamsport is $771 / 2$, and the oil when raised 1,200 feet at the summit, runs down to Williamsport of its own gravity, as the fall is 2,100 fect. The pumping engines are forty horse power each, and each has an equal share of the lifting to do in the way of the application of power. The pipe is six inches in diameter, and required 28,000 barrels of oil to fill it. At Williamsport receiving tanks holding nearly 60,000 barrels had been provided, and seventy oil cars were in readiness to transport the first flow of oil over the Reading railroad. The capacity of the pipe line is about 6,000 barrels per day, and if everything works according to the anticipations of the company, it may become necessary before the close of the season to build another line.

## IMPROVEMENT IN SUGAR MANOFACTURE.

A sugar planter and manufacturer sends to the Martinique Bienpublic an account of an experimental application to sugar canc of the diffusion process employed in the beet sugar factories of France and Germany. The experiments were made at the plantation Monccpos, Guadaloupe, with an apparatus of six maccrators. It was badly adapted to mect the difficultics incident to the peculiar nature of canc, yet it showed (1) that by a methodical washing of the slices of cane an artificial juice nearly equal in density to natural cane juice could be obtained; and (2) that one hour of systematical maceration is sufficient to completely exhaust the cane filer of the sugar with it contains.

## The yield of sugar in these experiments was from $121 / 2$ to 13 per cent of the weight of the cane, in white sugar.

 A comparison of the diffusion process, imperfectly carried out, with other processes, shows as follows:Extraction by rollers, as still practiced on a great number of plantations, obtains:

$\qquad$ Sugurar in the state of molasses
Sufar lost in the bagases
By perfected roller mills:


By the diffusion process:


The advantages realized by diffusion can therefore be summed up as follows:
Over the perfected presses, 72-60, equal to 12 per cent; over the not perfected presses 72-36, equal to 36 per cent. We shall therefore obtain a surplus of 12 to 36 per cent upon the total weight of sugar in the cane; or in other words, the production will be increased one fifth of the sugar obtained in the first case, and in the second case it will be doubled.
The molasses will be of a better quality, being less colored and of a more agrecable taste.

## THE BREWERS' CONVENTION.

The nineteenth annual convention of the United States Brewers' Association began in St. Louis, Mo., June 4. This association represents 2,830 breweries, of which New York has 405, Pennsylvania 383, Wisconsin 248, California 213, and Ohio 207.
The sale of beer for the year ending June 30, 1878, was the largest ever known, being $9,473,361$ barrels, which was 313,685 barrels more than the next largest in any fiscal year, that ending June $30,1876$. The figures for the first nine months of the present year indicate that fully $10,000,000$ barrels will be sold. Of this the brewerics of New York produce about a third
The export trade in American beer is rapidly increasing, a committee report giving the figures as follows :
export of beer of domestic produce.


Mcantime there has been a remarkable falling off in the importation of beer, as will be scen by the foliowing table: importation of foreign beers into the united states.


## the australlan exhibitions.

A bill has been passed by Congress authorizing the President to appoint Commissioners to represent the United States at the International Exhibitions at Sydney and Mel bourne, Australia, and appropriating $\$ 20,000$ for such representation at cither or both of them. As the Sydney Exhibition opens in August next this action comes too late to accomplish much there. It is to be hoped that a more gencrous appropriation may be made for the Melbourne Exhibition, to be held between October 1, 1880, and May 31, 1881. The Australian exhibits at the Centennial Fair were among its most interesting features; and sound commercial policy as well as courtesy warrants something like a corresponding effort to have the United States becomingly presented to the Australians.

## THE NEW STEAMSHIP ARIZONA.

The largest merchant steamer afloat, next to the Great Eastern, is the new steamship Arizona, of the Williams \& Guion Line, plying between New York and Liverpool. The Arizona was built by Elder \& Co., of Glasgow, and is of exceedingly fine model.
She is 465 feet in length, 46 feet beam, $371 / 2$ feet depth of hold, and close upon 6,000 tons burden. Her engines are the latest improvement on the compound principle, there being one high and two low pressure cylinders of an indicated horse power of 7,000 . She is propelled with a four bladed screw, 23 feet in diameter, with a pitch of 33 feet. The steam is generated by seven double ended boilers, and the consumption of coal is estimated at about one hundred tons per day for full stcaming purposes. There are on the main deck five powerful steam winches, with double gear ing steam capstan for working the anchor, etc. She is stecred from the bridge by steam, and in case of accident is fitted up with the usual manual steering gear in a wheel house, protected by a strong iron turtle back deck. There are also steam pumps and a powerful engine, by which any quantity of water can be brought to any part of the ship in a few seconds. The appointments for the conve-
nience and comfort of passengers are superior, stecrage ac nience and comfort of pass
commodations particularly.

## insects as medicine.

According to our medical exchanges the latest sensation in the way of a materia medica is the Blatta Orientalis, or in less scientific language, the cockroach, which comes this time, as it did once before, from Russia. Bogomolow is the name of the person who has investigated it. The beetle, dried and powdered, is given in doses of four and a half grains in Bright's disease, chronic or acute. But it appears that this is not the only thing that the insect is good for, since Unterberger and Kochler are said to have used it with great success in various forms of dropsy.
Kirby and Spence point out the fact that many insects emit very powerful odors, and some produce extraordinary effects upon the human frame, and for this reason, say they, it is an idea not altogether to be rejected that these animals may concentrate into a smaller compass the properties and virtues of the plants upon which they feed, and thus afford medicines more powerful in operation than the plants themselves.
Setting aside the preliminary observation in regard to "powerful odor," such a notion can scarcely have reference to the cockroach, the favorite food of which is the bedbug, or, such pabulum failing, almost anything from a minced pie down to an old boot. What particular medicinal alkaloid the insect's digestive apparatus can eliminate from such a mixed diet it would be difficult to determine. The homœonpathic pharmacist, however, has long been accustomed to obtain the concentrated strength of some such active princi ple by triturating the blatta down to its ultimate molecule with sugar of milk. By reference to a homœopathic work on symptomatology we find that "provings" show that this insect, when administered to the healthy subject, causes laziness, which certainly is an extraordinary effect to be pro duced by so agile a beetle. A high potency of the bedbug is obtained by means of the same manipulation, although the resulting trituration is better known to the followers of the school just mentioned as Cimex lectularius. In this comminuted form the bug is found beneficial in fevers of varifavor in. But this same delectable insect has also found five or six of the bugs being administered for a dose as a cure for chills; and it has likewise enjoyed some notoriety as an emmenagogue. Another insect, not usually mentioned in polite society, also enters into the homœopathic list of rem edies, and this is the head louse (Pediculus capitis). "Prov ings" show that this insect has a remarkable cerebral tendency (as we might suppose), and hence its use is indicated in various forms of severe headache, accompanied by nausea and vertigo.
It is curious to look back at the list of materia medica of olden times, when, with vipers, toads, etc., insects held a prominent place, and were administered with as much confidence in their remedial effects as is now bestowed on the vegetable and mineral medicines of the present practice. In those days powdered silkworms were esteemed as invaluable remedies for vertigo and convulsions; earwigs were given to strengthen the nerves; and five gnats were equivalent, as a purge, to three grains of calomel. Bees dried and pulverized were believed to cure the falling out of the hair (Alope cia), and were also administered internally to promote urine; and for the latter purpose the triturated insects are now used by the homœopaths. These insects, say they, are similar in their action to cantharides, and often succeed when the latter fail. "Still," says the editor of Hull's Jahr, "we have often seen them fail in our own and others' hands, when they seemed fully indicated." Again, in the olden time, powdered scorpions were regarded as an infallible panacea for stone and gravel; and fly water was none the less es teemed as a collyrium in various affections of the eye. The tick was good for erysipelas, and the wasp, from its direct action on the mucous lining of the kidneys and on the neck of the bladder, was a most invaluable diuretic. The lady bird (Coccinella) was esteemed as a sovereign remedy for colic and measles, and crushed upon an aching tooth was long re garded as a specific for toothache. The same insect (Coccinella septempunctata) is now officinal in the homæopathic pharmacopcia, and in the form of a trituration is supposed to be useful in swelling of the gums and toothache accompanied by dull headache. Gerbi, a learned Italian professor, assures us that if a finger be once imbued with the juices of
a little insect rejoicing in the sesquipedalian name of Rhino batus antiodontalgicus, it will thereafter retain its powe of curing the toothache for a whole year
In former days ants were celebrated as specifics agains eprosy and deafness, as well as for their aphrodisiac virtues; distilled with spirits of wine they formed the Aqua Magnanimitatis of ancient medicine, a liquor which was believed to give vigor and animation to the whole bodily frame. The ame extract of ants was also considered efficacious in strengthening the memory and increasing the power of loving, and it likewise prevented paralysis and cured ringing in the ears, etc. The chrysalides of ants were said to be diu retic, and they have been used in dropsy. A preparation called "spirit of ants"(Spts. Formicarum) is officinal in the German pharmacopocia, and was formerly much used inter nally as a stimulant, just as ammonia is usually employed; but formic acid, which is the active agent in the preparation, is not now regarded with favor by the medical faculty, and is little used.
The cockchafer (Melolontha) of Europe was once highly es teemed as a remedy for the bite of a mad dog and the plague. Dioscorides is authority for the statement that a plaster of spiders applied to the temples will keep off ague; however
this may be, it is certain that these insects are occasionally used as an internal remedy, in pill form, for a like purpose in some of the Southern States. Triturations and tinctures of one or two species of spilers (especially the Epeira dia dema) are officinal in the homœopathic pharmacopoia. Speaking of spiders reminds us that one species (Tegenaria medicinalis) has been largely employed in the United States instead of the Spanish fly.
The cochineal insect (Coccus cacti) was formerly regarded as a stimulant, antispasmodic and diuretic, and still enters into an old fashioned prescription for whooping cough; but its remedial virtues are so doubtful that it has dropped from the rank of a medicine to that of a mere coloring agent for medicinal preparations. In this capacity, however, it regains something of its lost prestige, for the deeper the tint of the preparation colored with it the stronger the medicine in the imagination of the average patron of the drug store. A similar insect is the kermes (Coccus Ilicis), indigenous to the basin of the Mediterranean, officinal in the French Codex, and used for the same purposes as the foregoing.
The only insects that have really managed to hold their own in the struggle for existence in the good graces of the regular practitioner, are the blistering beetles (Cantharis, Mylabris, etc.). These are still extensively used, both as external and internal remedies. In Europe we believe that the Spanish fly (Cantharis vesicatoria) is, with one exception, the only species used; but in the United States, although this same species is almost universally employed, yet several of our American blistering beetles have often been substituted for it with perfect success; these being the striped (Lytta vittata), the ash colored ( $L$. cinerea), the black ( $L$. atrata), and the margined blister beetles ( $L$. marginata). In China the Mylabris cichoriï has long been employed, and seems also to have been considered the most powerful vesicatory among the ancients, who, however, appear to have been likewise acquainted with the golden cetonia (Cetonia aurata) and some others mentioned by Pliny. A species of Mylabris, very abundant in Bengal, Bahar, and Oude, has been found equally as efficient as the common Spanish fly; and, in other parts of India, the giant cantharis (C. gigas) and the violet colored cantharis (C. violacea) are used, as is the red headed blister beetle (C. rufceps) in Java and Sumatra. In Brazil the species used is the C. atomaria; in Arabia, the C. Syriaca, and in some parts of Europe the Mylabris trimaculata is em ployed. The use of one of the blister beetles, the Meloe proscarabous, was long ago recommended as an antidote to hydrophobia, and a pamphlet on the subject was communi cated to the Entomological Society of France by M. Fermaire in 1856; more recently, we have seen it stated that this is a favorite remedy of the Arabs for the same disorder, the beetles employed being Meloe tuccius and Mylabris tenebrosa, and the dose being a piece the size of a grain of wheat given to the patient in a piece of meat. Prepared as a trituration, the Spanish fly is used in homœoopathic practice for a like purpose.

Such, then, are a few of the singular remedies that the ars medica has from time to time made use of. And now the question arises, Will these insect remedies ever come in vogue again? Will they ever partially replace the many roots, herbs. and barks which, in one form or another, make up our present materia medica? Perhaps so; who knows? A well known medical author writes thus: "There exists a fashion in medicine, as in other affairs of life, regulated by the caprice and supported by the authority of a few leading practitioners, which has been frequently the occasion of dis missing from practice valuable medicines and of substituting others less certain in their effects and more questionable in their nature. As years and fashions revolve, so have these neglected remedies, each in its turn, risen again into favo and notice, while old recipes, like old almanacs, are abandoned until the period may arrive that will once more adapt them to the spirit and fashion of the times." So, then, it may be that the coming cockroach is but the precurors of the "innumerable caravan" of bedbugs, coakchafers, ants pediculi, and others, that are again moving to the front to as sert their right to heal man, instead of being a pest to him And it may be, too, that, based on this practice, a new " pathy " shall arise to supplant one or more of those now in existence, and which shall be called entomopathy. As we before remarked, who knows?

American Elevators in Europe.
We have seen a recent letter from Mr. Petrus Regout, owner of the celebrated glass manufactory at Maastricht, Holland who states that he has lately put up in his establishment an American elevator, made by Volney W. Mason \& Co., of Providence, R. I., which gives entire satisfaction. Accord ing to Herr Regout, they subjected the safety devices of the elevator to the following severe test: The platform, which of itself weighed 480 kilos, was loaded with a special weight of 500 kilos more, and the lifting rope was then suddenly cut; but the platform did not fall, being firmly held up by the safety racks. M. Selig \& Co., Berlin, the well known engineers, have taken the agency for Messrs. Mason \& Co.'s elevators, and are now introducing them in Germany. The above is one of the first practical trials they have had.

## Snow and Frost in June.

Severe frost was experienced along the northern tier of States toward the close of the first week in June, and on the th snow fell at North Troy, Vermont, and at Sandwich New Hampshire.
The eruption of Mount Etna has nearly subsided.

## the kropp electric lant.

Herr von Krupp, of Essen, has receutly patented an in vention for "Improvements in Electric Light Apparatus." The main object of the invention is to regulate automatica ly the position of the carbons of an electric lamp "in a simpler manner than heretofore, without abandoning the generally acknowledged conditions on which the precision of motion of the single parts depends." The invention includes the application of a brake appliance for the automa tic regulation of the distance between the two carbon points. A fan or fly revolves in quicksilver, or other liquid, for the purpose of regulating the motion of the carbon holder, this part of the apparatus being designed as a substitute for clock work. A magnetic coil with iron casing and iron bottom is employed in connection with the motion of the brake appliance.

Fig. 1, in the engraving, which we take from Engineering is a side elevation, and Fig. 2 a front elevation of the lamp, in which $A$ is the holder for the upper positive carbon, and $B$ the holder for the lower negative carbon. The upper holder, A , is suspended from the disk or pulley, C, by means of a jointed chain or wire, the lower holder, B, being similarly attached to a disk or pulley, D , the latter disk being just half the size of the former. The chains or wires are so passed round the pulleys that when the holder, $A$, descends a certain distance by its weight, the other holder, B, ascends to half the distance. Accordingly the electric arc formed between the carbon points occupies a fixed position. As the weight of the upper holder, A, must not be too small, because its motion would then be easily influenced by dust and dirt, it is necessary to have an appliance for retarding and regulating its course or travel. For this purpose a fly or fan, E, is applied, which revolves in mercury or other liquid. On the spindle of this fly there is a pinion, F, which gears with a tooth wheel, $G$, on the spindle, $X$, of the chain pulleys, $C$ and $D$. In order that the fly, E , by the insertion of a fresh carbon should not have to revolve backward, the toothed wheel, G, is fitted with a pawl wheel, $H$.
The setting and regulating of the proper distance between the carbon points is effected in the following manner: On the same spindle, $X$, as the pulleys, C and D, and tooth wheel, G, there is a disk, $I$, as shown in the separate view, Fig. 3. Fig. 4 is a separate view of a brake of a peculiar form acting on this disk, I. The brake consists of two parts, $K$ and $M$, which are jointed together at $L$. The lower part, $M$, can turn on the spindle, $X$, and has a hole, $M^{1}$, in which is inserted a small peg, N, Figs. 1 and 2. The peg, N, has much play in the hole, and the back ward motion of the brake is limited thereby. $O$ is a brake block on the upper part, $K$, of the brake; $P$ is the keeper for an electro-magnetic coil, $\mathbf{Q}$. This keeper is by a brassrod suspended from the other end of the part, $K$.

When the lamp is in action the keeper, $P$, is drawn into the coil, $Q$, whereby the brake block, $O$ is pressed against the disk, I, turning the latter in its further movement downward, that is, so far as the set screw, R, Fig. 1, will allow. Thus, the upper carbon point will be raised, and the lower carbon point lowered, and the electric arc then makes its appearance. The carbon makes its appearance. The carbon points now gradually consume away, ecrer and its effect on the electro-magnet, $Q$, is lessened. The brake, $K$, supported by the spring, S -the action of which can be suitably regulated in proportion to the strength of the current by means of the lever, U , and set screw, V -and by the weight of the carbon holder, moves slowly back. The altogether about 50,000 barrels of oil daily. The product brake disk, $I$, is thereby enabled to turn forward, and the this spring has been 25 per cent greater than last year and carbon points can approach each other. When this movement has proceeded as far as the brake disk, $I$, moved back before, then the lower part of the brake comes to bear against the peg, N . By the further weakening of the current, the brake will now turn in its joint at $L$, the brake block, $O$, releases the disk, $I$, and the carbon points move toward each other, whereby the current is strengthened and the brake is again applied to the disk, I, either simply to hold it when the carbon points are in their right position, or to pull it back when the carbon pointsare too close torether When inserting new carbons, the brake is fixed by the set
screw, W, and the work is arrested thereby. The electro magnetic coil, $Q$, rests on the bed plate, $T$, of the lamp, and is surrounded by an iron casing, whereby its power of at raction for the keeper is increased.
The fixed position of the arc provides for keeping the light in the center of a concave reflector. Where this is not required, the lamp may be simplified by leaving out the moving parts for the lower carbon holder, making it fixed instead of movable. The lamp thus devised has been employed by Herr von Krupp in portions of his great factory at Essen, in Germany, and the results have been so satisfactory that the light is being extended to other parts of the establish ment.
oll Wells and their Products.
Recent statistics show that there are now 10,882 wells pro-
ducing oil in the State of Pennsylvania, and they pour out


KRUPP'S ELECTRIC LAMP. during the past year, and there appears to be no danger of to be taken to Paris." exhaustion of the supply. This vast product adds immensely the country's industries, and the transportation of it affords large revenues to the carriers.

Infusion of Forsechestnut in Rheumatism.
Dr. W. S. Drake reports in the St. Louis Medical and Sur gical Journal that he had an inveterate case of chronic rheu matism cured by the patient bathing in an infusion of horse
chestnut. This patient had not walked for nearly two years and had gone through the whole list of rheumatic remedies. While treating a horse with the infusion of horsechestnut he found the swelling to rapidly disapipear from his hands. He hen applied the remedy to other joints, and received the same benefit. This is certainly an improvement on the prac ice of carrying a horsechestnut in one's pocket as a prophy actic of the same complaint.

## Ancient Memphis.

A traveler in the East gives the following interesting ac count of his visit to the remains of ancient Mcmphis, found ed by the first known Egyptian king-Menes. "But what did we see of this wonderful city? Only a succession of mounds" says the writer; "a fcw pieces of ancient statues and far down below the present level, with its face in the water, a magniticent figure of a woman in Egyptian dress, with noble features and finely-modeled form, almost perfect, although proba bly 4,000 years old. As a matter of course, we lingered and looked as long as we thought sentiment required, the pushed on to the remarkable ruins of the cemetery, which was connected with this city, or I should say, magnificent city of the dead-to the very con fines of which Memphis extended. It is now but a little more than a vast mountain of sand, being just on the precincts of the African desert. There are so many tombs everywhere peeping out, and so large a number of pyra mids-eighty-one in all, scattered about -that the interest is kcenly excited a once; and at every step some new developments take place. When we remember that old Memphis was seven teen miles in circuit, and was occupicd with villas, gardens, and sacred groves, we can realize more than in any othe way the wondrousness of the scene which remains to us to day. After passing the largest pyramid, considered the oldest monument of antiquity in the world, we descended rapidly to the one little house of refuge standing in the midst of the sand, dismounted and lunched-thus securing a good resting scason, and after about an hour, started out with our guides to the two special points of interest here, the Mauso leum of the Sacred Bull, and the tomb of the Priest Tih, the latter built about 3050 B . C. These were uncovercd in 1860 by the Egyp tian authorities, who, first noticing mounds in the sand bearing the ap pearance of heads, appointed a com mission, and, after a labor of sixtee months, an avenue of sphinxes, feet long, was laid open, the pedestals or statues being perfect in all cases This was paved and led to the Mauso leum of the Sacred Bull, where these objects of worship had been entombed for several dynastics. There were found three separate chambers of temples, the latest where dates were found -650 B.C.-being the only one now open. One cannot help fecling an interest in every detail of such a place There are the long avenues, broad and high, hewn in the solid rock, while al along the sides are deep recesses where are now standing the sarcophagi of the bulls. Twenty-five perfect ones stand in one archive, cach weighing forty tons, and many of them fully engraved with figures, representing life, death and immortality. But it is no mor wonderful to see them where they are than to understand how they were put there. One which was presented to the French had been abandoned when moved some little distance, as too heavy to be taken away. They are thirtecn fee long, eleven feet high, and seven feet deep, and, although many of the cov ers have been removed, nothing was othing wa found in any of them. Above the sarcophagi are inscrip bout three times as great as the yield three years ago. One Many tablets were found upon the walls, which were placed thousand eight bundred and eleven new wells were opened there as offerings to the god; these, however, were all allowed

The Academy of Sciences of the French Institute have elected Mr. Cyrus H. McCormick as correspondent of the Academy in the Department of Rural Economy. This is a ccognition of his services in the invention and manufacture of harvesting machinery, and his official connection with the recent Exhibition at Paris.

## NEW SHOP SAW

The machine represented by the annexed engraving is an improved shop saw which combines all the necessary adjustments forcuttingright and left hand angles and slitting at any bevel. The gauges for these purposes are light, simple, and easily handled. The saw mandrel is of steel, 25 inches in length, has long bearings, is hung in a swinging framehinged on the counter shaft-giving a uniform and good length belt.
The swinging frame is raised and lowered, by a worm working into a worm pinion, on a shaft carrying two gears that mesh into both sides of the upper end of the swinging frame, thereby securing accurate and positive movement of the saw up and down. The top is hinged at the rear end and may be raised to a perpendicular position. It has a loose throat piece that may be removed for the admission of different sized saws, dadoes, or other tools. The mandrel is fitted at the end opposite the saw to receive a boring bit, and the frame is calculated to receive a boring table. All the adjustment necessary is provided in the arrangement for lowering and raising the saw. A good boring machine is, in this manner, provided at a very slight cost; in fact, the purchaser can bolt a plank on the side of the frame and provide himself a boring table without additional cost.
This saw is very simple, convenient and strong without being bulky. It is plain but substantial, and withal it has all the conveniences required in a shop saw at a very reasonable cost. It is manufactured only by the Battle Creek Machinery Company, of Battle Creek, Mich., whose reputation for good work is a guarantee of excellence.

## -relephone in Church

A telephone has been placed in the Congregational church at Mansfield,Ohio, the wires leading to the houses of several aged and invalid persons. A contemporary in describing it |gas may be suddenly generated at great depths, it migh says it surmounts a floral decoration on the table in front of the open platform, where it is hardly seen. 'The speaker pays noattention whatever to it, yet every word uttered in the auditorium is easily heard in the rooms of the dwellings which the wires reach. The first message from the minister was from Scripture: "The word is nigh unto thee;" "His word runneth very swiftly."

## A NEW INVALID BED.

The invalid bed shown in the engraving is the invention of Mr. Wm. S. Groff, of Frederick,. Md. It is intended for hospitals and private families, and has been very highly recommended by eminent physicians and persons who have used it. It seems especially adapted to cases of paralysis, fractures of the lower limbs, and to persons who are obliged to keep a recumbent position.
It will be seen by reference to the engraving that the bed It will be seen by reference to the
bottom is made in several sections. The head section may be raised or lowered, and it is held in any de sired position by the curved ratchet bar, which engages a pin projecting from the inner side of the bed rail. The middle part of the head section is made in two pieces, which may be drawn out laterally to admit of ventilation and also to afford a ventiation and also to afrord a
means of treating bed sores. The middle section of the bed is made in two parts, which are removable to admit of the use of an adjustable bed pan without changing the position of the patient. The foot sec tion of the bed is divided longitudinally to give a separate suppor for each leg, and it may be raised for each leg, and it may be raised
or lowered at "pleasure, being held or lowered at pleasure, be
in position by folding legs.
Above the foot section a bar is supported by two bent rods, and is itsclf provided with a track or way for the rollers that support a stir rup intended to reccive a strap for supporting one or both of the legs.

The inventor also provides a pul ley to be attached to the footboard of the bed to suspend the leg by means of a cord and counterweigh The pulley has a locking device for
retaining the leg in any desired position. A table, not shown in the engraving, is attached to the bed for supporting food, dishes, etc., and for holding books, papers, and writing ma terials. This table is adjustable, and may be readily attached to the bed or removed. The bed is arranged for the comfort of the patient and for the convenience of the at tendant or nurse. Its advantages will be readily admitted by those who have occasion to use an article of this charac-
ter. Further particulars may be obtained from Wm. Boul din, Jr., Frederick, Md

## Volcanic Eruptions.

In seeking an explanation of the phenomena which Her Siemens witnessed during a visit to Vesuvius in 1878, the author has been led to some general studies in vulcanology, which have far more than local interest. At the time of his visit, says a writer in the Nineteenth Century, steam, or other vapor, was being ejected in explosive puffs from the cone in vapor, was being ejected in explosive puffs from the cone in
the center of the great crater. Assuming that steam or


PRESTON'S DIMENSION SAW.

Prevention Better than Cure
The following extract is from an address by the venerable Dr. Samuel D. Gross, recently delivered at the dedication services at the unveiling of the McDowell monument, in Danville, Ky. These words have a practical ring, and were ddressed to the young men of the Kentucky Medical Society, who were present in large numbers:
The great question of the day is, not this operation or hat-not ovariotomy, or lithotomy, or a hip joint amputa ion, which has reflected so much glory upon Kentucky medicine-but preventive medicine, the hygiene of our per sons, our dwellings, our streets-in a word our surroundings, whatever and wherever they may be, whether in city, town, hamlet, or country, and the establishment of efficient town and State boards of health, through whose agency we shall be the better able to prevent the origin and fatal effects of what are known as the zymotic diseases, which carry so much woe and sorrow into our families, and of ten sweep like a hurricane over the earth, destroying millions of human lives in an incredibly short time. The day has arrived when the people must be roused to a deeper and more earnest sense of the people's wel fare, and suitable measures adopted fo the protection as well as for the better de velopment of their physical, moral, and intellectual powers. This is the great problem of the day, the question which you, as representatives of the rising gene ration of physicians, should urge, in sea son and out of season, upon the attention of your fellow citizens-the question which, above and beyond all others, should engage your most serious thoughts, and elicit your most earnest co-opera tion.

## Collodio-Bromide with Gum

## Gualacum

In a note in a recent number of the offi cial journal of the Photographic Society
fairl by the outflow of much lava, and that after each explosion ufficient time must be given for the accumulation of fresh列 an in could occur. It may be suggested, indeed expul sion could occur. It may be suggested, indeed, that as
water at a very high temperature is dissociated into its components, the magma or molten rock beneath the volcano might contain an explosive mixture of oxygen and hydrogen gases; then on any considerable diminution of pressure these gases would recombine and again form water. It is, however, highly improbable that, under the enormous pressure to which the magma must be subjected, anything like dissociation should occur; for the author's own experiments have shown that a mixture of oxygen and hydrogen, when subjected to a very high pressure, will explode. Dismisssubjected to a very high pressure, will explode. Dismiss-
ing, then, the idea of dissociation, the author is driven to


GROFF'S INVALID BED.

Great Britain Captain Abney says: The members o he Society are invited to try a modification of the ordinary washed emulsion process, as it is believed that it is valuable in more ways than one. The modification consists in add ing to the washed emulsion one sixth part of alcohol which has been saturated with gum guaiacum. The plate is coated in the ordinary manner, and the film takes a greenish-blue tint when dry. The drying may be done 'spontaneously,' or it may be accelerated by the warmth of a drying room or box; but the temperature should not exceed $120^{\circ}$, since the gum then fuses and the film repels the developer. Those plague spots that refuse to develop have not been found to be present except in one or two plates, and the fact of their presence has been recognized before placing them in the dark slides, since they remain of the ordinary color of the bromide while the surrounding portions are colored of the bromide while the surrounding portions are colored,
as stated above. It is something to be able to see the spots as stated above. It is something to be able to see the spots
before development, and on this account alone the addidition of this gum is valuable.
To develop, the plate is flooded with alcohol, and then washed and treated with the alkaline or ferrous oxalate developer in the usual manner. The film, be ing very porous through the removal of the gum, readily takes any amount of density, and it is amen able to intensification with pyrogal lic acid and silver nitrate. If a phantom image be developed first by a weak developer it may be built up as the operator may choose. The film has no tendency whatever to leave the plate; even the mos horny film becomes glued to the sur face, and, as before stated, easily permcable to the developing solutions. The gum acts as a preserva tive, as will be seen by the simple experiment of dissolving it in alco hol and pouring the solution over a clean plate. On evaporation of the alcohol a hard, transparent film is left.
The keeping qualities of these plates between exposure and deve lopment have yet to be tested. If they keep as well after exposure as they do before they will be very useful plates for the tourist. The writer appeals to photographers to compounds of hydrogen, rise from below, and, mingling|try the process, in the hope that it may lead by experi with atmospheric oxygen, form an explosive mixture which ment to the introduction of a really good preservative is burned in the upper part of the volcanic chimney. From the large quantity of steam generated by the explosions, it is probable that hydrogen is the principal combustible con stituent of the gases, but it is not easy to decide whether the hydrogen exists in a free state, or combined with sulphur carbon, and other elements.
which may be applied to the plate with the emulsion itself.
"Gum ammoniacum has been already used by Mr. Stillman, but its comparative insolubility is a great drawback to its use as a preservative. Gum guaiacum combines with bro mide; hence it is efficient on this score."

## AMATEUR MECRANICs. <br> <br> AAILT MADE SLIDE BEST

 <br> <br> AAILT MADE SLIDE BEST}While the most of the work to be done on the foot lathe may be accomplished as expeditiously and quite as well without a slide rest as with it, yet there are some operations that are greatly facilitated by means of this tool. Boring, for example, a very difficult thing to do with hand tools, may be done quickly and accurately by using a slide rest. - In gear cutting-which will be described in a subsequent arti-cle-a slide rest is essential.
In the case of this tool, as well as others previously described, the purchase of a well made article is recommended. Yet, if one has time and feels so inclined, he may make a really efficient slide rest with no other tools than his lathe and ordinary turning tools. Figs. 1 to 3 inclusive represent a slide rest that may be made in this way, Fig. 1 being a perspective view, and Figs. 2 and 3 respectively longitudinal and transverse sections of the tool carriage.
The T-shaped casting, A, has a longitudinal slot, which is made T-shaped in cross section to receive the head of the bolt that confines it in position upon the plate fitted to the lathe bed. The vertical ears at opposite ends of the casting are bored to receive the ends of the rods, $B$, upon which the tool carriage, C , slides.
The first operation in making the slide rest is to make one side of the casting, C , perfectly plane. It is then chucked in the lathe with the plane side next the face plate. Three holes are bored through it, two for the rods, $B$, and a smaller one it, two for the rods, B, and a smaler one for the screw, $G$. It is then chucked on
an angle plate, so that the holes for the rods, $B$, are equally distant from the center line of the lathe, and the hole for the
rod, $D$, is bored very carefully to insure the


Fig. 4.-BORING ATTACHMENT.
smell is due. The pure oil has the composition of heptane containing 83.85 per cent carbon and 16.03 per cent hydro gen. The author has compared the heptane obtained from $P$. sabiana with the heptane from petroleum, and that obtained by treating azelaic acid with baryta. The specific gravity of the heptane from petroleum is $\% 301$, that from azelaic acid is 700 . These heptanes are believed by Schorlem mer to be identical. 'The author is at present engaged in an investigation of this point. It is very remarkable that a paraffin should be found in such a state of purity in a plant.

## miscellaneous inventions.

Mr. A. P. Peabody, of Holden, Mo., has patented an ins proved animal trap for catching rats, mice, and other small animals. It is automatic in its operation and very simple in its construction.
An improved instrument for cleaning combs after they have been used for combing the hair, has been patented by Mr. Samuel E. Hibbert, of Lowell, Mass. It consists of a spindle united to two disks, between which are stretched twisted or crimped wires.
Mr. Thomas Cunningham, of Nashville, Tenn., has patented an improved mail bag fastener, which consists in a fork to which the rope is attached after bcing reeved through the mouth of the bag so as to have a looped end, which, when the bag is to be closed, is drawn tightly and doubled over the fork, so as to be held firmly in place.
An improved farm gate has been patented by Mr. L. C. Pope, of Paola, Kan sas. This gate is constructed so that it may be conveniently opened and closed by a person on horseback or in a vehicle. The gates are supported by rollers which its sides. The casting, $A$, is now placed upon a plane sur- by distilling the exudation of the Pinus sabiana, a tree inface, and the casting, $C$, is clamped to the ear at one of digenous to California, and known locally as the " nut pine" its ends, and adjusted so that a line drawn through the cen- or "digger pine." To procure the exudation, the tree, durter of the holes is exactly parallel with the bottom of ing winter, is notched and guttered at a convenient height the casting. The casting, $\mathbf{C}$, is used in this manner as a template for drilling both of the ears for the reception of the rods, B. It will be necessary to exercise great care in drilling these holes, as it is of vital importance to have the rods, B , perfectly parallel.
The casting, C, may now be tapped to receive the screw, $G$, and the tool carrying bar, $D$, may be fitted to its place, and turned down and threaded to receive the internally threaded boss of the wheel, $E$. This boss is fitted to the base of the casting, $C$, and is grooved circumferentially to receive a split ring, $F$, the latter being drilled to receive the ends of three screws that project through the casting into it and prevent the boss of the wheel, E , from moving lengthwise of the hole, while the arrangement permits of the free rotation of the wheel. The bar, D, has a head which is drilled vertically to receive the tool post, and is provided with a heavy feather at the top, which is received by the slot formed by sawing into the upper portion of the cast ing, C. To render the bear ing of the bar, $D$, somewhat adjustable, two screws pass through the casting above th feather. The tool post is of the usual description, having a loose collar above the head of the bar, $D$, and a nut below it. The mortise for receiving the tool extends a little below the loose collar, so that when the tool is clamped the post and ring will also be clamped A slot is cut through the bot tom of the casting, $C$, into each of the guide rod holes to permit of adjustment in case of wear by means of the screws which pass transverse y through the slot. The ends of the rods, B , are fastened by a similar device. The screw, $G$, is prevented from end motion by a shoulder on the outside of the ear at the crank end, and a collar on the inside. The rods, $B$ and $D$, may be made of steel or of cold rolled iron; the latter will be true enough without turning. The casting may be either of brass or iron; a good quality of iron will perhaps prove the most satisfactory. The slots may be cut with the saws described in a former article. The tools to be used with the slide rest have also been previously described.
In Fig. 4 is represented a boring device which will be readily understood without special description. The casting, A, is fitted to the tool rest socket and provided with a sliding $\left.\right|_{\text {is setails of which are given in the paper. The crude oil }}$

An improved fire-wood drag saw has been patented by Messrs. T. B. Fagan and M. W. Henry, of Van Wert, O. The invention relates to a frame and the manner of hanging the saw therein, so that the sawing is done more rapidly and with less exertion than with the ordinary hand saw.
Mr. L. O. Winans, of Newburg, N. Y., has patented an improved plaiting machine, which consists of a rectangular frame or box made of a single piece of tin, having in the top parallel slots, and having the edges at the slots bent downward so as to form a lip under each slot. The plaits are formed by forcing the goods down through the slots with a flat blade.
Mr. Enoch Lord, of Portland, Me., has patented an improvement in reclining chairs, which consists in bent and pivoted bars, and catch bars pivoted to the back and arranged so that aperson sitting in the chair can raise both catches with one hand and adjust the chair back at any desired angle.
Messrs. Alfred E. and William E. Feroe, of Madalin, N. Y., have patented an improvement in processes and apparatus for fining fermented liquors. In this process the yeast is separated from the ale and lager beer in a very short time, and the flavor and the appearance of the liquors are improved.
Messrs. Alanson Cary, of New York city, and T. S. Blair, of Pittsburg, Pa., have patented an improved metallic fence post, the design of which is to arrange the materials of which it is com posed so that pressure against the post will always be opposed by the tensile strength of the materials, thus making the post very light but strong.
An improvement in milk coolers, patented by Mr. John White, of Lisbon, N. Y., cools the milk by a current of water and retains it at a
EASILY MADE SLIDE REST. water and retains it at a boils at $101^{\circ}$, dissolves but a small quantity of hydrochloric $\mid$ proper temperature. It consists in a double vessel having boils at $101^{\circ}$, dissolves but a small quantity of hydrochloric
acid gas, and is but little attacked by cold nitric acid. From a consideration of the general properties and behavior of this hydrocarbon, the author of the present paper (Mr. Thorpe) concluded that it was likely to be a paraffin. The occurrence of a paraffine playing the part of oil of turpentine in the vegetable kingdom was a thing hitherto unheard of, the only natural sources of this hydrocarbon (heptane) being petroleum and fish oil. The author therefore obtained from Mr. Wenzell two gallons of the abietene, and subjected it to a most exhaustive chemical and physical examination, the details of which are given in the paper. The crude oil
is slightly contaminated with a resinoid matter to which its
hinged double leaves or covers through which the water circulates.
An improvement in wrenches for making screw conncc tions between pipes, couplings, etc., has been patented by Messrs. J. G. and O. G. Johnson, of Girardville, Pa. The wrench jaws are pivoted to the handle, and they are held together by straps.
A tap, consisting of a grooved tapered body, threaded through a portion of its length, and provided with an internally threaded ring for confining cutters in the grooves, has been patented by Messrs. L. D. Castle and J. W. Strong, of Bridgeport, Conn.

## RECENT mechanical inventions.

A machine tor felting or haidening hat bodies, in whic he opposite working faces of the apron and felting roll are ,rovided with rope ribs, has been patented by Mr. J. G. Iecker, of Danbury, Conn.
An improved fastener for window shutters and blinds, vhich will fasten itself when the blind is swung open, and may be readily unfastened without reaching out of the win low, has been patented by Mr. N. P. F. Rosenberg, of New York city.
$\Lambda_{\mathrm{n}}$ improved rolling shade for greenlouses, consisting of number of slats hinged together, and placed on the outside f the greenhouse roof, so that it may be readily rolled up or et down over the glass by means of mechauism inside the rouse, has been patented by Mr. Leon Lefébure, of Ncw York city.
Mr. Jonalhan Lefller, of Meyerstown, Pa., has patented a ut for securing the bolts of railroad rails or parts of na:hinery, which, when applied, is locked and prevented from uring backward. It is also cupable of tightening itself, 8 is to take up shrinkage and prevent rattling.
Mr. William T. Doremus, of New York city, has patented in improvement in the oscillating chair for which letters natent No. 161,671 were granted to him April 6, 1875. In he improved form the degree of elasticity of the rubber prings may be readily regulated, so that the tilt of the chair hily be adjusted.
n improved clutch, intended for use in connection with he rim of a pulley, hoisting drum, or coupling device, has been patented by Mr. Patrick Fleming, of Fair Haven, Conn. It consists in a hub fitted with radial arms, which ure thrown in and out by a wedge-acting sleeve connected with the hub.
An improvement in the class of churns whose box or body is suspended by rods or chains, so that it may be oscillated, las been pitented by Mr. Joel T. Hart, of Greenwood, Mo. The improvenent consists in the combination of a treadle lever with the suspended churu box.
An improved percussion trip for throwing glass balls has been patented by Mr. Wm. H. Plumb, of Paterson, N. J. In this device a ball-supporting cap is attached to the end of a piston rod, which is thrown up by the
of cartridges in a revolving cylinder.
Mr. Pardon C. McCune, of Mount Etna, Iowa, has devised Mr. Pardon C. McCune, of Mount Etna, Iowa, has devised
an improvement in horse powers which consists in applying a balance wheel to the shaft from which the power is taken, and driving the same by means of cranks and connectiog rods from the master wheel of the horse power.
An improved carpet stretcher, actuated by a spring and lever, has been patented by Mr. L. $\Lambda$. Winn, of Carthage, N. Y. This invention consists sinuly of a bow spring, lever, and link, the spring having at one end a claw for engaging the carpet, and at the other a toe, which is inserted under the elge of the base board.
$\Lambda_{\mathrm{n}}$ improvement in locomotive smoke stacks, consisting in an arrangement of spark and cinder deflectors and a shicld for preventing the back draught from exhaust steam and currents of air, has been patented by Mr. John R. Fish, of Grand Rapids, Mich. It is intended to prevent the ejection of sparks and cinders and deliver them back to the stack.
A steam valve, constructed so that the old and worn out seat may be removed and replaced without breaking the pipe joint, has been patented by Mr. Cbarles $\Lambda$. Bevans, of New Liaven, Conn. After unscrewing the guide of the valve stem aud removing a nut that retains the valve seat, the latter may be readily withdrawn.

## Artificial Ice.

The Boston Journel of Chemistry believes that one of the remarkable triumphs of science and art as developed in this progressive age is seen in the devices for producing artificial ice in large quantities. It is claimed, and not without reason, that, so perfect has the apparatus become, ice can be formed ou the shores of any of our northern lakes and rivers at less cost than that necessary to the cutting and storing of natural ice in winter. One of these interesting devices in operation on the shore of the St. John's River, Florida, last winter, afforded the writer ample facilities for observ ing its work from day to day, and testing its capabilitics. It was of the class in which ammonia is the agent employed to produce refrigeration, and well known as the arctic machine. It was found capable of "turning out" ten tons of ice daily, in the form of blocks about two and a half feet long and ten inches in thickness. The congelation was perfect, and the product met with it ready sale at the hotes and private residences, not only in Jacksonville, but at anl the points on the St. John's River. The price of Nothern ice in
Florida previous to the introduction of the machine was from Florida previous to the introduction of the machine was from
ten to fifteen dollars a ton in moderate quantities; the artificial ice is sold at five dollitrs, and thus a powerful and successful competitor to the ice companics sprang up at the door of their depositories. The dealers resisted and ridiculed the " machine" for a considerable time, but in the end it triumphed, and prices were reduced. The actual cost of ton, and this includes the storing and delivery. It must be known, however, that fuel in Florida costs almost nothing. The ice company have only to hatul the waste lumber from a steam sawmill, fifty rods away, to be used as fucl, and it is supplicd gratuitously.

The principle upon which the machine acts is the same as that which every housekeeper adopts in freczing creans in
summer. When solids are changed to liquids, a large amount
of heat is absorbed, and surrounding objects must supply it; if the liquid is volatilized, or changed to a gaseous body, still larger supplics of heat are demanded. Thus, if caustic ammonia, which in its natural condition is a gaseous or aeriform body, is subjected to powerful pressure it changes to a liquid,
and in doing so is forced to give up a large amount of latent and in doing so is forced to give up a large amount of latent heat. If it is relieved of pressure it again becomes aeriform,
and as it demands a large amount of heat it seizes it from all bodics in contact. If water is in contact it is robbed of it latent beat and becomes frozen, and thus ice is formed.
In the arctic machine about fifty pounds of liquid am monia are stored in a very strong iron cylinder, and this is connected with a coil of pipes immersed in a tank of strong brine; into this brine galvanized iron cans holding pure water are placed, and thesc cans are of the size of the blocks of ice which are formed. The liquid ammonia is allowed to flow through these coils, and it gradually becomes gaseous,
and in becoming so abstracts from the water so much heat that it speedily freczes. A powerful stcam pump forces the gascous ammonia back into the iron cylinder again, thus liberating great heat, which is disposed of by cold water dropping upon coils of pipes through which the ammonia passes on its way to the condenser. The process is a con inuous one, and if the pumps and coils do not leak there is no loss, and the operation may go on so long as the machin ery lasts. The apparatus and the scientific principles upon which it acts are very interesting, and we are convinced that at present there is no hindrance to securing abundant sup plies of ice, at cheap cost, in any tropical country wher fuel is abundant and of low cost.

## Iron Industrite of Leeds.

The machine trade of Leeds is at the present moment, like most other English industries, in a state of depression. The productive power of the various foundries and machine shops, however, is greater than ever; and when the tide of
prosperity turns once more in their favor, the canopy of smoke will settle with all its old density over the woolen metropolis, and the furnaces will blaze, and the hammer and anvils will clang, with all their ancient force. It is marvelous to observe to what a position the iron industrics of Lecds have risen in such a short space of time, yielding large and rapid fortunes to the leading men engaged in them, and almost elbowing the staple trade of the town into a condition of secondary importance. It is one of the tradi Uons of the district that iron works existed in Leeds and the
neighborhood in the time of the Roman occupation, and the monks of Kirkstall are credited with baving added iron working to their other pursuits; but it was not until the Murrays, the Fairbairns, the Kitsons, and other artificers in iron entered upon the scene that Leeds came properly under the rule of Vulcan. These men not only enriched themselves, but enriched the town, developing to the general profit of the community the valuable mineral resources of the district, and giving the world the advantage of their many mechanical discoveries. It was never dreamed at the beginning of the present century that such a possibility of development existed within the boundaries of Ralph
Thoresby's native town. There were in 1871, 99 collieries existing in the Leeds district alone; the total number fo Yorkshire being 423. In the same year there were in the
Leeds and Bradford district 13 iron foundries, containing 247 puddling furnaces, and 59 rolling mills. The great in dustrial activity and immense resources which these figures represent are in wonderful contrast to the picture which could be drawn of the condition of things half a century ago; and whether England is destined to retain its industrial pe-cminence or not, the history of the men who were mainly instrumental in building up the nation's industrial greatucss will always remain among the most atractive and
most instructive evidences of a progress that is as yet probably the mightiest achievement of human effort.-London Society.

## Country Schools.

I writer in Barnes' Educational Monthly discusses intelli gently the importance of common schools and the difficulties encountered by teachers in inducing regular attendance and the maintaining of uniformity of text books. Another difflculty, complains the writer, arises from a mania among a certain class of farmers for acquiring all the land that joins theirs. Indeed it becomes a species of insanity, and from it men seldom recover. This is the way it works: So bundred man, by scrimping and scraping, haing his, and makes the first payment, giving a mortgage for the balance. Now, for years he must scrimp and scrape even more closely, to pay off that mortgage. No sooner is this accomplished than the process is repeated; and so on, till death ends his work.
Meanwhile, his family is denied every comfort, his wife is a slave, and his children are growing up little better than heathens. Not that the father means to be unkind or ueglectful, but he is "so poor"-land poor, always with a mortgage hanging over him, always with big interest and big taxes to pay. His home cannot have books and pic flowers, and the thousand dainty devices which make home attractive, because the overworked mother has no time nor heart for such things; and so the eternal grind, grind, grind, of their life goes on, without a particle of brightness to illumine it.

Now for the effect upon our public schools. Such a man requently becomes the heaviest tax payer in the district Through the renters upon his various farms be often con trols votes enough to turn the scale in the district election. Now, he has himself and a colleaguc like unto him electer directors. Do you need to be told what such a board will do? Poor school-houses-for why should he care more for the school-house than for his home?-no apparatus, short terms of school; the cheapest of cheap teachers-one who will work twenty-six days for a month, "same as farm hands"-become the rule. Or, if this man does not reach the dignity of school director, he still has a controlling in fluence in district affairs, and that influence is all in favor of a penny-wise, pound-foolish policy.
The effect upon his own children is no less disastrous. They do not attend school regularly, because they are kept out to work whenever a possible five cents can be made thereby. They are seldom supplied with necessary books, for these cost money, and the money must go to lift the mortgage. They have no enthusiasm for study, for the atmosphere of their home smothers it. And the great danger is that these children will grow up to curse the world with multiplied copies of their father.

## American Products in England.

The Agricultural Gazette, published in London and devoted as its title implies, to the farming interests of Great Britain, suggests that he would be a bold man who should venture to deny that American competition is the great niglitmare of every English producer. Not merely in the abundant sur plus of "prairies bounded by the setting sun," but also in many minor articles (to the perfection of which human skill and labor enters), the toc of America galls Britannia's heel. English bacon curers, cheese dairymen, and butter makers have long been dolefully complaining that their ordinary make is driven out of the shops by importations from beyond the Atlantic. A London builder recently stirred half the Black Country to wrath by stating in the Times that his cus tomers preferred American locks. One day it is the vision of flects entering Liverpool with cargoes of fresh meat and of fiects entering Liverpool with cargoes of fresh meat and
live cattle, which drives a section of Englishmen half wild. live cattle, which drives a section of Englishmen half wild.
The next, the Kentish fruit growers see with horror the demand for the finest Blenheim oranges and Ribston pippins encroached on by "Baldwins." While those most self-satisfied of all Britons (the breeders and turfites of Newmarket and Epsom) have just had a wholesome pill to swallow in witnessing the triumphs over the best English and French horses of Papoose and of Parole.
It is impossible that this well-nigh universal success of our closest rival can be accidental. There must be a reasonsome motive, universal there, but less active here-which brings our cousin Jonathan in so often as a winner. Defea should be healthful, if its causes be discrectly examined. It cannot be merely soil and climate which work this miracle For, into some of the $\Lambda$ merican triumphs soil and climate do not enter. Nor can it be always the extra burden of taxation here which turns the scale against us. Because, in several of the wins recorded, the labor (which is the most expensive factor in the production) costs more there than the same would cost here.
It is not of the least use, as British farmers unwisely prefer to do, grumbling at the Legislature for not doing something in this case to redress the balance and to bring back good times. It is quite plain that some at least of the causes of our defeat are, to no smallextent, inherent in ourselves; in our ways of conceiving and of carrying out our work.
The $\Lambda$ merican thinks nothing too small not to be worth looking into, and the ingenuity and thoroughness with which every secret of nature is probed and is recorded are beyond all praise. We, on the contrary, are so satistied that tho methods we inherit are not only the best now, but the best ever to be discovered, that we do not care to do more than to inquire. "what is the old way." Indeed not a few farmers resent as an insult the suggestion that they have anything to learn. To follow a precedent is the Englishman's one idea. Yet, as the problem offered to farmers is continually changing (for new items bave constantly to be tiken into ac count, and as relative values are continually being altered) the way to solve this problem successfully is by no means to go on copying the old figures. If cheese and butter are to pay the maker, they must now be the best of their kind, because, whatever may have been the case once, customers now have a choice, and they choose the best: laiving once hat the best they will not take inferior. If cattle are to pay the vendor, these, too, must be of the lest. And it is only common sense to say there ought not to be so many middlemen to claim a slare out of the final price.

## Shad in Ar

Seven years ago a lot of little shat were placed in the Ouachita river, which rises in $\Lambda$ rkausas, flows into Louisiama, and empties into the Red river in the latter State. Nothing was seen of them for a long while, and most people had forgotten the experiment, when two years ayo two or thre stray shad, the first that had ever been known in that region, were caught. Last year between thirty and forty were taken, and this spring they have been caught in immense quantities in Arkansas, in the vicinity of Hot Springs. This shows that there is no reason why the fish should not be domesticated in the far South, and the New Orleans papers call upon the people along the rivers in that region to stock them with young shad.

## The Treatment of Nenraleta.

Aconite is an old remedy in neuralgia, which has, however, not altogether realized the expectations which wer formed of its value. The power which it often lacks has been lately claimed for its alkaloid by Professor Gubler, who announced that aconitia is almost infallible in trigeminal neuralgia. This substance was long banished from the materia medica for internal use, but it has been employed occasionally since the discovery of a crystallized form by Gréhaul and Duquesnel in 1871. lts value in neuralgia has lately been investigated by the New York Committee on Neurotics, of which Dr. E. C. Seguin is the chairman. The dose of all forms of aconitia is about the same, the initial dose being about half a milligramme (T80 grain) twice or thrice a day. Gubler states that the dose of amorphous aconitia may be gradually raised to half a centigramme, but Duquesnel's preparation has to be given with greater caution. There are, however, differences in susceptibility, and some persons can not bear a larger dose than $\frac{y}{y 0}$ of a grain; while one case was met w tolerated.
From a trial of the treatment in a series of cases, the com mittee conclude that, on the average, distinct physiological and therapeutical effects may be obtained by giving $\mathrm{T}^{2} 0$ of a grain three times a day. Of six cases of severe trigemina neuralgia, one, probably a reflex neuralgia from a decayed tooth, was not at all benefited. Three cases of epileptiform neuralgia were slightly or only temporarily relieved. Two cases were cured. One of these had existed for seven years, with an interruption of seven months, procured by resection of the affected nerve. 'The results thus afford a partial sup port to M. Gubler's assertion.

The value of ammoniacal sulphate of copper in the treat ment of the same affection has been asserted by M. Féréol in a recent communication to the Académie de Médecine. He states that in cases in which every treatment has failed, even the administration of gelseminum and of aconitia, a cure or remarkable relief may be obtained to the most severe symp toms by this drug. Among the examples he gave of its use was the following: Trifacial neuralgia of two months' duration, with absolute (?) insomnia, was unrelieved by the extraction of teeth, quinine, bromide, aconitia, or tincture of gelsemi num, hypodermic injections of morphia, or arsenic. From the first day of the administration of the ammonia sulphate of copper there was a notable remission in the symptoms and cessation of the insomnia. In one case the dose was pushed to eight grains without any other accident than nausea. It has the drawback of occasioning a persistent metallic taste in the mouth. Only one case of intolerance was met with; in that a grain and a half of sulphate of copper occasioned violent vomiting.-Lancet.

## Chinese Physicians.

According to the National Medical Reviero, when the Chinese physician examines the pulse, he places the arm of his patient on a cushion; then he applies the in dex, the middle and ring fingers on the an terior face of the wrist in such a way tha the index finger may be nearest the arm, and the ring finger nearest the hand. The phy sician then elevates and depresses each finger alternately, with more or less force, like on playing on an organ. They examine, also during a limited number of respirations, each of the nine pulses, which are formed, accord ing to their doctrine, on each hand, and the deduce from these their prognosis, at once without hesitation; make their prescriptions and attend to administering their medicine on the spot; receive the fee and retire, not to return unless again summoned.
The Chinese physicians imagine a multitude of odd connections between the viscer of the human body and the elements, the seasons of the year, the stars, colors, etc The heart, they say, is analogous to fire, to the planet Mars, to summer, to spring, and to southern climes. It comes from the liver begets the spleen and the stomach, is anti pathic with the kidney, and receives no in jurious infiuence from its contact with the lungs.
During the springtime the pulse is lik a tense cord; in summer it is more de veloped and becomes exuberant; in autumn it appears as if floating; in winter it is rathe quiet.

They think that the spirits and the blood both vehicles of heat and humidity, run through all parts of the body in twenty-fou hours. This daily circulation, they say, commences in the lungs at 3 o'clock in th morning, and ceases next day at the same place and at the same instant. The know ledge of the canals through which this is effected constitutes, in the eyes of Chinese physicians, the fullness of anatomical know ledge.

They count six canals which pass di rectly from above downward, and an equa number which return from below upward eight canals run transversely, and fifteen ob liquely.

## NEW ROTARY ENGINE

The construction of rotary steam engines has received the attention of many of the best engineers and mechanics, with results that have usually proved anything but satisfactory However, it is claimed by the manufacturers of the engin shown in the accompanying engraving that, after having everal of them in use at their own factory and in various ther places, they are satisfied that it is practical and that it must for many uses supersede the reciprocating engines.
The case, A, contains cams and abutments; and the cylin der, B, has attached to it the heads, C C, which rotate with


## ROTARY ENGINE.

t when the engine is in motion. The blade, D , is provided with packing saddles or shoes at each end. The cylinder packing rings, $F$, and the outside heads, $E$, are recessed to admit the cylinder heads, C , and are bolted to the case in the ordinary way. The cylinder, B, and the rotating heads $C$, are slotted for the accommodation of the blades, $D$ Steam being admitted at the steam port, $G$, forces the ex ended end of the blade around to the exhaust port, $H$ before reaching this point, however, the blade passes up the cam, and is shifted endways through the cylinder, $B$, so tha when the upper end of the blade, $D$, reaches a position in front of the port, $G$, the expanded steam is exhausted hrough the pipe, $H$, and the motion is continued as before the blade passing around the inside circle of the case, $A$ and up through the cylinder, B, as it moves forward. The packing rings are placed in a suitable groove in the case, and are pressed against the cylinder heads by means of steam which is admitted through a small passage extending from the steam port to the back of the rings. The saddles at the


NOTEMAN'S ROTARY ENGINE
ands of the blades are attached to the blades by means of knuckle joint which allows them to adjust themselves to ny angle of the wearing surface of the case; the pressure when at work, always keeps them packed against the case, so that the wear of the saddles or case is taken up and a perfect steam joint always maintained. The cut off, as shown in Fig 1 , is a novel feature in this rotary engine; as the steam is exhausted but twice to a revolution, it is perfectly practical and may be set to cut off the steam at a third or half the troke, as may be desirable, thus utilizing the expansive forc f the stam. One notable point in this engine is the ab sence of springs or any kind of soft packing. The manu facturers state the joints are so well protected that there is no possibility of the escape of steam until it has done its work. This engine is the invention of Mr. Alonzo Noteman, of Toledo, Ohio, and it is manufactured exclusively by Messrs. D. E. Saltonstall \& Co., of the same place.

## Legal Practice in London.

In the legal profession in England there are three distinct and well defined branches of practice; and the boundary lines of the several spheres of enterprise may not be over stepped. The solicitor transacts ordinary business, and ad vises his client, both as to the avoidance and the redress of grievances. He asserts the rights of the layman who in trusts his interests to his keeping, and avenges the wrong inflicted upon him by others, so far as these functions can be performed with the aid of the ordinary appliances which the law affords. When matters become more complicated than the simple remedies will suffice to cure, the solicito seeks the aid of counsel. The client cannot go directly to the latter to the prejudice of the general practitioner at law nor can counsel transact ordinary business for laymen, how ever willing they may be to pay his fees or secure his ser vices. An opinion may of course be obtained on the most trivial subject, but the case must be submitted through a solicitor, or counsel cannot entertain it, so that the wide professional interests are duly protected. There is a still more exclusive class of practitioners, who act solely as con sultees and leaders-the Queen's counsel-who are prohibit ed from appearing in most cases before the courts withou junior By this simple but effective organization of labor ny unsemb conflict of aims and interest is prevented and the public benefit, not less than the profession, by the ar rangement made and carried out.-Lancet.

## Plgment Process for Enlargemente

The Association Belge de Photographie publishes a pig ment process by Dr. Van Monckhoven, which is especially dapted to solar enlargements. He dissolves wax in ben ine, charges a small quantity of cotton with the solution nd applies the latter to a light piece of plate glass. Th plate is then provided with a coating of collodion or varnish and then immersed in water for thirty minutes. It is hen taken out and placed flat upon a table, where it is coated with a mixture consisting of a colored pigment, gelatine, and bichromate of potassium, which having become firm, the plate is allowed to dry in the dark. In place of this (in addition to this) Monckhoven usually takes pigment paper, sensitized in the usual manner by dipping in a solution of bi chromate of potassium, places it upon the collodionized surface of the plate-previously moistened with water-rubs it down in or der to obtain perfect adhesion, and finally leaves it to dry. The plate is then exposed in the solar camera (enlarging apparatus) by allowing the picture rays to act, through the plate, upon the film treated with bichromate. The exposure is regulated by the assistance of the photometer. The plate is subsequently immersed in warm water of $30^{\circ}$ for fifteen minutes, then in water of $60^{\circ}$, after which the sheet (paper) is detached, and the pictur developed in the usual manner. It is then fixed, and a piece of white gelatine paper is finally affixed to the picture by means of the roller. When this has become perfectly dry the picture is detached. If white gelatin paper be used, which is very brilliant (glossy) the picture will retain its smooth appearanc even if it is mounted on cardboard. If, on the other hand, dull looking gelatine paper be employed, the picture will have the appear ance of any ordinary print obtained by single transfer. Relative to this process, Monck hoven declares the exposure of the pigmen film as adhering to the plate to be essentially new. The following advantages are claimed

1. The net-like appearance of the picture and the spontaneous insolubility of the chro mo-gelatine will be avoided.
2. A perfect evenness (uniformity) of the paper, and a greater durability of the same are obtained.
3. All drawbacks of the single transfer pro cess, as imperfect adhesion, air bubbles, and other casualties well known to persons using the pigment process, are successfully avoided
4. The resulting prints remain perfect, and the pictures are clear and sharp beyond com parison.
 scene of danger.
A species of peripatus is found in St. Thomas, but I did not succeed in meeting with any. An agouti, a species of rodent (Dasyprocta) occurs in the island, and Mr. Wyman told me that it was common in the gullies near his sugar plantation.-H. N. Moseley, "Notes by a Naturalist."

## THE CYCLODES

The cyclodes are so called on account of their teeth, the crown of which is rounded, and which reminds of the sharp and cutting teeth of other reptiles that belong to the same class. The cyclodes have a large round trunk, which diminishes regularly from the neck to the extremity of the tail. The tail and body form one piece. The snout is blunt and the tongue is fiat, is covered with scales, and has the shape of a lance, with an incision at the end. The eyes are oval and oblique, and are behind the mouth. The neck is very short and narrow. The body is covered with smooth scales arranged like a coat of mail. The claws are small in proportion to the size of the body. The fingers are short, plump, and nearly cylindrical. Three species of cyclodes are found in New Holland-the cyclode of Casnarina, the black and yellow cyclode, and the cyclode of Boddaert
The giant skink, or the cyclode of Boddacrt, is shown in the engraving. is shown in the engraving. head than the other two species. The upper par of the body is marked with transverse alternating fawn colored and brown stripes. Sometimes these stripes pass down the sides, when the brown or black ones are covered with large yellow spots Back of the eyes there is dark stripe which ex tends as far as the shoul ders. In some of the ani mals the top of the head i reddish, while in others it has a black border. This species attains a length of about fffteen inches.

Like most of the skink family it is very slow in its movements and will lie for hours per fectly immovable, and generally prefers and
 walking the belly drags along the earth, for the
legs are short and too feeble to support the body. It lives on pulpy fruit, small animals, and young birds.-La $\quad$ B, as shown at $E$ (Fig. 1), permitting all of the animals to Nature.


CYCLODE OF BODDAERT, AT THE JARDIN DES PLANTES, PARIS.
236. Six lots of fifty beans each were taken at random from the old stock, weighed, and the average for fifty found to be $269 \frac{2}{3}$ grains. A like experiment with the crossed stock gave an average of $213 \frac{1}{6}$ grains. The average weight of an equal number of beans from each stock was nearly as 100 to $\mathbf{7 9}$ in favor of the old stock.

## Poisonous Properties of Laburnum

The laburnum (L. vulgare), a small ornamental leguminous tree very common in our gardens under the name of " golden chain," is quile a favorite with both young and old on account of its being an early bloomer, as well as because its fiowers are very pretty.
A writer in the Gardener's Chronicle calls attention to the fact that the seeds of this plant act so violently as an emetic
 tle known that all the parts of this tree-leaves, fiower pods, and even the bark and roots-are highly dangerous and conin the A dose of 0.03 of a gramme injected under the skin is sufficient to cause the instantaneous death of a dog or a cat. Dr. Christison was the first who observed the fatal poisoning of a man by cytisin, and more than a hundred cases of poisoning by this alkaloid, of which the majority were fatal, have been recorded in medical literature. Children par ticularly, who had eaten ticularly, who had eaten
of the pods or seeds of laburnum (ten seeds kill a child), but also adults who by mistake had taken flowers of this plant in stead of false acacia to prepare a tea, were dan gerously affected. The symptoms of this kind of poisoning are not at al characteristic, and unfor tunately no antidote is a yet known for it

## Japanese Cement.

Mix the best powdered rice with a little cold water, then gradually add boiling water until a broper waster proper consistence is ac which reason it is well adapted for fancy paper work, which
requires a strong and colorless cent requires a strong and colorless cement

The Steamship scotia.
Many of our people, from having frequently crossed the Atlantic in the steanship Scotia, the last side-wheel steamer built for the Cunard Company, will be glad to know whit has become of their favorite vessel. A foreign contemporary gives the following account of her:
"Few would recognize in the large twin screw steamer which left the Mersey lately, the once famous Cunard liner Scotia, the last of the great paddle steamers built for the Atlantic trade, and which, under the command of the late Captain Judkins, was for years looked upon as the fastest and favorite vessel on the line between Liverpool and New York. The Scotia was built in 1862, when, with the excep tion of the Great Eastern, she was probably the largest mail steamer afloat, being about 400 feet long over all, 47 feet 8 inches beam, and 4,050 tons bulder's mcasurement, and fitted with a pair of side lever engines of 1,000 horse power. The introduction of screw steamers fitted with compound engines for the Atlantic and other occan voyages has, of late ycars, en tirely superseded the paddle steamers, and a few years back the Scotia was withdrawn from the Cunard Company's sailing list, and was subsequently purchased by the Telegraph Construction and Maintenance Company to be employed in their cable-laying operations. Extensive alterations were made by Messrs. Laird Brothers, at Birkenhcad Ironworks The Scotia has been stripped of her masts, fun nels, machincry, paddle wheels and paddlc boxcs, deckhouses, etc.; she has also been raised by the addition of a spar deck, and al tered about the after end to prepare her for twin screws, and has been fitted with new compound engines, and also provided with three immense cylindrical tanks in which to stow the electric cable, as well as with most elaborate and approved stcam machincry for paying out and hauling in, also steam cap stan, stcam stcering gear, winches, etc. The new engines are two distinct sets, on the compound system, with inverted cylinders, 38 inches, and 66 inches dameter, and 3 fect 9 inches stroke, supplied with steam at 75 lb . pressure from three double-ended cylindrical boilers, and are calculated to drive the vessel at a speed of about $11 / 2$ knots an hour.

## THE ELECTRIC PEN.

Our engraving, which we take from La Nature, represents a new electric pen devised by Messrs. Bellet \& Hallez d'Arros, who deserve credit for having remedied several imperfections which existed in the first instruments made on this principle.
This pen was suggested by the familiar experiment of percing a eaird by the passage of an electric spark from a Leyden jar. The spark of an clectric machine or an induc tion coil passing between metallic points or between a point and a conducting body is capable of piercing a card, and will, of course, much casier puncture a sheet of paper. When the sheet of paper rests upon a metallic plate and the surface is traplate and the surface is traversed by the electric pen the plate and the pen being connected with the poles of an induction coil, a line may be produced by a serics of very fine perforations, which will vary in number in a given space with the rapidity of the discharges and the rate of the movement of the pen. The principle of the pen is very simple, but before the practisimple, but before the practical utilization of it was
reached, many difficulties had to be surmounted. Among to be surmounted. Among
these we may mention the these we may mention the
tendency of the sparks to tendency of the sparks to
burst forth, when the pen is within a short distance of the paper, puncturing the papcr in all directions, making it impossible to draw a clear line from the start. The operator was also liable to severe shocks. Another difficulty was the distance between the successive perforations. These imperfections havebeen overcome by Messrs. Bellet \& Arros, by reducing the strength of the secondary current, so that it has only sulficient power to pierce the paper, and will not, therefore give a perceptible shock. The paper which is to form the stencil is dipped in a solution of salt and dried; this operation prevents too many sparks from issuing from the pen and insures an absolutcly truc and clear line. The interrup ter is of novel form and is operated by the magnetized core of the induction coil. The apparatus forms a desk of me
dium dimensions. At one side of the desk there is a plung ing bichromate battery; the induction coil is placed in the middle and is connected by one of its wires with the lead of an ordinary lead pencil, which serves the double purpose of making a visible mark on the paper and of conducting the current. Themetallic plate which supports the paper is also connected with the coil and is secured to the desk top. When it is desired to take an impression from the stencil it is placed overa sheet of paper, and rolled with printer's ink reduced with a little printer's varnish or with castor oil.

## A NEW SOUNDER.

The accompanying illustration represents a sounder for


## A NEW FORM OF SOUNDER.

dred have been constructed for the telegraph lines in India.
It differs from an ordinary sounder in the arrangement of the armature, which is supported by a vertical spiral spring. This spring serves to restore the position of the armature when the current ccases, as well as to relieve the lower bearing of nearly all friction. The prolongation of the armature acts as the beam, and plays between the two stops shown in the engraving.
To insure very good insulation for damp climates, the coils are rendered solif̣ ly repeated immersions in a compound of

## NEW AGRICULTURAL INVENTIONS.

An improvement in the class of churns having a recipro cating dasher which is operated by a spring motor, has been patented by Mr. W. L. Allegru, of Hebbardsville, Ky. This mprovement relates to the construction of the churn cover, which is composed of two separate disks, the lower onc being designed for gathering the butter.
An improved churn dasher, constructed so as to give the milk a continuous rotary motion as the dasher is moved up and down, his been patented by Mr. Seth K.Warren, of Louis ville, Ky. The invention consists in wings eccentrically pivoted to arms attached to the dasher handle

A cultivator that is constructed so that its tecth may be
evatcd or depressed at will, so that it may be hauled or drawn over the road on its own wheels, has been patented by Mr. Wm. Jones, of Mill Point, N. Y. It will cultivate or make a furrow close to a fence or hedge.

An improved machine for stacking and ricking hay and straw has been patented by Mr. B. E. Jones, of Boonville, Mo. The in vention consists in a combination of devices which cannot be readily described without an engraving.
Mr. A. W. Meyer, of Labaddic. Mo., has devised an improved straw elevator for thrashers and separators, which consists in the combination of a fan blower, a pivoted screen leld in a horizontal position by a weighted arm, and a conductor spout, with a stacker having cross slots in its floor.
An improved sulky scraper, constructed so that it may be readily adjusted to the various positions required tor collecting, carrying and dumping the load by the driver from his seat, has been patented by Mr. William C. Marr, of Onawa, La.
Mr. James M. Matthews, of Knoxville, Tenn., has patented an improved plow, which has a semicircular iron beam upon which the mould board is made adjustable.
Mr. Sam. T. Ferguson, of Minncapolis, Minn., has patented an improvement in horse rakes, which consists in a yielding or flexible lever, which may be held by the hand of the driver, and which may be readily changed to a rigid lock lever which will hold the teeth of the rake to the ground without the aid of the driver.

## The Fur on the Tongne.

The nature of the fur on the tongue has been the subject of a study by Henry T. Butlin, F.R.C.S., and the results of his investigation are given in a paper read at a recent meeting of the Royal Society. The author finds that tongue fur consists chiefly of (1) débris of food and bubbles of mucus and salivil, (2) epithclium, (3) masses which at first appear to and salivia, (2) epithelium, (3) masses which at first appear to
consist of granular matter, but which are the gloe of certain consist of granular mater, but which are the glea of certain
forms of schistomycetous fungi. In order to ascertain the true nature of the gloe, and to obtain it in a purer form, it was cultivated upon a warm stage. Several fungi were discovered, but only two of hiese were present in every instance, Micrococcus and Bacillus subtilis, and as the gloa produced artificially was similar to that existing naturally in the tongue fur, it is be lieved the fur is composed essentially of these two fungi. Micrococcus developed frecly and abundantly, forming large masses of yellow or brownish yellow color. Bacillus did not develop, but existed in greater or less alurulance in all the cases examined. It appeared to be identical with the Leptothrix buccalis de scribed by Robin. Although it did not develop under artificial conditions, it is probable that development takes place frecly upon the surface of the tongue. Its habitua occurrence there, and the pre sence of spore-bearing fila ments, favor this view. Be sides these fungi there wer present in more or less abun dance, Bacterium or less abun cina ventriculi, Spirochueta pli catilis, and a larger form of Spirillum or Vibrio. The first

## NEW ELECTRIC PEN.

ne of wax answers well). The range of the instru ment is shown by its working without fresh adjust ment, either with one Daniell's cell through 6,000 ohms or with 20 through 0 . When very delicately adjusted, one Daniells cell through 31,000 ohms is just able to work -G. Dubern, in Journal of the Society of Telegraph Engi neers.
e of th of these fungi existed in some of the furs, and twice de
veloped with great rapidity. The second was frequently present, and generally developed quickly, forming large masses of a yellow or yellowish brown color. The Spirochuetn occurred in only two or three of the specimens examined. The slime between and around the teeth was found to consist of the same fungi as the tongue fur, but the rods of Bacillus were longer, probably owing to fewer disturbances.
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 their creditors. . Mr. Waters, Sr, after thirty years' ex-
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Taps, Dies. Screw Plates, Reamers, etc. Send for list. For Screw Cutting Engine Lathes of 14, 15, 18, and
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Eclipse Portable Enginc. See illustrated adv., p. 414. Dismond Engineer, J. Dickinson, 64 Nassau St., N.Y. Vertical Engines. F. C. \& A. E. Rowland, N. Haven, Ct. Excelsior Steel Tube Cleaner, Schuylkill Falls,Phila.,Pa Solid Emory Vulcanite Wheels-The Solid Original
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## NEW BOOKS AND PUBLICATIONS.

 Origin, Progress, and Destiny of the English Language and Literature.By John A. Weisse, M.D. New York: J. John A. Weisse, M.D. New Now. 1879. 8vo, pp. 701.

If not the first, certainly the most thorough and comprehensive, study of the origin, development, and ver made by scientific methods. In its preparation Dr. Weisse has studied with singular acuteness and patience the vocabularies of typical British writers in every age rom the year 597 to the present, tracing the orign of he words used, and the varying percentages of words drawn by different writers in successive ages from the
different sources - Anglo-Saxon, Gothic, Tlanish, different sources - Anglo-Saxon, Gothic, Janish,
Swedish, German, Dutch, Flemish, Welsh, Cornish, Scotch, Irish, Armoric, Greek, Latin, French, Italian, Spanish, Portuguese, Russian, Arabic, Hebrew, and
Armaic-all of which have fed the grand stream of Armaic-all of which have fed the grand stream of
English speech. Contrary to popular notions, English as at present spoken is, in its vocabulary, about threequarters Greco-Latin and one quarter Gotho-Germanic or Anglo-Saxon. In other words but one-quarter of the from the latter family of languages, and the tendency is and has been steadily toward the increasing of the percentage of Greco-Latin words. As to the destiny of the English language, Dr. Weisse believes with De Can-
dolle that in a century or so it will dominate the world. dolle that in a century or so it will dominate the world.
The English speaking peoples are a multiplying, colonizThe English speaking peoples are a multiplying, coloniz-
ing, conquering race. Already they command nearly half the world's commerce, though numbering but onefifth the world's population. They have more books and newspapers than all the rest of the world, and more inventors and inventions. In directness, compactness, and simplicity of grammatical structure, English speech surpasses all other languages-properties which make it everywhere the language of the telegraph-and it only needs rectincation an in. Wr. Weisel curious and valuable information, and has made its mark as one of the few great works of the age.
Magnetic Variation in the United
States. By J. B. Stone, Ph.B., C.E.
New York: 1878.12 mo pp. 139. Price $\$ 1.50$.
Every practical surveyor will appreciate the advantage of a compilation of the recorded facts in relation to the variation of the compass throughont the United and to supplement his tables with such information as will enable the surveyor to determine easily the allowance that must be made in any case for the difference in variation between any dates. There is added a brief account of the nature of terrestrial magnetism, the va-
rious theories as to its origin, its change in intensity, and duration, and the progress of magnetic observation.
The book may be had of Mr. Stone, Boonton, New The boo
Jersey.
Graphical Computing Table. By Lieut.
William H. Bixby U. S. A. John Wiley \& Sons.
It would be impossible to say, without a wide and varied series of practical tests, whether this ingenious table is a curiosity merely, or an instrument of grea
practical utility. The credit of its construction is given to Lalanne, French Inspector General of Bridges
and Highwaye. It certainly enables one to arrive at the results of many complicated mathematical opera tions almost by simple inspection. If we had puch of take the mastery of its use. The time and labor spent on its preparation surely ought to bring some practical return. Young offce workers may do well to give it a
trial. The errors are said to be within one half of one per cent.

1878 of New York State Survey foł 1878. James T. Gardner, Directo
Albany: C. Van Benthuysen \& Sons.

The field work of the past year was principally upon
that part of the central belt of triangles from Albany westward, lying in the counties of Oneida, Madison, Onondaga, Oswego, Cayuga, Wayne, Seneca, and Yates. The measurements embraced an area of about 2,000 square miles, in, one of the most wealthy and populous
parts of the States, containing two important cities and parts of the States, containing two important cities and
nearly two hundred villages and hamlets. Every one of these towns was found to be misplaced from one to two miles on all existing maps.
Plasterer's Manual. By K. Cameron.
New York: Bicknell $\&$ Comstock. pp. 53. Price 75 cents.

A practical little handbook describing the tools and materials used in plastering, the appearance and action
of different limes and cements, methods of making and applying mortar, and giving, in small space, a larg amount of information useful to plasterers. Both pub-
$I_{\text {ishers and }}$ author have done their work well.

An Exposition of Creation. By Rev. Joseph Gross. Philadelphia: William
Syckelmoore. pp. 135. Price 40 cents. Mr. Gross is an aged clergyman whosticks to Genesis, literally. Genesis is right; geology clashes with Genesis; therefore geology is wrong. The logic is good. The usual custom is to assert that Genesis means what it
does not say; then build up a scheme of geology resting more on imaginationthan on fact; then say that geology and Genesis agree. Mr. Gross is gailty ofno such foily.
He does not know much about geology, further than that it does not agree with a literal interpretation of Genesis i. and ii. His major premise being, to his
mind, unassailable, his conclusion is inevitable. Geology and Genesis cannot be harmonized withou

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HINTS TO CORRESPONDENTS.
No attention will be paid to communications unless
ccompanied with the full name and address of the accomp
writer.
Name
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We renew our request that correspondents, in referring ame the date of the paper and the page, or the number of the question.
Correspondents whose inquiries do not appear after reasonable time should repeat them
Persons desiring special information which is purely of a personal character, and not of general interest, we cannot be expected to spend time and labor btain such information without remuneration Any numbers of the Scientific American Supple office. Price 10 cents eaoh.
(1) G. M. writes: I want to make an enine, 6 inches stroke and 4 inches diameter, of brass. How large should the ports and exhaust be, and how can I make the cores for the same? A. Stcam port
$3 / 821 / 2$ inch, exhaust $\% / 821 / 2$ inch. Consult a moulder
(2) W. W. asks: Does the upturning of irgin earth (not! marshy districts) from 1 to 20 feet deep, and filling up hollows, produce malaria in any form? A. No, not in a healthy region. Still if any one in the neighborhood should afterwards suffer from an or too lazy to discover the cause of the patient would probably be told that he was a victim of malaria. Maaria appears to be a convenient verbal pack-horse for a wide range of medical ignorance
(3) G. H. O. asks (1) for a recipe for a pre paration for sealing bottles that is insoluble in alcohol. A. Soften glue in cold water and melt it in the water
bath to form a very thick paste. To this add good gly bath to form a very thick paste. To this add good gly-
cerine in quantity equal to the dry glue taken, and continue the heating to expel as much of the water as possible. This may be cast on a marble slab to cool, and
melted for use as required. This is not soluble in alcoholic liquids. 2. Is there any liquid as good as alcohol, but cheap, for preserving insects, snakes, etc. 9 A.
Alcohol is one of the best; a solution of arsenious acid may be employed for insects.
(4) J. S. B. writes: I contemplate putting in an engine to run my presses and heat the office.
About two effective horse power will be required, and the office is about 20x 40,9 feet high. 1. Will either of the engines of the following dimensions do the work,
and which will be the best? One is, cylinder, $3 \% \times 66$ nd which will be the best? One is, cylinder, $3 \% \mathrm{k} \mathrm{x}$ tive style, diameter 23 inches; length of furnace,23inches; width of furnace, 18 inches; height of furnace, 16 inches; number of tubes, 18; diameter of tubes, 2 inches; length of tabes, 41 inches. The other is, cylinder, $4 \times 6$ inches,
240 revolutions per minute; boiler upright; diameter, 240 revolutions per minute; boiler upright; diameter,
24 inches; height, 60 inches; number of tubes, 26 ; 24 inches; height, 60 inches; number of tubes, 26 ;
diameter of tubes, $21 / 4$ inches; length of tubes, 36 inches; diameter of tabes, 24 inches; lengto
grate surface, 207 square feet. A. Use the larger engine 4x6. 2. Will it be necessary to place the boiler below trap to return the water to the boiler. 3. Will it be of
any use to attempt to utilize the exhaust steam? any use to attempt to utilize the
Utilize it by heating the feed water.
(5) C. L. H. asks for some method of keep ing moulding clay moist for some length of time. A ix a little glycerinc with the wate
(6) C. E. A. asks what cement to use for fastening mineral specimens to woods-as in making
mineral caskets. A. Good glue or sealing wax answers very well. Thick solution of shellac in alcohol or in a hot aqueous solution of borax will also answer the re
quirements.
(7) E. A. R. asks how to preserve natural fowers. A. The fresh leaves are spread and pressed
into a suitable dish with alternate layers of fine, thoroughly dry sand, as hot as the hand can bear. When the sand has cooled they may be removed, smoothed,
and dipped for a few moments in clear French spirit and dipped for a few moments in clear French spirit
varnish, and allowed to dry in the air. By many melted white wax is preferred to the varnish. This latter
must not be too hor. The dried leaves are dipped in must not be too hot. The dried leaves are dipped in
the melted wax, drawn several times over the edge of the melted wax, drawn scveral times over the edge of
(8) H. T. N. writes: I have a marine arometer and do not understand exactly what effect the atmosphere has on it to foretell rain, snow, or wind
etc. I have asked others that have them; they differ and appear to know no more than myself. Please give
rules by which the changes are indicated. A. High rules by which the changes are indicated. A. High winds and storms are nsually preceded by a sudden fall
ing of the mercury. The approach of fine weather is
indicated by the rising of the mercury. The rising of indicated by the rising of the mercury. The rising of
the mercury in winter indicates frost; in frosty weather it indicates snow; while its fall indicates a thaw. I
sultry weather coming thunder is indicated by the falling of the,mercury. When the helght of the mercury
alters slowly, the kind of weather indicated will con. tinue for along time. If it falls,it will be foul; if it rises, $t$ will be fair. Fuctualons the mercural column ndicate changeable weather. These rules may be re-
lied on in a general way. No positive rules can
(9) W. H. D. asks: What will color char coal and tallow a dark red-a good permanent dye? A. We know of no satisfactory method of dyeing charcoal
red. Perhaps the admixture of a small quantity of red ocher or Berlin red with the tallow would answer the requirements.
(10) J. S. writes: I am engaged to some stent in brass casting, using old metal almost exclusively. I am unable to make sound castings, and desire
some information. It is not the fault of the moulds, as I have notrouble with new metal. The trouble seems to
be a sort of white scum of oxide which forms very be a sort of white scum of oxide which forms very
rapidly, which, going into the mould with the metal, makes the castings porous and rotten. A. Stir the
molten metal well with a stick of grecn wood, and solten metal well with a stick of grecn wood, and
sprinkle the surface with a little dry argol and salammoniac before pouring.
(11) C. T. E. asks: 1. What are the ingredients and quantities for manufacturing black and
brown hair dyess A. See p, 348, Cooley's "Cyclopedia of Practical Receipts." 2. What is the best method of preparing violin rosin? A. Moisten the powdercd rosin thoroughly with turpentine spirits, agitate with about
ten parts of water,and boil the milky liquid for an hour. ten parts of water,and boil the milky liquid for an ho
(12) J. C. W. writes: In the May 10th Queries," W. A. B. asks how to procure powdered silver such as is used in the Righi telephone. You suglowing, which is mainly an old chemical method, and may or may not answer the requirements of W.A. B.: Make a solution of nitrate of silver by dissolving the crystallized salt in pure distilled water, and of such strength as that about 60 grains shall be in one gallon of the water. By making the solution stronger or
weaker, more or less coarseness of the powder will reweaker, more or less coarseness of the powder will re-
sult. After solution is made immerse in it a strip or about 24 cean copper sheet, and set the whole aside for tated upon the stripn the silver will have been peciple me tated upon the strips of copper in a finely divided me-
tallic state. I am inclined to the opinion that frequent or constant agitation of the liquid will produce a better result than if the precipitation is allowed to proceed un-
disturbed, but cannot say positively that it will. disturbed, but cannot say positively that it will. After
the action is completed shake or agitate the vessel so as to detach the loosely adhering coat of silver from the copper strips, and having removed the latter, collect the silver by filtering the liquid through paper, rinsing all the precipitate into the filter. After the water has
passed wash the precipitate with water containing one passed wash the precipitate with water containing one
or two per cent of aqua ammonia until all the copper (or or two per cent of aqua ammonia until all the copper (or
cupric nitrate) is removed from the silver powder. Any cupric nitrate) is removed from the silver powder. Any
accidental chloride of silver will be thus removed also. Then let the water drain out of the filter until it ceases to drip, when a continuation of the washing may be reof the water. After this wash out the alcohol with stronger ether or ether containing no water, then ex pose the filter (opened freely to the air) to a warm temperature, avoiding the approach of flame, for fear of setand may be easily rubbed to a fine soft metallic powder and may be easily rubbed to a
by passing through a fine sieve
(13) S. M. L. writes: 1. I wish to construct a wheel seven inches in diameter and two inches thick. one half in open air. The wheel sits horizontally, the shaft being vertical. The distance between bearings is about five inches. What is the smallest sized iron or
steel shaft I could nse with safety? I estimate the side steel shaft I could nse with safety? I estimate the side pressure to be about 210 lbs. A. $9-16$ inch. 2. If a tube
be placed in water, and the air exhausted from the tube be placed in water, and the air exhausted from the tube,
the water will rise about 30 feet. If a turbine wheel were placed in the tube, about on a level with the surface of the water, would the water exert a force on the wheel equivalent to a fall of 30 feet in open air, supposing the weight of the water above the whecl to be taken off? A. No. 3. Is there any safe rule for estimating
the horse power of turbine wheels under a given pressure, and the number of revolutions they will make and the amount of water they will pass, in a given time? A. Turbine manufacturers have such rules. 4. Can vent perpetual motion machines, one which gives sketches and descriptions of the most important plans that have been devised by inventors? A." "Perpetuum
Mobile, or Search for Self Motive Power," by H. Dircks.
(14) C. A. S. writes: In the Scientific MERICAN, page 230 , volume 38 (April13, 1878), is give a process for copying tracings by the aid of photography It is claimed that this process will give a copy in dar (deep blue) lines on a white ground. I have repeatedly tried the process, over and over again, but have not yet
succeeded in getting the result desired. The best result I can get is a copy of dark blue lines on a nearly equal ly dark blue ground, the ground being only a shade lighter than the drawing, however long I may leave the paper exposed to the light. Will you please inform $m$ what the trouble is? A. Potassium ferrocyanide pro duces in solutions of the ferrous (proto) salts a bluis white (nearly white) precipitate, which by absorption o
atmospheric oxygen speedily acquires a distinct blu color. The oxygen speedily acquires a distinct blue posure to the air, dilute the solutions employed some
(15)
(15) R. V. H. asks: How can I make a sil vering solution so I can appiy with a cloth and have a
silver plate? I have a recipe but it rubs off with the hand. silver plate? I have a recipe but it rubs off with the hand
The recipe is as follows: 2 drachms nitrate of silver 41. drachms water; 1 drachm sal ammoniac; 4 drachm each chalk and soda. A. The silver deposited in this manner is a mere wash and cannot be expected to stand much handling. A better wash than the one referred to
is prepared as follows: Dissolve $1 / 2$ ounce silver nitrate in is prepared as follows: Dissolve $1 / 2$ ounce silver nitrate in
a small quantity of water, warm, agitate this with about

1-3 ounce of pare hydrochloric acid, and let the precipi-
tate subside. Wash this (silver chloride) several times, tate subside. Wash this (silver chloride) several times, sium cyanide in soft water; add this gradually (warm) to the precipitate until the latter is completely dissolved, and dilute the solution to one gallon. Dip the articles (brass or copper) to be silvered in strong hot potash solution, rinse in water, scour with a brush and fine dark deposit is obtained, add more water to the bath; if t coats slowly, add more silver chloride. As the silver s gradually abstracted more of the chloride must be added. If properly silvered the work will admit of polishing. A trace of grease or dirt on the work will spoil the deposit. Cyanide of potassium is very
poisonous, and care should therefore be taken to avoid poisonous, and care should thererore be taken to avoid
introducing it, through cuts or otherwise, into the sys-
(16) T. A. writes: I am thinking of geting a condensing steam engine, and have been told that (for condensing purposes) than would a non-condensing engine. Could I use two wells for this parpose, by run-
ning the condensed steam (water) to the second well, ning the condensed steam (water) to the second well,
aud then the nest day use this same water for condensing purposes again; and then running it to the first well gain, and so back and forth, using the same water over ould be actually lost or evaporated each day, say in a 12 hours' run with 50 horse power engine? A. Your mode of using two wells will answer if they are of sufflcient capacity to give time for one to cool off while using water from the other. The water should, in cool-
ing, be reduced in temperature about 40 degrees. If your boiler and engine are tight, the loss would probaly not exceed 5 per cent. But is a
(17) O. E. writes: I want to make an elec tro-magnet capable of lifung 1 ounce $1 / 4$ of an inch. 1 . A. Make the cores $11 / 2$ inch long, $1 / 2$ inch in diameter ind them with 6 or 8 layers of No. 20 covered wire What battery and conducting wire will be best, cir thit about 15 feet? A. If for continued use, use two or ell of Grenet or Bunsen would do. For conducting wire use No 16. 3. How should I fasten the wire to the
core? A. The wire is not fastened to the core. For method of making magnets and full particulars as to roportions, resistance, etc., see Scientipic American trated by over 50 cuts.
(18) E. C. B. writes: In a recent query, ove a table by electricity by placing their hands upo m, without pressing upon it? You simply answer "no." Now I would like an explanation. I have been one of seven who moved a table in this way, it going around Time to start about twenty minutes. If it is not the lectric current, what is it? A. Muscle generally, som times muscle combined with a vacuum formed in the palms of the hands of some of the table mover
(19) H. G. A. S. asks: Will you be kind enough to tell me what about is the total strain on a 7 ,
and Steinway \& Sons make, bears a total strain of 66.00 lb . Parlor grands of the same make average $30,000 \mathrm{lb}$. strain each; and upright pianos, having also thre
strings to each note, from 20,000 to $25,000 \mathrm{lb}$., accord ng to size; the square grand pianos, 7 1-3 octave, being partly 3 stringed to each note, about $20,000 \mathrm{lb}$; octave square pianos, two strings to each note, abo $16,000 \mathrm{lb}$. each. 2. Some thorough work on tuning
and temperament? A. The only standard work, in and temperament? A. The only standard work, in which tuning and temperament are most scientifically ish language, is "Professor Helmholtz's Tous Seng ons."
(20) C. R. N. writes: 1. If there be a smal arture in a steam boiler, say one half inch in diamete riven into it having a square end than if the end wer harp and tapering; if so why? A. No, the pressure acts upon the total area of the opening. 2. Which has an coetric the throw bing equi? A. An accentric is simply a crank.
(21) E. A. W. asks: 1. Can a circular saw be made to revolve so rapidly that it will not cuts A ng saw or one at rest, or in other words, will lightnin trike one sooner than the other! A. We think the would be no difference. 3. Which will run easier, wheel with boxing much too large for spindle, or on having boxing that fits the spindle neatly? A. We With slack best; the shaft is then always in proper lin
(22) J. T. E. asks: 1. What is the strikin orce of a pile hammer falling twenty-two feet, weight ineteen cwl. A. $35 / 2$ ton. 2 . What will preven water from foaming in steam boilers? What canses different remedies are accordingly required. Often a mporarily
(23) J. H. B. asks: 1. Can a current water heel be made that can be used successfully for runwheel? A. Yes. 2. Can the motion of machinery ropelled by such a wheel be governed, and how? A. yantity and velocity of a current of water be to the uce a 25 horse power? A. Consult a good millwrigh or engineer as to the special conditions of your case
(24) E. M. asks (1) if it would be advisable o have small pump exhaust into boiler chimney. A sipkion indispensable to a steam gauge? A. To inte pose between the steam and the diaphragm of the gange short column of water, which prevents the heat of the
(25) A. L. G. asks if expansion joints ca
e used with saccess in a line of steam pipe one han
dred and twenty feet long. We have a great deal of trouble in keeping our unions tight; the steam is used or heating purposes, one line of piping 120 feet, one trap. A. Yes, with entire success, if you put in enough Mr
Minerals, etc.-Specimens have been re eived from the following correspondents, and xamined, with the results stated:
C. A. J.-It is chalcocite or copper glance, with malauantity. Thbe ore of copper if found in sufficient ermined by a quantitative analysis.-A. S. -The socalled ore consists chiefly of iron sulphide, bronze powder or Dutch gold leaf (brass), sheet metal clippings, and The grael conists chiefly of quat of this may prove auriferous.- No name.-The specien contains much silica, iron, and lime. It may prove -E. B. S.-Quartz pebbles,-W. M. B.-The object is a ossil one of the extremities of the internal bone or shell of a Belemnite, a cephalopod which was very abundant uring the Cretaceous Period,to which the green sand of your State belongs. The animal was allied to and much portion you send is what the scientists call the phrag mortion you send is what the scientists call the phas wivided into deeply concave air cham bers (which you may see by holding a specimen up to the light), and these were connected with each other by a tube. It was originally exceedingly delicate, and owes ts preservation in its present hard state to the infiltra-

COMMUNTCATIONS RECEIVED
On a Mathematical Discovery. By J.C. M.
[OFFICIAL.]
INDEX OF INVENTIONS por which
Letters Patent of the United States were Granted in the Week Ending May 20, 1879 ,
AND EACH BEARING THAT DATE [Those marked (r) are reissued patents.]

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