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## Vol. $\underset{\text { [NEWSERIES.] }}{\text { XXXI }}$.]

NEW YORK, JULY 31, 1875.


## IMPROVED BOILER AND FEED WATER HEATER.

We publish herewith illustrations of a boiler designed expressly to economize fuel. We select them from the pages of Iron, which journal accompanies them with some sen sible remarks, the gist of which is as follows:
If there is one department of engineering receiving more attention than any other at present, it is that of economy of bece the tempgrature of the escaping gases fuel. And this is very justly so, since, fuel. And this is very justly so, since,
like a horse, the expense of boiler or like a horse, the expense of boine power does not lie in its first engine power does not lie in its first cost, but in what it afterwards con-
sumes. We take it, as a rough calculasumes. We take it, as a rough calculaburn its own value in coals about every six or nine months, according to its efficiency and economy.
There is, undoubtedly, very wide margin forimprovement in our present construction of boilers and engines. It is well known that only about one tenth of the theoretical value of the motive power of fuel is utilized in ordinary boilers and engines. What a inary boilers and engives. What a earful wal the whole fuel used represents! Money thrown away; our natural resources
more rapidly impoverished; the atmosphere laden with carbonic acid and other impurities; and our buildings and edifices disfigured. with our wasted coal, or soot.
A considerable portion of this waste of power lies with the mechanical arraugements of the engine. It is comparatively lately that the true principles of obtaining the full work from the steam used has been fully and generally understood. Unrestricted radiation from cylınders, boilers, and pipes, poor expansion, and throttling in the steam pipes are to be thanked for much of this waste. Probably, however, much more is to be attributed to the wasteful $u$ se of fuel in boilers. This may be occasioned in many ways, but the sum total of the matter will alwuys amount to the fact that so much of the whole tuel and beat goes out of the climney unutilized. It is thus that such a very striking saving in fuel may, with the best arrangements, be effected.
It is a difficult matter to decide immediately what description of boiler should be best for econumy, or in what direction the most economy may be effected. If a user of steam power be inclined to invest in the best boiler he can obtain for the highest economy of fuel, he would very soon be bewildered by the very contradictory statements that he might hear on the subject. He will hear, in one direction, that he must use a multitubular boiler for economy, although he sees that it is open to the grave defects of complexity, difficult to lean, liability to wear out in the tubes and so on. On the other band, he will hear it stoutly maintained, and very fairly borne out by facts, that the old Cornish boiler properly used, cannet be beaten for econo my of fuel, and gives at the same time the utmost solidity, facility for cleaning, and the greatest durability.
Some engineers will be found to rely most for economy on special grate arrange-ments-patent fire doors, automatic stokers, fire bars, etc. Others will laugh these to corn, and say that they are useless new fangled notions, and simply are a further expense and trouble. It is probable that there is some truth in all the various opinions, and the varying practical result are achieved according to the special cir cumstaces of each case.
We only propose to consider the action and waste of the hot gases of combustion in being allowed to pass freely into the open air. It is at once seen that the comparison between the temperature in the fire box and in the chimney will give us one of the best tests as to the in the chimner will give us one of the best tests as to the economy with which the boiler is working, and that for per
fect economy the escaping heat should not be greater than that of the steam. The question is, how is this effect to be obtained? And, if obtained, will it answer, practically?


A very large additional heating surface is thus added to the boiler, which materially aids in absorbing the heat from the gases of combustion. The absorbed heat, which would otherwise have passed up the chimney and have been wasted,
is thus utilized in heating the feed water to about $250^{\circ}$ or the buildings.
$300^{\circ} \mathrm{Fah}$. This is sufficient to effect a gain of from 15 per cent to 30 per cent on the former consumption of fuel, depending upon the amount of heat formerly going to wastein the different instances. The broad principle on which such considerable economy may be effected is easily seen when we consider that, if the whole of the water evaporated is raised from $60^{\circ}$ to $300^{\circ}$ before going into the boiler, this represents some 20 or 25 per cent of the whole heat required to vaporize the water into steam
Referring to our illustration, we see a circular arrangement of the pipes of the economizer, which admits of a very convenient attachment in the center of his latest patented improvement, namely , the feed water filter. The sectional view, Fig. 1, shows this useful addition to the feed water heater. The hot water, after having ascended to the top of the outside set of pipes, and having been thus raised to its highest temperature, is then ready to precipitate and part with its suspended matter. This is effected by diverting the stream downwards through a central pipe in the filter into the deposit basin below, the clean feed water ascending again around the descending tube, and being thence taken to the boiler. The suspended sediment becomes separated from the water by the abrupt reversal of the current, and thus collects in the basin provided for that purpose at the bottom of the filter. This deposit basin is fitted with a door or cover, from which the sediment can be removed as it collects. Theimportance that should be alwavs attached to the prevention of incrustaation upon the henting surfaces of boil tion upon the heating surfaces of boilers is now becoming more thoroughly appreciated. The advantages derived from keeping boilers clean are threefold; first, greater safety agaiust explosion, since the failing of plates is frequently due to their overheating or bursing trom oeposit; second, much greater economy in the evaporation of water, as calcareous sediment is a very bad conductor of heat; third, considerable economy in the cost of boiler repairs, as the plates, being always exposed to the water, are less likely to be come leaky. The ioventor uses quadcome leaky. The ioventor uses quad- that it can only be permitted to reduce the temperature of $\mid$ ruple scrapers, which insure perfect cleariou in our illustrathe escaping prodicts to a degree which shall not interfere wi $h$ the draft or the brightness of the fire
In a very large proportion of boilers at present in use. the emperature of the escaping gases is probably very much higher than is compatible with economical working. To render useful this hitherto large proportion of wasted heat is the from soot. The raising and lowering actiou in our illustra-
tion is very simple and compact, and a considerable improvement over former arrangements. An advantage in the way in which the tubes are connected at the top and bottom consists in their connections being separate circular pipes-the best form to resist pressure-rather than a flat-sided box. The arrangement also admits of very easy withdrawal and replacing of any one of the tubes when required, the bottom joint beiny made on a slightly tapered face. The joints are all made metal to metal, and will, therefore, stand any amount of heat. This builer and heater is the invention of Mr. Joseph Twibill, of Hulme, near Manchester, England.

## New Electro-Magnetic Clock.

Messrs. T. Cooke and Sons, of York, England, have completed the erection of an electric motor and clock dial in the telegraph gallery of the new buildings of the General Post Office, London, which, in some points, is novel and interesting. The hands of the large dial, which are driven by the motor, are at a distance of about forty-five feet from it, and are connected to it by means of iron rods and several pair of bevel wheels for turning the bends. The dial itself is six feet in diameter, and such is the sensitiveness and power of the motor that the connecting rods, bevel.wheel work, and hands, are driven by a single Lelanché cell of small size, the current from which is transmitted by the standard clock in the gallery. The motor consists by the standard clock in the gallery. The motor consists simply of a polarized pendulum vibrating between two pairs of electro magnets, carrying a double ratchet at the upper
end, the pointer of which is worked by a vane at the top of

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## THE STRENGTH OF INSECTS.

It is said that he is a philosopher who can accept the in evitable without repining. There are times in our lives when the most unpleasant things are forced upon our atten tion, and we fail with our best efforts to rid ourselves of them. As warm weather advauces, we need no argument to convince us that the insects which destroy our vegetation, offend us with their presence, and even without permission cause our own blood to course through their veins, are among the inevitables. To accept these without complaint or repin ing would surely give us undisputed title to the name of philosophers; and if we could find anything of pleasure in stead of annoyance in our involuntary contemplation of them we would be doubly worthy of the appellation. That they all serve some useful purpose, cannot be denied; and if we knew their whole history we should doubtless be fully convinced of this. Some of our greatest pests, as flies and mos quitoes, have already been shown quite clearly to be our friends rather than our enemies.
Besides their practical benefit, there is no little interest in noticing the great physical force which they exert. We call a man, a horse, a lion, or an elephant strong; but it is very easy to see that, proportionally, insects are the strongest ani mals that live. They manifest their strength in running, leaping, flying, and sometimes in other ways. Some insects have been known to run so rapidly that, if a man of ordinary size should make as good time, proportionally, he would ru more than twenty miles per minute, or sixty times the ordin ary rate of a railroad train. A locust with the aid of its wings will leap 200 times its own length; to equal which, a
man would need to leap nearly a quarter of a mile. A flea man would need to leap nearly a quarter of a mile. A flea,
without wings, will leap the same relative distance; and it without wings, will leap the same relative distance; and it
has been estimated that, if a horse should jump as far in pro portion to its weight, it would scale the Rocky Mountains in a single leap. Most insects jump by means of their hind legs and the latter part of the hind body; but one family of beetles-the elateride or spring beetles-leap vertically when on their backs, by use of a spine on the hinder part of the thorax which fits into a cavity behind it, and which, when forcibly closed and acting like a spring, throws the beetle several inches into the air. While in the very act of writing this, one of this family pays me a visit, and shows its power by making several springs at least six inches in hight, which is about twelve times its own length. Some dragon flies are among the strongest on the wing. They can be seen flying about pools of water after smaller insects for hours at a time, turning, wheeling, going sideways, and in nearly every conceivable direction, and never seem to think of being tired. And, what is very remarkable, they have the power of chang ing at right angles the direction of their flight, and so sud denly that one can hardly ever be quick enough to hit or cap ture them. The Entomological Magazine speaks of one o these chat flow on a vessel at sea when the nearest land was
the coast of Africa, 500 miles away. A humble bee has been seen to follow a rail car going twenty miles per hour, agains a strong wind, for a considerable distance; and it even went
faster than the car, as it flew to and fro and in various zigfaster than the car, as it flew to and fro and in various zig zags around the vehicle. Some beetles have a flight swifter,
onsidering their size, than any bird; and Linnæus mention a butterfly that sometimes travels more than a hundred mile on the wing at one flight; he also says that an elephant hav ing the force of a horn beetle would be able to move a moun tain. All have doubtless seen a beetle move a candlestick o lamp in his efforts to escape from underneath it; and he has been compared to a prisoner in Newgate shaking the build ing with his back. Pliny said, long ago, that, if we compar he loads of ants with the size of their bodies, "it must b allowed that no other animal is endowed with such strength
in proportion." Some interesting and ingenious experiments for measuring he strength of insects have lately been made by a Belgian naturalist named Plateau. He first tested their power of raising weights while walking on a level surface. His novel method of doing this was to harness the insect by a horizonal thread running over an easily-moving pulley, at the other end of which was attached a scale pan for holding sand. To keep theinsect in a straight direction, he fenced it in between wo parallel strips of glass; and to keep it from slipping, he cored its track with corrse muslin. As the insect moved orward, it pulled the thread over the pulley and raised th sect could move no longer. The insect and the sand it had raised were then weighed, and the relation between the eight of the two was obtained. He found that the insec could raise forty times its own weight; while by a simila nethod a man could raise only five sixths of his weight, and a borse only one half or two thirds of his. By repeating each experiment three times and emploging a vast number f insects of various sizes, and comparing his results, he came to the conclusion that the smaller insects in the sam roup invariably raise the greator weight in proportion to heir own weight.
He then tried their leaping power, by fastening the wings and elytra, and by suspending under the thorax (by a thread) bits of lead set in wax. He increased the weight till the insect could no longer raise it. Then, by his determination as before, he found that, while the largest crickets could raise in this way only about one and a half times their own weight, the smaller ones could raise three or four time ,

To test the pushing power of insects, he placed some of them n a long cardboard tube blackened on the inside and admit ting light only by a transparent glass at one end. To this glass was attached a lever which drew the scale pan over
the pulley, as in the first experiment. The insect, in its en the pulley, as in the first experiment. The insect, in its en and thus raised the weight. As results of these experiments, he found that, in inverse ratio to their weight, the pushing power varied from three or four to eighty or ninety times the insect's weight.
The power of flight possessed by insects was tested by fixing weights to the body in the same way as in leaping. He ound that they employ much less force in flying than in her efforts of strength; perhaps this is because, unlike irds, they are not intended to carry weights through the ir. Beetles raise in flight from one sixth to twice thei weight; flies, three times their weight. A drone weighs four imes as much as a bee, and drags less than fifteen times its weight, while the bee drags twenty-three or twenty-four mes her weight. But in flging, the bee raises nearly he wn weight, while the drone raises a weight equal to only half its own.
By these experiments, he found that his law applies equally well, whether the strength is exerted in walking, leaping pushing, or flying. He finds that it also applies, in a mea sure, to the entire class of insects taken together. as well as to the same group of insects taken by themselves. There re some exceptions to this, however, which are probably due to differences of structure. By dividing all the insects nto three groups-lightest, medium, and heaviest-he finds that the law holds good. Then the relative force is repre sented by the numbers 26,19 , and 9 respectively. The fac eems to be that the strength of an insect increases with th surface of a section, and not with the volume of its muscles This would make the weight increase faster than the motive power, and be consistent with the law that the smallest are rongest. It takes but a moment's reflection to see the wis om of this arrangement. Of course the hardness of the soil, the weight of the grains of sand, and all the resistance to be vercome are equally great to the small as to the large in sects, and it needs greater relative strength to give the sma larg a fair chance
But these facts and conclusions give rise to other questions which are not so easily answered. Since insects are stronge han other animals, on what food do these small Cæsars fee that they are grown so strong? Is their physical organiza ion formed on different mechanical principles? Have the power of creating or utilizing greater force from the food
they eat? Their food, being animal and vegetable, does not seem to differ materially from the food of other animals; and they seem to use the same mechanical powers in their moions. They are, in the perfect state (in which state they manifest their great strength), as a rule, very small feeders, and some eat even nathing. As their strength must come rom the food they eat, the question as to how so much can come from so little is as interesting as it is difficult. So far as we know, no attempt has ever been made to determine the laws of the relations between the amount of food consumed
and the strength which it generates. The difficulties ar perhaps not iusurmountable; but one great disturbing ele ment would probably appear in the fact that insects may store up force in their earlier stages which they use in the perfect state.

## RAPID TRANSIT IN NEW YORK.

A commission, appointed by virtue of a recent law of the Slate legislature, is now holding sessions in this city to de ermine upon the best plans for city steam railways. For merly it was considered that the underground method wa by far the best for a narrow and crowded city like New York, as it occupies no portion of the street surface, is out of sight ccasions no disturbance by its operation, and furnishes the most abundant accommodations for speed and the largest traf ic. In those days the proud New Yorker had determined to ave the best and most substantial railway works that could be built. But that was prior to the Tweed and other robberies, before the debt of the city had been swelled to over a hundred millions of dollars. Cheaper structures, it is now sup posed, will answer, and on this account the elevated plan has come to be looked upon with special favor.
At a recent sitting of the Commissioners, no less than thirty different plans for rapid transit were presented, all of which were for elevated tracks except one, the latter being for canal railway between the buildings, with bridges or tunnels or the street crossings.
All of these elevated plans involve the placing of bridge tructures of some sort, in several of the principal streets and there appears to be a peculiar unanimity among the citi ens on the subject. Nearly every person is in favor of such oads, but no one wants it to run in his street or in front o his store or dwelling. The Sixth avenue people think that an elevated railway is greatly needed, and will do their share toward its construction, provided it is erected on Seventh avenue. The Seventh avenue people are equally in favor o the bridge, but are ready to rise in arms if their magnificent thoroughfare is disfigured with it; they are clearly of opin ion, however, that Eighth avenue is the proper place for $i$
The road must also cross the town somewhere, and thos who reside on 42d, a fine broad street, are in its favor, pro ided it is erected on their neighbors' premises, a quarter o mile distant, say, on 37th street; and they are of opinio hat the constant passing of cars and locomotives in front o the second story windows of their friends down there wil mpruve their prospects and bealths, which now suffer by reason of too much quietude and seclusion.
To satisfy the public will be an apparently difficult task or the new Commissioners; but we wish them success. Tiey will doubtless find out, before their labors are finished, tha the building and equipping a first class substantial railway for rapid transit, capacities being equal, is just as expensiv on the elevated as on the underground plan.
In the neighboring city of Brooklyn, the projected elevated sreet railway is also accepted with pleasure by the people. " But when the route of the proposed road is mentioned ther is,' says the New York Herald, "at once a persistent and screeching dissent Property bolders on Myrtle avenue com orward and scream against building the road on that ave ue.'

## A CITY ONE HUNDRED AND EIGHTY THOUSAND YEARS OLD.

In the current number of the Overland, a Californian geclo gist reviews the geological evidence of the antiquity of a uman settlement near the present town of Cherokee in that State, and estimates the age of that most ancient of discov red towns to be not less than 180,000 years!
The data for all such calculations are necessarily uncer ain, as they are derived from the present motions of th continents and present rates of erosion: still, from the changes that have taken place since the pioneers of prehis toric California left their traces on its ancient sea shore here can be no doubt that thousands of centuries must have come and gone.
The traces in question are numerous stone mortars, found in undisturbed white and yellow gravel of a subaqueous for mation, not fluviatile, underlying the vast sheets of volcunic rock of which Table Mountain is a part. In one instance mortar was found standing upright, with the pestle in it, ap parently just as it had been left by its owner. In som ases the mortars have been found at the depth of forty fee rom the surface of the gravel underlying Table Mountain The distribution of the mortars is such as to indicate with reat positiveness the former existence of a human settle ment on that ancient beach when the water stood near th evel at which they occur: a time anterior to the volcanic outpouring which Table Mountain records, and anterior to he glacial epoch.
The recent geological history of that region may be briefy summed as foilows
Previous to the placing of the mortars in the position in which they have been found, the early and middle tertiary sea level had receded to the position of the coal beds under ying Table Mountain, fully one thousand feet below the evel of Cherokee. Subsequently, in the pliocene period, here was a further subsidence of about fifteen hundred feet, omething like six hundred feet occurring after the mortar ad been abandoned. All this, as has been noticed, took place before the volcanic outflows which covered up all the ancient detritus of the region, including that of the ancien ivers (whose gravelshave furnished so much of the gold of California). The geological age of the river period was de ermined by Lesquereux from specimens of vegetation, now xtinct, collected in the survey of the ancient rivers: speci ens indicating a flora of the pliocene age, retaining some characteristic miocene forms

After the volcanic period, the land rose again, the time of emergence embracing the glacial period and the new eroding period in the sierra, during which the slates, and the hard metamorphic greenstones, and the granites were slashed with cañons three thousand feet deep by the action of iceand running water. Taking the rates of continental movement determined by Lyell, our geologist calculates that the time required for thechanges thus outlined could not have been less than eighteen hundred centuries. For a period so long preceding the glacial epoch as the time when ancient Cherokee was buried by the waters of the advancing sea, his estimate is certainly not extravagant, though it does transcend so enormously the time men have been accustomed to allow for man's residence on earth.

APPARITIONS.
From time to time, as there was occasion, we have referred to the so-called revelations of modern spiritualism, to the to the so-called revelations of modern spiritualism, to the
discovery of gross imposture in connection with the same, discovery of gross imposture in connection with the same,
and to the strange hallucinations, in regard to this subject, and to the strange hallucinations, in regard to this subject,
which have overtaken even men who have no mean pretentions to the name of scientists. We have just seen a resume of the history and theories of supernatural appearances and influences, in the second volume of the new edition of the Encyclopedia Britarnica, a work which is generally regarded as an unusually high authority. The article to which we refer traces the origin of and reasons for superstitious beliefs, considers the evidence for the reputed appearance of ghosts, and concludes with the principal arguments for and against the creed of the spiritualists. The writer of the article evidently considers the strength of the argument, in favor of spiritualism, to consist in the character of a few of Es supporters, men like Mr. Wallace and Mr. Crookes in England, and Robert Dale Owen in this country. Reference is made to the experience of Mr. Crookes, who not only saw
a spirit, but clasped it in his arms, and thus demonstrated a spirit, but clasped it in his arms, and thus demonstrated
its substantial existence; and the conclusion to the whole its substantial existence; and the conclusion to the whole
matter is that spiritualism, even if its principles are not matter is that spiritualism, even if its principles are no
fully proven, is still a fair subject for scientific investigation with a reasonable presumption in its favor
We have referred to this article in the Encyclopedia Britannica because an opinion, such as that cited above, in a publication of such high standing, is worthy of more than passing notice. No matter how wonderful the events that gregation of spiritualists, their revelations have little effect on any one outside the circle of their immediate followers; but let a man of somescientific attainments, and, moreover, a member of the Royal Society, add his testimony to the truth of these events, and we see that he may deceive even edition of the Encyclopedia Britannica was announced, that edition of the Encyclopedia Britannica was announced, that
it was to $\mathrm{b} \geqslant$ scientific in the best sense of the term, and, while it was to $\mathrm{b} \geqslant$ scientific in the best sense of the term, and, while
giving due weight to popular beliefs and superstitions, that giving due weight to popular beliefs and superstitions, that
it would endeavor to sift away the chaff with which many of them are enveloped, and reveal their real character. We are to understand, then, from the article under consideration, that such investigations as have been made by some of the more distinguished converts to spiritualism can properly be classed under the head of scientific experiments, which, while not perhaps absolutely conclusive, leave the matter sub judice. When we remember the character of the evidence on which all the modern muracles depends, the difficulty if not impossibility of making a thorough investigation with the facilities afforded at a sianc., and the complete exposure of all the notorious cases of sp.r. $\cdot$ ual visions, ou "Apparitions" in the Encyclopedia Britinnnica either gives a "Apparitions" in the Encyclopedia Britirnnica either gives a
clear understanding of the actual facts connected with spir itualism, or represents in any sense the views of scientists generally in regard to the matter. No mention is made, for instance, of the exposure of the Katie King fraud in this country, while the $\stackrel{r}{ }$ sion of this airy being, produced in England under the auspices of the same mediums, is given as one of the strong arguments for allowing spiritualism to have a standing among scientific men. For our part, we can say that we have never heard of any event at a spiritualistic se. ance that at all approached the movements of the wonderful Psycho, in London, whose rationale escaped detection for months, with exhibitions in open day, and with app
every facility for investigation that could be desired.

PROSPECTS OF SCIENCE ON THE PACIFIC SLOPE.
The conditions for the advancement of Science beyond the Rocky Mountains are peculiarly favorable. The country itself presents an exhaustless field of research in every de partment of the physical and vital history of the world. Its records of continental upheaval and subsidence, of ancient
rivers and vanished seas, of vast volcanic outpourings and rivers and vanished seas, of vast volcanic outpourings and
vaster scenes of erosion, are wonderfully full and legible In the beds of its tertiary lakes are the remains of multitudes of the progenitors of recent forms of animal and vegetable life-inexhaustible mines of material for the solution of the great problems of evolution. On the shores of those lakes and rivers dwelt the most ancient races of men that geology has furnished glimpses of. Already abundant traces of them
have been discovered in and beneath the later tertiary strata, have been discovered in and beneath the later tertiary strata,
and it is not unreasonable to hope that future observation and it is not unreasonable to hope that future observation
may connect them with the post-glacial founders of the may connect them with the post-glacial founders of the
civilizations which grew up along the valley of the Colorado, before that strange river had sunk its channel a mile below the surface of the plain it once watered, probably before the Nile spread its first layer of fertile soil over the foundation sands of ancient Egypt. Chemical geology has already been immensely furthered by the knowledge gained through the mining operations of the interior and the investigations they
have inspired; while the demands fur men of scientific training, incident to a country so largely given to mining, have secured to the Pacific Slope a proportion of scientific observIns unequaled in any other country.
In older communities, Science and scientific thinking have to contend with the conservatism of custom and the traditions of scholastic culture; in the far west, where scientific training has been at a premium from the first, where public prosperity rests so largely on scientific operations, Science is likely to get more than its fair share of encouragement rather than less.
In proof of this
in proof of this, it is necessary only to contrast the financial condition of the California Academy of Sciences with that of our eastern societies of like character. It is true that something more than money is needed for productive inves-
tigation: the natural and social conditions must be favorable, and there must be no lack of men of proper zeal and training to undertake the work. In this respect, as already noted, the Pacific Slope is as greatly favored as in its abundance of wealth; and only the grossest mismanagement of their means and opportunities can prevent the richest harvest of scientific achievement by the Pacific scientists, whet independent or connected with the California Academy.
The magnificent scope and execution of Mr. Bancroft's recoast, afford atection with the native races of the Pacific working, and a model of thorough scientific investigation We shall be greatly disappointed if Mr. Bancroft's work does not prove to be the first of a long series of correspondingly valuable researches in other departments of knowledge undertaken by the scientific workers of the west. Hitherto their work has of necessity been chiefly of a practical, money-
making sort. It has given them the best possible training for the conduct of investigations of broader scope and re moter profit. The work lies ready at hand; and it is safe to predict its prosecution with true western vigor and thorough

## DANGERS OF CHLORAL DRINKING.

Blessed be the man that invented sleep, said the immortal Sancho Panza. When the primary physiological effect of chloral was first made known, thousands called down equal lessings on the man who discovered that simple and seem ingly harmless sleep compeller. No matter what cares mad stranger of " tired Nature's sweet restorer," painless key to the soothing realm of Morpheus, with no ap parent penalties to pay for the invasion. It is not surprising herefore, that chloral soon came to be employed, withou medical direction, to a greater extent than had ever been the case with any other sedative
But experience has not justified the implicit confidence re posed in it. Its apparent harmlessness only made the insid ous effects of its daily use the more dangerous. Though it might not kill directly, it too frequently enabled death to ake place from causes that would not have been immediately fatal without the sedative influence of the drug on processes needful for life; and not infrequently the mashinery of life came to a stand under its influence when no other disturbing cause could be detected : more frequently, perhaps, the Lan chloroform, with which it has many chemical and a few physiological relations. The danger of premature death, however, is not the gravest consequence of chloral drinking and the Lancet editorially predicts that some day, when the punishment for the misuse of the drug falls upon some sen sitive temperament and gifted intellect, we shall have the "Confessions of a Chloral Drinker," to take its place beside De Quincy's " Confessions of an Opium Eater.'
There seem to be two sources of danger attending the habitual use of chloral. The most obvious arises from the he result of improper living. The proper cure for the dis tressing symptom is a return to right living, which will never be done so long as the penalty is masked. Instead of curing the disease. chloral simply hauls down the danger signal and permits the wrong doer to hurry on to complete destruction. It is thus a deiusion and a snare.
But this is not the worst. Chloral is itself a serious dis urber of the vital economr, though its action is very slow. turber of the vital economr, though its action is very slow.
Healthy life is the attendant, if not the effect, of a properly balanced and correctly working organism. Any tampering with our physiological machinery, more especially if habit ual, is of necessity mischievous; and the practice of chloral
drinking is such an interference. We see its immediate drinking is such an interference. We see its immediate
effect in the phenomena of sleep; and there is an analogy, as effect in the phenomena of sleep; and there is an analogy, a
he Lancet points out, between the temporary effect of a sin gle dose, and the permanent effect of its habitual use.
"In sleep, the sensory recipient and lower motor centers are separated from those of consciousness and will with which, during the waking state, they are in close connection. This eparation can take place only under certain conditions,which ary much in different individuals. Chloral introduces an artificial influence, and separates forcibly those functions of the nervous system which would otherwise have been linked togetber. It stills unpleasant emotion-removes disagreeable
sensation-paralyzes the will. This can hardly occur repeatedly without some permanent effect. Each region of its influence presents an example of perverted action. The will ecomes weakened, emotional manifestations are in the chloral perverted, and their action is no longer under the same con rol of associated impressions. All influences of a depressing character are felt more keenly. The sufferer becomes mor sory disturbances become frequent, and with them various
paretic phenomena depending chiefiy on defective will Ultimately still graver consequences may result. Delirium, imbecility, and paralysis of the pharynx and œesophagus are among the symptoms which have occurred in recorded cases, and which have ceased when the habitual dose was discontinued. All the time the supposed need for sedatives increases, the craving therefor may become as intolerable as for opium-the patient moaning for chloral which he can hardly swallow-while sleep gradually becomes impossible except under artificial influence.'
This is a serious showing for a drug popularly believed to be absolutely safe and harmless. And when we add, to its direct injuries to the nervous system, its indirect influence in direct injuries to the nervous system, its indirect influence in
perpetuating the unsanitary conditions and habits which lead to a resort to it, the need of caution in its use and the propriety of a resort to it, the need of caution in its use and the propriety
of and of abstaining from its use
be apparent to the dullest.

## COLLEGIATE RACES

Now that the excitement of the intercollegiate regatta has waned, there will, we think, occur to many some sober sec ond thoughts, regarding that and all similar competitions, which deserve more than a passing consideration. Physical pluck and endurance will always command admiration; but whether such qualities are to be considered superior to others which involve the higher attributes of the mind, so as to war rant their cultivation in lieu of or to the detriment of the lat ter, is a question which quickly suggests itself in view of the elative importance popularly accorded to the recent display f physical strength and to the several college commence ments which lately have occurred. If the columns of the daily press are to be taken as an index, the meager space allowed to the reports of the latter exercises, and the almos nlimited enterprise exhibited in securing the most trivia particulars relative to the boat race and its participants, show plainly on which side popular interest is enlisted Are we then to infer that superiority at the oar, or on the race course, is by the friends of education, as well as by the people generally, ranked higher than superiority in mental attainments? We hope not-we believe not-but then, are we not tacitly at least encouraging such a conclusion in the minds of the young men who fill our colleges?
There can be no gainsaying the fact that a certain amoun of physical culture is a necessary concomitant to good health. A well balanced and healthy brain is rarely found in a weak and decrepit body. Mens sana in corpore sano is a in a weak and decrepit body. Mens sana in corpore sano is a
wretchedly trite proverb, but none the less true; and cerwretchedly trite proverb, but none the less true; and cer-
tainly there is no class to whom its precept is more important than to those who in youth undertake a four years course of study. But physical culture carried to excess is as bad as no culture at all, or even worse, since it may leave be hind it, after severe exertion, injuries which are ineradicable: or Nature, strained beyond endurance may give way in he hour of trial, and, as in the case of Renforth the oarsman, death may triumph in the midst of the contest. Every account of the recent regatta and the subsequent foot race grees in stating that, in very many cases, the marks of ove raining were apparent, facts abundantly proved by the ainting of some of the most muscular rowers, and by the pitiable condition in which, it is reported, several of appaently the strongest of the pedestrians concluded their efforts. While it cannot be expected that young men will fail to $b$ carried away by their own and by the intense popular enthu siam manifested in these competitions, and thus rush to xtremes both in the matter of physical exercise and in neg ect of other duties, it is not to be supposed that the olde nd wiser heads of college authorities and of parents will countenance proceedings fraught with bad results. To the ormer, especially, the public looks for a wise guidance of those under their charge ; and it is certainly as much their duty to impress upon their students the laws which govern health and correct living as those which underlie any department of knowledge. It certainly is their office to point out how far physical culture is beneficial as it is to how that its neglect is hurtful-to check it in one case as to ncourage it in the other
We are very much disposed to question the expediency of such contests as those now ended, and from another and different standpoint from that above taken. Their only ad vantages are an increase of esprit de corps among the students and the bringing of our educational institutions prominently o public notice. These, however, are more than compen sated for by the highly demoralizing effect which they possess, in common with all races or chance occurrence pizing which gambling can be based. It certainly is the race horse or the dice box; and the fact that betting is not only indulged in freely by the students themselves, but freel countenanced by the alumni, is not at all calculated to im rove the moral tone of the institutions in which young me re supposed to obtain the foundations for their subsequen careers.

## The New York Dock Department

George S. Greene, Jr., C. E., has recently been appointed Chief Engineer of the Dock Department of the city of New York, General Charles K. Graham having resigned. Mr Greene, although comparatively young, is an indefatigable worker, a thoroughly practical, experienced engineer, and a man of spotless character. The appointment reflects credit upon the Commissioners by whom the selection was made The administration of the Dock Department devolves upon a board of three Commissioners, namely, Salem H. Wales, form rly of the Scientific American, President, Jacob A. Wester velt, and Henry F. Dimock, all of whom are leading and in fluential citizens

IMPROVED AIR RESERVOIR
M. A. Galibert, of Paris, France, has recently patented in this country respiratory apparatus, consisting of an air reservoir made of a skin, india rubber, or any other airtight material, in which pipes are suitably arranged for inspiring and expiring the air from and into said reservoir.
The apparatus is intended for furnishing pure air for breath ing in localities where vitiated air. smoke, etc., render the atmosphere unfit to sustain life. The engraving represents the airtight bag. Two rubber or other flexible pipes penetrate to the inside of the air bag-one fastened near the top and the other dropping to a point near the bottom. These pipes, after passing to the outside a certain distance, are fastened to the mouthpiece, which is so shaped as to fit inside of the mouth, to be held by the help of the teeth and lips. Two straps are fastened to the air bag, and by them it is carried by the bearer.


In use the air bag is inflated with bellows. When full, the tubes are stopped by a pressure with the fingers, or by twisting them so as to arrest the escape of air from the bag The bag is now strapped to the back, the nose stopped with spring pinchers or otherwise, the mouthpiece is inserted between the lips, the pipes relieved from pressure, and the apparatus is now ready for use.

## dEvice for protecting horses,

Mr. R. P. Lawton, of Oramel, N. Y., has recently patened, through the Scientific American Patent Agency, a horse protector, the object of which is to allow the head piece of

the same to be used in place of the check rein, and be thrown out of the way on detaching it, while the body of the protector is so applied to the thills that the horse may be readily uuhitched without being hindered thereby. The reins are guided and supported in such a manner that no entangling of the tail with the same is possible.
In the engraving, A represents the main part or body of the horse protector, which is constructed in the usual manner of lateral bent wires, $a$, applied to longitudinal supporting wires, $b$. The net, blanket, or other article used for protecting the horse against flies, storms, sun, etc., is placed over the main frame, A, and supported by the same and suitable stiffening wires, which are stretched to connect diagonally over the bent pieces, $a$. The longitudinal supporting pieces, $b$, are bent at their rear ends into coiled springs, $d$, and firmly attached by means of socket slots and clamp screws, $e$, to the thills. The front ends of the side pieces, $b$, are bent under right angles toward the thills, and applied by end hooks, $f$, to loops or staples, $f^{\prime}$, of the thill. The action of the spiral springs, $d$, carries instantly the main part, A, in upward direction, as soon as the front ends of the supporting pieces
are detached from the thills, so that the horse can be unhitched without being interfered with by the supporting frame. The head piece, B, is attached to the upper part of wire piece, $g$, bing provided with a spiral spring, $g^{\prime}$, which has the tendency to throw the head piece back on the body, A, unless connected to the bridle. Light wire rods, $h$, con nect the front part of the head piece, $B$, with the bridle, and nect the front part of the head piece, B, with the bride, and
take thereby the place of the check rein for holding up the head of the horse The spring connection of head piece and head of the horse The spring connection of head piece and
body gives sufficient freedom to the head of the horse, that his check arrangement is not onerous to the same. The reins are supported, for the purpose of not getting entangled with he protector or tail, on a separate wire frame, C, which is also in yielding manner applied either to clamps of the har aess or attached to the main part, $A$. The reins first pass along a lateral V-shaped wire, $l$, of frame, C , placed lateral ly across and resting on the back of the horse, then over rea guide hooks, $m$, of the same, and finally over hooks or eyes $n$, of the bent rear wire, $a$, of the main frame, $A$, to the dri ver, who is thereby enabled to retain full control of the horse The protector may be constructed of steel wire of sutficient lightness to form a neat and practical attachment to the thills. In using the protector with a double team, in which case the thills are not available, it is necessary to suppor the same on a standard attached to the hip and back straps, the front ends being fastened into a slot or socket of the hames. The head piece is applied in the same manner in both cases.

## NEW CLINICAL THERMOSCOPE.

Dr. E. Seguin, of 17 East 21st street,New York city,has re cently invented a clinical instrument for the detection of anomalies in the condition as to heat of the human body. It is a very simple device of merely nominal cost, and is th most sensitive indicator of changes in temperature which w have ever seen. The inventor calls it the clinical thermo scope; and it consists of a glass tube, of a quarter of a line ore, seven inches long, closed at one end by a bulb nine lines in diameter, and flared at the other end. To make it ready for use, the bulb is heated over a lamp or fire, or more readily in a bowl of hot water; and when the air contained in the bu $b$ is heated to a few degrees above the atmospheric temperature, the open end is
$0^{*}$ quickly plunged an inch deep into, and quickly of withdrawn from, a bowl of cold water. The drop or two which will have then entered the mouth is seen to run up the tube. If it stops near the bulb, it will be the index of the ther moscope. If it stops sooner, say two or three inches from the mouth, or if it runs into th bulb, the latter was too cold or too hot, and w have to jerk away that drop of water and re commence; three or four trials, to obtain a good water index, take hardly a minute
In this condition, the air contained behind the water index makes itself isothermal to the
ordinary temperature, and the thermoscope is ready.
It is applied to any spot where an anomaly of caloricity is known or suspected. Its place by preference is in the closed hand. In five to ten seconds the index has attained the maximum hight or fall; and to read it, we note the dis tance the index drop of water travels, and the time in seconds it takes to reach it. To take more exact observations, a movable scale is at tached to the stem, so as to putits lowest figure on a level with the head of the water index; so that the thermoscope is always correct—" which," says Dr. Seguin, " is more than can be said of most of our clinical thermometers."
But with or without a scale, it gives indications of the thermal condition at the start ( $a$ ), and of the volume of hea escaping by radiation (b); while by gently blowing on the bulb, it shows the degree of combustion which takes place in the lungs; and other phenomena of heat may be diagnosed by its use.
Without using a scale,an attendant can tell, by application to the affected part of a patient's body, at what hour the in dex rose quicker and higher, or quicker only, and not so high, etc. Without a scale, too, a physician who well knows his case, and is short of time, can, in less than ten seconds decide upon the dynamic conditions of the next twelve or
twenty four hours, dependent on the waste of caloricity by radiation-that is to say, life itself in many cases-and prescribe accordingly.
Dr. Seguin recently communicated to the New York State Medical Society the following interesting case, in which the alue of his instrument was made apparent:
"Called to a man fallen from a three story hatchway, I found compound fracture of one leg and a fracture of the skull; and the patient, rather insensible to pain, had full consciousness, with jactitation, with a speck of erotism; his pulse was con fused, temperature $98.5^{\circ} \mathrm{Fah}$., in other terms,at the point of perfect health. Was it delusion? No, it was a compound temperature whose component elements escaped the fever thermometer.
"I tried the thermoscope. Put in the hand, it rose, in he axilla it rose more, below the sternum it rose less, in theinnerangle of the eye it fell rapidly. The thermoscope had discovered the point where extravased blood was coagulating, at the base of the brain. Thus it became compre-
hensible that a temperature of $98.5^{\circ}$ Fah., the thermal point of perfect health, may in a dying man be a compound temperature, whose composition could be approximated by these
figures: $100.3^{\circ} \mathrm{Fah}$. of general pyrexia, balanced by 96.7 Fah. of hemorrhagic apyrexia, equals $98.5^{\circ}$ Fah. This thermoscopic analysis saved the man further painful manipu lations, and hedied, as predicted, inside of three hours.
" The thermoscope in contact with the living shows the activity of their caloricity; and in contact with the dead, it ceases toindicate heat only as organic combustion become progressively extinct. As thousands have been buried alive he invention of a true necrometer excites a deep interest, in creased, if possible, since cremation was mooted. For some have knocked at their coffins and re-entered the world; but of what use would it be to knock for help inside the furnace The proof of death is wanted now more than ever, and, if " not mistaken, the thermoscope gives it.
"I give this simple and costless instrument to my confréres, begging them to try it in the spirit of candor which made Bio say: " We must not shun the humblest contrivances, when they can improve or supplement the medical senses."

## improved treadle sawing machine.

We illustrate herewith a sawing machine operated by a readle, in the engraving of which A represents a sawhorse

f the common construction, with side standards and latera cross pieces of suitable strength, for supporting the weigh of the body and the additional parts attached thereto. A platform treadle, $B$, is pivoted by a cross rod, $a$, to suitable bearings, $a^{\prime}$, of the side standards above the lateral bottom piece of the same, and made of concavo-convex shape, for giving a firmer hold to the feet of the person operating the machine, and preventing, also, the contact of the under side with the ground. The treadle, B, is extended to one side to project beyond the horse standard, and provided with an in clined lever arm, C, which is rigidly braced to the treadle, and connected by its curved extension, $C^{\prime}$, with the bifurca ed end of the saw frame, D. The rear part of extension, $\mathrm{C}^{\prime}$, is connected to a pivoted lever rod, $b$, with a crank wheel haft, $d^{\prime}$, and balance wheel, $e$, at the opposite side of the saw horse, with shaft, $d^{\prime}$, turning in suitable bearings of the same. The balance wheel is weighted at one side for the purpose of carrying the crank wheel into position to bereadi y moved by the treadleand arm, avoiding the position of the ame on one of the dead points for starting. The forked end of said frame, $D$, is adjustably pivoted to the rear end of the extension, $\mathrm{C}^{\prime}$, and reciprocating motion imparted to it by the arm and extension, $C^{\prime} C^{\prime}$. Said frame, $D$, is made in a curved shaped, in any approved manner, with a saw blade cutting in both directions, clamped adjustably and detacha bly therein. A rear extending amn, E , is bolted to the up per part of the sawhorse, A, serving for guiding the saw frame along the same, it being held in forward position for the sawing by a pin, $f$, of the same, and in rearward posi tion, when thrown back for adjusting the log, by a spring hook, $g$, near the outermost end of the arm, E. A V-shaped piece, $F$, corresponds in shape with the upper legs of the sawhorse, A, and slides by a groove, $h$, on the main cross piece of the sawhorse, and by a sleeve-shaped perforation, $h^{2}$, in a lateral guide rod, $h^{1}$, of the upper part of the saw horse. Crotch or piece, F, serves to support sticks or logs of lesser width than the sawhorse, by being carried between the side standards into the required position.
The machine is operated by rocking the treadle platform with the feet, pressing with one hand the upper part of the saw frame, and feeding with the other hand the sticks to the saw.
Mr. John M. Linnell, of Monticello, Iowa, is the inventor, and the invention was patented through the Scientific Amer ican Patent Agency.

Chemical Filter.-Place inside of the glass funnel used a small filter of parchment paper pierced at the bottom with a fine needle; afterwards place the ordinary filter in the fun nel, and filter as usual. Such cones of parchment paper can be used in any required size, are easily obtained, and may be applied to almost all purposes where the more expensive platinum cones have hither been used.

Chloride of bartom, as a remedy for boiler incrusta ions, gives general dissatisfaction.

IMPROVED SLIDE VALVE CALCULATOR.
There was privately circulated, at the last exhibition held by the scriptinated a dion are delineated on a diagram. The application of the graphic steam on the template has got round to the line, B F, the when the next vertical line is reached, the steam port is method to these intricate calculations is very ingenious, and $\mid$ half of a stroke or one quarter of a revolution. The position ${ }^{\text {a }}$ ing as the template is moved forward until, on the mark be-


CALDWELI'S SIIDE VALVE CALCULATOR.
shows the usefulness of this mode of exemplification in a re- of the piston in the cylinder may be ascertained by counting $\mid$ coming coincident with the thick vertical line, the steam markable manner. The diagram, designed by Mr. John A. the number of sections of the stroke circle contained in the port is closed
markable manner. The diagram, designed by Mr. John A.
Caldwell, Pittsburgh, Pa., is termed the slide valve calculator, and it shows the manner in which a given slide valve, of any dimensions and travel, will perform its functions, and it will also give the dimensions of a slide valve necessary to produce any required result. We publish the diagram herewith.
The method of its application is as follows: Cut out a paper template, as shown in Fig. 2. The circle, A, represents the stroke of the engine, one eighth of the full size, and the circle, B, the travel of the valve of the full size; go that for an engine having a piston atroke of 24 inches and a valre travel of 2 inches the circle, $A$ would require to be 3 inches and the circle, $B, 2$ inches in diameter. The quarter circle, C represents one quarter of the C, represents one quarter of the crank pin. After placing the calculator before you in such a position that the letters $B$ and $F$ will read from left to right, pass a pin through the center of the template, shown in $\mathrm{Fi}_{6}$. ${ }^{2}$, and also through the center of the calculator. Their cent rs being thus coincident, turn the template until the center of the crank pin stands toward B on the line B F. On the template, and coin cident with the perpendicular thick line on the calculator, make the mark shown in Fig. 2 at the point, $T$, and turn the template in the direction of the arrow until the mark reaches

port is closed.
It will have been perceived that, so far, the thick vertical line has represented the receiving edge of the steam port, and that the point, $T$, on the template has represented the receiving edge of the valve; and as the valve had no lap, the crank pin is then to be considered cn the dead cente line, B F.
We must now assume the thick line to represent the ex haust or inside edge of the stean port, and the mark, T, to represent the exhausting or inside edge of the valve. Pro ceeding to turn the template round again, when the frst vertical line, on the $B$ side of the thick line, is reached, the ex haust port is open $t$ of an inch (providing the valre has no incide lap if it had tof inch of ingide or exhaust lap the mark, $T$, would heve just reached the thick line or the the mark, T , would he jut edge of the port); and when the mark reaches the line, B F the exhaust will be open as much as this amount of valve travel will allow. Turning the template again, the approach of the mark, T, toward the thick line represents the closing of the exhaust, until the two beceme coincident; then the exhaust is closed and the engive has made one revolution, the crank pin being again on the dead center, and the mark, T, at the thick line, from which positions they respectively started.

A valve constructed thus would read:
Travel of valve.................... . . . 2 inches

Cut off. . .............................
Exhaust from end of stroke...
Exhaust fro
Expansion.
Cushio
Lap...
Steam
Steam port opens.
Exhaust port opens.
Lead...
In other words, our example has been upon a valve withou either excess of travel, steam lap, or exhaust lap or lead. We will now give an example of the use of the calculato for valves having lap:
Diameter of cylinder is 12 inches, stroke 24 inches, ports 12 $\times 1 \frac{1}{8}$, which is equal to one tenth of the piston area. Steam supply to the cylinder is to be cut off at $\frac{2}{8}$ of the stroke, and the exhaust is to commence when the piston has traveled to within 3 inches of the end of the stroke. Travel of valve is 21 inches, the cushion being a result to be determined. Commencing, then, when the valve is on the dead center line $B F$, and (as before) on the B end of it, the valve has to be moved ahead to allow for the lap and give steam when the crank pin is in that position. This is done by making the mark, $T$, on the template in advance, to the amount of the lap from the thick line toward the F end of the line, B F. If we had not known the requisite amount of lap required to cut off at $\frac{2}{8}$ of the stroke, we would have to try, say, $\frac{\pi}{8}$ of an inch, and alter it more or less as we found it to cut off too early or too late; but in our experimental case, $\frac{8}{8}$ plus $-\frac{1}{3} \frac{1}{2}$ of an inch is the requisite lap, and we accordingly make our mark on the template that much in advance toward the $F$ end of the line, B F, of the thick line. If the template be now turned, it will be found that the steam port is opened ${ }_{1}^{2} 6$ of an inch ; and when the mark has arrived at the identi cal spot it started from (but on the under side of the line, B F), it will be found that the crank pin stands at the $\frac{3}{3}$ line, and the piston has proceeded $\frac{?}{8}$ of its stroke. The exact distance in inches can be found by counting the curved lines, from $F$ back to the crank pin, along the stroke circle, each space representing 1 inch . It will be found that there are 8 of them, and 8 inches is the distance the piston is from the end of the stroke.
The proper way to find the inside lap is to move the mark around $\frac{1}{8}$ of an inch at a time, and at each movement stop and examine the position of the crank pin to see if it is near ing the desired exhausting point. In this case, $\frac{1}{8}$ of an inch would bring the mark to within $\frac{1}{32}$ of an inch of the fourth line from the thick one, and the crank pin is some distance yet from the third inch from the end of the stroke (the exhausting point). This shows that $\frac{1}{8}$ of an inch inside lap is not sufficient. We then try the addition of another $\frac{1}{8}$ of an inch inside lap, and find that the mark is within $\frac{1}{3} \frac{1}{2}$ of an inch of the third line, and still the crank pin is not at the desired spot. We therefore try the addition of another $\frac{1}{8}$ of an inch, and examine, and then another, in all $\frac{1}{2}$ of an inch. and find that the crank pin wants a little yet; but by moving the mark another $\frac{1}{32}$ of an inch, we find, by counting as before, that the crank pin has arrived at 3 inches from the end of the stroke. Now it is evident that further movement of the mark will result in opening the exhaust. When it has arrived at the line, B F, the exhaust will be fully open; and when it arrives at the same line again (but on the upper side of the line, B F), the exhaust will be closed. We proceed to move it accordingly, but we may as well observe how much said port is open when the piston is at the end of the stroke By proceeding as before, counting one $\frac{1}{8}$ of an inch after an other, we find 6 of them are passed before the piston is a the end of the stroke, showing that the exhaust is $\frac{8}{4}$ of an inch open by the time the crank pin is on the dead center line. We may now see if the exhaust port is going to be fully opened or not. The mark was $\frac{1}{8}$ of an inch from the thick line when the exhaust port began to open, and it will not be fully open until the mark has arrived at the line, B F. Now the space intervening measures $1 \frac{1}{4}$ inches, wherea the port is only $1 \frac{1}{8}$ inches wide, consequently the valve travels not only over the port, leaving it fully open, but $\frac{1}{8}$ of an inch beyond it, showing the exhaust to be sufficiently free.

Now by moving the mark round to the line corresponding to the opening of the exhaust, namely, $\frac{1}{8}$ of an inch from the thick line, we find that the crank pin stands at $1 \frac{8}{4}$ inches from the end of the stroke, as the curved lines show $1 \frac{1}{4}$ inches; this, then, is the amount of the cushion. If more cushion is desired, we go over the same ground, after having added a little more inside lap; but this amount, with sligh lead, would run well at a piston speed of 300 or 400 feet per minute. Lead would have the effect of opening the exhaust sooner, and of reducing the amount of cushion; but what was lost in this way would be compensated for, so far as the cushioning was concerned, by the admission of live steam, permitted by the lead before the piston had arrived at the end of the stroke, and when the crank pin was consequently on the dead center. The result given by our last experiment would read as follows :
baCk and front.

|  | B | F |
| :---: | :---: | :---: |
| Travel of valve. | $21-4$ inches | $21-4$ inche |
| Steam lap. | 21-32 " | 21.32 " |
| Cut off. | 8 | 10 |
| Exhaust lap. | 17-32 " | 17-32 " |
| Exhausts at. | 3 | 4 " |
| Expansion. | 5 | 6 " |
| Cushions. | 13.4 | 11.2 |
| Steam port opens. | 7.16 inch | $7-16$ inc |
| Exhaust opened at end of stroke. | 3.4 | 3.4 |
| Exhaust port opens. . . . . . .Ful | <8-8 | lus 1-8 |

The B column denotes the back end of the cylinder, and the $F$ the front end; the latter is found in the same way, only the calculator is turned so that the letters $B$ and $F$ will read upside down.
If it is desired to ascertain what effect lead, obtained by moving the eccentric ahead, will have on the engine, we pro ceed as before; but when the mark, $T$, has moved forward to the amount of lead required, we move the template no fur ther until we have made a new mark on the template coinci dent with the line, B F, which new mark will represent the new relation of the crank pin to the old mark; then througb out the operation we employ this new crank pin in place o the old one. By moving the template back to its old posi tion, that is, till the old crank pin is on the line, B F, th new crank pin will denote just how far the piston is from the end of the stroke when the lead commences to act.
By the aid of our illustrations and the given examples in the method of using it, the calculator cannot fail to be un derstood and appreciated by those who may require to either ascertain what results are being given by the valve of an ex isting engine, or the proper proportions of a valve for engine about to be built.

Joshua Rose.

## fortegivadeute.

## A Charcoal Battery.

To the Editor of the Scientific American
I enclose a sketch of a cheap and durable form of battery of considerable power; and for many purposes of experimen this battery may be used to advantage. The current is steady and there are no unpleasant fumes given off, as in many acid batteries. In Fig. 1, the containing vessel, T, is made of tin

into which a rod of zinc, $Z$, wrapped in canvas, shown at $B$ is placed. The space between the tin and zinc is then tightly packed with small pieces of hardwood charcoal, C. These cells are charged with a strong solution of potash made in hot water. In making up this battery, the zinc of one cell connected with the tin of the next. This battery should be placed on an insulating substance.
Another form of this battery is shown in Fig. 2, and a sec tion of two cells in Fig. 3. The containing vessels are mad of tin, T T, which are filled with charcoal, A A, to a depth

of ong or two inches. A piece of canvas, C C, is spread over he charcoal, and on this a plate of zinc, Z Z , is placed. The locks of wood, B B, are placed on the zinc; a strip of the latter is bent over the blocks so as to connect the zinc of one cell with the tin of the next. In charging these cells, shown in Figs. 2 and 3, the fluid of one cell must not come in con fact with the tin of the next; if it be so, the electromotive force would only be that of one cell. The fluid is kept con centrated by placing on the zinc plate of each cell a quantit of potash.
Ardtrea, Ontario, C. W

## The Spider's Web.

To the Editor of the Scientific American:
In your issue of July 3, the çuestion is asked: "How does a spider make its web, the lines of which, crossing at the center, are carried, some of them to the surrounding objects,
while others are fastened to an outer circular line, made eviwhile others are fastened to an outer circular line,made evidently before the outer circular lines of the woof are formed?" Also: "Where does the spider place itself whenit ejects the lines which form the spokes of the wheel?"

The extreme outer line surrounding the web, to which the spokes are fastened, is by no means always circular - ihis de-
pends upon the position of the surrounding objects to which the web is fastened. The spider first extends lines from one point to another by the shortest route possible, inclosing a sufficient space to build its web; then he extends a line acros where he intends to have the center of his web. He next fixes the center by fastening a line thereto on the central line, and, carrying the line at right angles or nearly so to the first line, hitches it to the nearest object, whether that be he outer line of the web, or anything to which the web is astened. It will be observed here that the spider ejects al the spokes of the wheel (except the first line across the cen er of the web) from the intended center, placing the firs ines at right angles or nearly so, and dividing the distance each time a line is extended from the center until a sufficien number are put up, always stretching the lines alternately in opposite directions until the spokes of the wheel are complete. He then places his left forefoot on the center of the wheel, and hitches the first end of the circular line of th woof to one of the spokes of the wheel and mores round the center, fastening his thread to every spoke as he goes along, measuring the distance from one line to the other by stretch ing his right hind foot to secure the web to the spoke with his left fore foot one line toward the center and moving spirally along from one spoke to the other, until he gets his web sufficiently large for his purpose.
Batavia, Ill.
A. M. Spencer.

## \section*{The Potato Disease} <br> To the Editor of the Scientific American:

Having given the potato disease-blight or rot-considera ble attention, and made microscopic examinations of the fungus known as the peronospora in.festans (Berkeley called it botrytis infestans), I find that lime is the best cure and preventive. My attention was arrested by the article on page 277, volume XXXII., headed "A Remedy for Potato Blight," referring to the communication of Mr. Lyman Reed, and the process of the action of microscopic parasites attacking the tubers.
It strikes me that Mr. Francis Gerry Fairfield has things a little mixed up. He carefully cleaned the specimens pro cured by him, and subjected them to heat for 96 hours o more, before he examined them. He finds the ova of the icsects on the interior layer of the cuticle of the tubers, and says: "I have no doubt that they commence that histo lytic process that ends in the destruction of the tuber; but doubt whether there is any genetic connection between the fungi developed on the stalks in the course of the degenera tim, and the larvie in which the degeneration primarily sturts." The truth of the matter is that these microscopic animalculæ are a secondary product arising in the diseased matter of the tuber. Certain fungi have a nitrogenous sub stance analogous to diastase, which transforms the starch to dextrin, and finally into sugar, like a ferment, especially under moisture and an elevated temperament, inducing de composition, forming a nidus for the animalculæ. Had he used his microscope to trace the parasitic fungus, he would have discovered the fine threads of the mycelium extending to the tubers, which induces a ferment or gangrenous putrid mass that, like any other animal and vegetable matter, will breed animalcule in less time than 96 hours. This is easily proved and well known to anyone who has given the subject attention. Consequently, his sage advice " to dip the potato just before planting, in the solution" (carbolic acid), is, to my mind, all nonsense. When the animalcule or fungi infest the tuber, it is neither fit for use or planting. However, I may err, and it might be well to see the "copious notes," and "always give Mr. Reed the full honor of the first and "always give Mr. Reed the full honor of the firs
discovery."
J. Stauffer. Lancaster, Pa

## Utllizing the Grasshoppers.

T'o the Eilitor of the Scienlific American
The grasshoppers, desiccated and ground, would of course be useful as a fertilizer; but when in this prepared condition, they would form an excellent food for all insect-feeding birds. There is no better food for all young domestic fowls. Containing silicic acid in a soluble state, they seem specially adapted for young birds, promoting the growth of feathers. The young prairie chicken flies when only eight days old. The sharp-tailed grouse and the cock of the plains subsist entirely on grasshoppers up to their maturity; and after entirely on grasshoppers up they prefer grasshoppers to other food. I have found in the depth of winter, at the foot of the Rocky Mountains, the gizzard and stomach of the sharp-tailed grouse filled with grasshoppers, when they had to find the dead bodies of hem under six inches of snow.
There exists, in fact, no beast or bird of prey on the western plains which would not partake freely of them, when ever they are to be procured. I found, in the season when grasshoppers were plentiful, the stomach of the prairie wolf, the stomach of the little kit fox (canis cinereo-argen teus), and the gizzards of all falconider and owls filled with grasshoppers. Even by man they have been and are used as food. The inhabitants of the interior of Africa use them extensively, and the Pau-Eutaws or Digger Indians of our own country find them very palatable. I do not, however, suggest them for the latter purpose. E. Wernigh

## A Theory of Dissolution.

## To the Editor of the Scientific American:

The reason given that a solid will be dissolved by a liquid is hat the adhesion between the atoms of the solid and liquid s greater than the cohesion of the atoms of the solid.
The reason the adhesion is greater than the cohesion is hat the weight or specific gravity of the atom of the solid is less than the specifie gravity of the atom of the liquid : and
when the specific gravity of the atom of the solid is greater than the specific gravity of the atom of the liquid, the solid will not dissolve; and when the specific gravity of the atom of the solid is but a little greater than that of the liquid, it will require continual shaking to make it dissolve, or, when dissolved, to keep it from settling to the bottom. The rea son that the solid sinks when placed in the liquid is that there are as many more atoms in a given space of the solid than in the same space of the liquid as the weight of an atom of the solid is less than the weight of an atom of the liquid.

It will be noticed that the bulk of the solid that will be dissolved is much less than the bulk of the liquid; which proves that there are a greater number of atoms in a given space of the solid than in the same space of the liquid; fo each atom of the solid must come in contact with each atom of the liquid, to make a saturated solution.

Wm. L. Dudley.

## A Frictionless Joint

To the Editor of the scientific 1 merican:
Is not the following application of an old principle new, as presenting a minimum of friction?
A, Fig. 1, is a horseshoe magnet, having a brass crossbar $B$, between the poles, with a short extension, C , in the end of which is fixed an ordinary watch jewel. Fis a pendulum with crossbar, E E, for an armature, terminating in a needle point, $D$, resting up against the jewel, $C$. The weight of the pendulum must be just within the power of the magnet; and as gravity is barely overcome, the needle point only touches the jewel, and the friction is infinitesimal.


However, as pendulums left free to vibrate make a revolu tion in direction in twenty-four hours, it is possible that when vibrating from side to side, the magnet would hold the crossbar, etc. This would be obviated in part by making the armature, E E, of a circular plate, and would be entirely so by using the following arrangement:
A, Fig. 2, is the magnet, B B jewels in each pole, C C are the needle points, and $D$ the pendulum. The whole is to be placed under a receiver, and in both cases to vibrate to and from the observer, not from side to side.
Waterloo, Ill.
Henry Talbott, Jr.

## Altitude of Thunder Clouds.

To the Editor of the Scientific Americar:
In your issue of June 30, Mr. David Brooks of Philadelphia has given an interesting little essay on thunder clouds and lightning. Without assenting to his theory of the manner in which the latent electricity is evolved and discharged, as being at all complete or satisfactory, I am indebted to the writer for recalling to my mind some measurements made by me in $1810 \cdot 43$, by way of attempting to determine the hight of thunder clouds. Mr results were so great as to keep me n doubt as to the reliability of my method. I repeatedy measured clouds of 6 and 8 miles in altitude, and more than once got 10 miles as my result; and in a single instance I once got 10 miles as my result; and in a single instance I
measured the altitude of what turned out to be a terrific thunder and hail storm of $13+$ miles in hight. I published an thunder and hail storm of $13+$ miles in hight. I published an account of this one in the Concordia Intelligencer, printed at
Vidalia, La. Its limited circulation protected me, as I afterVidalia, La. Its limited circulation protected me, as I after-
wards congratulated myself, from severe scientific criticism. I now believeit was a reliable result, and the method legitimate. Let me state it that others may test the method, which I do not believe is generally, if ever, used by any other o'jserver.
$\Delta \mathrm{s}$ the cloud developed eastward of my position, and I had a clear horizon, its great altitude began to be remarkable before its companions (usually found touching at the base and ultimately confluent) had fairly established themselves. The rain was visibly discharging at the center of the base when the thunder began. Both head and base were well defined and I applied my sextant, when above $45^{\circ}$ hight were read. The cloud continued to rise and the electricity to be dis charged with rapidity; and the rain descended from bothsides when nearly $60^{\circ}$ were reached. The defined bases merged into the horizon, and I could no longer depend upon my results. The storm, of course, moved from me, as all clouds of great altitude move eastward in this latitude. I took the dew point, and ascertained the altitude of the base of all the clouds (approximately) by imputing 100 yards for every degree Fahrenheit of difference between the air temperature and the point of condensation, by the wet bolb,

This gave about 1,600 yards. At $4^{\circ}$, the elevation of th base of the cloud before me, the sine of the angle of elevation, gave about 40,000 feet for the distance of the center of
the thunder cloud; and $60^{\circ}$ elevation to its summit gave the thunder cloud; and $60^{\circ}$ elevation to its summit gave
about 70,000 feet, or $13 \frac{1}{2}$ miles. Subtracting the elevation of the base, 3,000 feet, we find some 67,000 feet. or nearly 13 miles, for the cloud hight. Subsequent information proved the storm to have been terrific. Its width was but a mile or two in starting, but it spread as it advanced, and did much damage by floods and wind, and many trees were struck by lightning.
If observers will keep a sextant and thermometer at hand, they will find frequent opportunity during summer of testing the hight of isolated clouds, which pierce and pass far above the cirrous clouds, whose elevation is at the base of the per manent south west upper current-the reciprocal of the trad winds. The development of the thunder clouds lies along that region, and their heads are always borne off to the northeast by its drift. Hence all tornados, hailstorms, and thunder clouds of considerable magnitude travel towards the north east in these latitudes, $29^{\circ}$ to $33^{\circ} \mathrm{N}$.
C. G. Forshey

## New Orleans, La

## Usefal Recipes for the Shop, the Household,

## and the Farm.

To test the soundness of a piece of timber, apply the ear to the middle of one of theends, while another person strikes pon the opposite extremity. If the wood is sound and of good quality, the blow is very distinctly.heard, however long he beam may be. If the wood is disaggregated by decay or therwise, the sound will be for the most part destroyed.
Paper prepared after the following recipe is said to rende the use of the razor strop unnecessary. By merely wiping the razor on the paper to remove the lather after shaving, keen edge is maintained without further trouble. The razor must be well sharpened at the outset. First, procure oxid of iron (by the addition of carbonate of soda to a solution of persulphate of iron), well wash the precipitate, and finally leave it of the consistence of cream. Spread this over soft paper very thinly with a soft brush. Cut the paper in pieces two inches square, dry, and it is ready for use.
Photographers will find the following a useful glass-clean ing preparation: Water 1 pint, sulphuric acid $\frac{1}{2}$ oz., b-chro mate of potash $\frac{1}{2} \mathrm{oz}$. The glass plates, varnished or other wise, are left for 10 or 12 hours, or as much longer as desired in this solution, then rinsed in clean water and wiped dry with soft white paper. The liquid quickly removes silve stains from the skin without any of the attendant dangers of cyanide of potassium.
Adhesive fly paper is made by boiling linseed oil to which a little rosin has been added, until a viscid mass is formed The latter is then spread evenly upon the paper.
A good red or blue ink, suitable for use with stamps, can be made by rubbing Prussian blue or drop lake with fine clay into a thick paste with water.
A tablespoonful of black pepper put in the first water in which gray and buff linens are washed will keep them from spotting. It will also generally keep the colors of black or colored cambrics or muslins from running, and does not hard on the water.
Lime slaked just before application aud sown by hand aid to be an infallible protection against fy in turnips.
A whitewash made of quicklime and wood ashes will detroy moss on trees.
A misture of tallow 3 parts, tar 1 part, applied to the bark while hot, will protec! fruit trees against mice
A cubic yard of sand or earth weighs about 30 cwt ; mud 25 cwt ; marl 26 cwt ; clay 31 cwt ; chalk 36 cwt ; sandstone 39 cwt ; shale 40 cwt ; quartz 41 cwt : granite 42 cwt ; trap 42 cwt ; slate 43 cwt .
In small blasts, 1 pound of powder will loosen about $4 \frac{1}{2}$ tuns of rock. In large blasts, 1 pound of powder will loosen $2 \frac{1}{2}$ tuns. Fifty or sixty pounds of powder enclosed in a bag and hung against a barrier will demolish any ordinary structure. One man can bore with a bit 1 inch in diameter from 50 to 60 inches per day of 10 hours in granite, or 300 to 400 inches per day in limestone. Two strikers and a holder can bore with a bit 2 inches in diameter 10 feet per day in rock of medium hardness.
A 4 horse team will haul from 25 to 36 cubic feet of lime. tone at each load.
About 270 cubic feet of new meadow hay, or from 216 to 243 cubic feet of hay from old stacks, or from 297 to 324 cubic feet of dry clover, weigh one tun.
To compute the number of tuns an ice house will contain, calculate the number of cubic feet in the house and divide by 35 ; this gives the number of tuns if closely packed.
To determine the weight of live cattle, measure in inches the girth around the breast just bebind the shoulder blade, and the length of the back from the tail to the fore part of the shoulder blade. Multiply the girth by the length and divide by 144. If the girth is less than 3 feet, multiply the quotient by 11. If between 3 and 5 feet, multiply by 16 ; if between 5 and 7 feet, by 23 , or if between 7 and 9 feet, by 31. If the animal is lean, deduct $\frac{1}{2} \delta$ of the result and the answer is the weight in pounds : this multiplied by 0.605 gives the net weight.
To make a glue which will resist fire, mix a handful of quicklime in 4 ounces of linseed oil and boil to a good thickness; then spread on tin plates in the shade. It will become oxceedingly hard, but may be easily dissolved over the fire and used as ordinary glue.
The following are good non-poisonous glazes for common earthenware (1) Silicate of soda at $50^{\circ} \mathrm{B} .100$ parts; pow. dered quartz 15 parts; chalk 15 parts. (s) The same with the addition of 10 parts borax

Artificial grapes are blown from melted resin and afterwards dusted with a colored powder.
The best homemade fireproof safe is a hole in the ground, well lined with brick and cement.
To restore the color of a marble mantlepiece which has become stained, mix up a quantity of the strongest soap ees with quicklime to the consistence of milk, and lay it on the stone for twenty-four hours. Clean afterwards with soap and water.
Plaster of Paris mixed with a saturated solution of alum, baked in an oven, pulverized, and lastly mixed with water, is an excellent cement for marble.
Slaked lime, placed loosely on a board inside a furnace during the summer, will take up the moisture and prevent rusting.

## Iron in Rallway Bridges.

Mr. W. Kent, of the Stevens Institute of Technology, has made some analgses of the rapid corrosion of iron in railway bridges. It has frequently been noticed that iron, exposed to the smoke, steam, and heated gases escaping from passing locomotives, shows a greater tendency to corrode than iron in situations not so exposed. A qualitative chemical analysis of iron rust that was taken from a bridge on the Pennsylvania Railroad showed the presence (in a water solution of the rust) of iron, ammonia, sulphuric acid, and traces of sulphurous acid and chlorine. A separate portion of the rust was tested for carbonic acid, which was found in considerable quantities. The escaping gases from the locomotive contain carbonic acid, carbonic oxide, moisture, and, if there is sulphur in the coal, sulphurous and sulphuric acid. The presence of these acids, no matter in how small quan tity, is sufficient to promote rapid corrosion.

## New Phenomena of Solar Radiation

M. Desains has recently examined the variations which the calorific solar rays undergo at the same time in point of intensity and with reference to their transmissibility through water. He expresses the results reached in tables which show the quantity of heat arising at noon during one minute, and at different periods of the year, on an area of 1.6 square nches. The numbers vary very slightly, ranging from 1 to $1 \cdot 3$. The minimum was observed in January, 1875, and the maximum in June, 1874. Another table shows how the quantity of solar heat varies in traversing 0.32 inch of water in a minute, at noon. On April 25th last, the sky being clear, sixty-three per cent of the radiation was transmited. In June and July, 1874, the proportion reached seventywo per cent. M. Desain deduces from his results the curious fact thatan increased transmissibility of the radiations is related to the presence of greater or smaller quantities of watery vapor in the high atmospheric regions. Facile transmissibility indicates cloudy weather on the following day; and on the other hand, when the reverse is the case, permanently fair weather may be expected.

## Aniline Black Marking Ink

To preparethis ink the following solutions are required: (1) Dissolve in 60 grammes of water 8.25 grammes crystaline chloride of copper, 10.65 grammes chlorate of soda, and 5.35 grammes chloride of ammonium. (2) Dissolve 20 grammes hydrochlorate of aniline in 30 grammes of distilled water, and add 20 grammes solution of gum arabic ( 1 part of gum to 2 of water), and 10 grammes glycerin. If 4 parts of the aniline liquid are mixed in the cold with 1 part of the copper solution, we obtain a greenish liquid, which may be used at once for marking linen; but as it decomposes in a few days, it is better to preserve the two solutions separately. The writing is at first greenish, but is blackened by exposure to steam (for example, by being held over the spout of a boiling kettle). A dry heat renders the tissue brittle.-Dr. Jacobsen.

A Preventive for Shafting Accidents.
There are no accidents more common in large manufactories, and few more fatal,than those caused by the engagement of some portion of a workman's garments with a swiftly rotating shaft. The loose dresses of female operatives are espec'ally liable to become entangled in countershafts placed near the floor, or in the revolving shafting of the machines which they may be attending. There is a very simple way of rendering these casualties impossible, and this without necessitating the usual plan of constructing a railing or fender about the moving piece. It is simply to cover the shaf with a loose sleeve along its whole length. The sleeve may be of tin or zinc and madeso as to be removable if desired The friction between it and the shaft would be sufficient to cause its rotation with the latter, but of course, in event of a fabric becoming wrapped around it, it would quickly stop, and allow of the easy extrication of the same. The sleeve should be lined with leather both within and at the ends in order to prevent noise.
The same idea in the shape of loose covers might readily be applied to cog wheels or pulleys,and thus prove a valuable safeguard against loss of life or limb.

In describing the fireproof houses now in process of con struction in Chicago, Ill. (see Scientific American of June 19), we noted especially the improved method of plastering which has been adopted-the system involving the use of concrete and other materials, supported by galvanized iron wire. Mr. James John, of Lat Salle, Ill., we should have stated, is the inventor of the system, which has been paten ted. Mr. John is therefore entitled to the credit of the in vention, which appears to be one of considerable value.

## TELLER'S BLIND SLAT HOLDER

We illustrate herewith a novel and simple device designed to hold the slats of a blind in any desired position. Owing to the shrinkage of the wood, and wear, slats as a rule be come loose, so tbat it is impossible to place them so that a gust of wind will not alter their position. In summer it is always desirable to tilt the slats so as to shut out the sun, or to open them so as to admit currents of air; while in winter the slats, tightly closed, are an additional protection agains the cold.


The invention, which is shown attached to the blinds in Fig. 1, and enlarged in Fig. 2, consists of a plate of metal, A, fastened to the stile, and between the latter and the slats, by means of a single screw at its upper extremity. This screw holds it loosely so that it may easily be pusbed outWard and jummed against the edges of the slats by the cam button, B, after said slats are adjusted as desired. The slats are thus firmly heid and cannot be moved or opened from the outside.
There are no springs or other mechanism to get out of or der. The device is subject to no hard wear, is ornamental, and is easily affixed to the blind frame.
For further particulars in regard to agencies for selling the invention, address the patentee, Mr. C. E. Steller, 35\% East Water street, MiJ waukee, Wis.

## SMITH'S IMPROVED AWL

Wo illustrate herewith a novel improvement in shoema kers' awls, whereby the usual bristles on the waxed ends are rendered unnecessary. The instrument is made with a notch, A, inclined toward the point, and a notch. B, inclined in the opposite direction. The thread has one end inserted in the notch, $A$, and is pushed through the leath. er with the awl. Before withdrawing the latter, the other end of the thread is placed in notch, $B$, and the instrument is retrac ted The effect is to form a stitch precisely the same as that made precisely the same as that bristles, with the waxedendsand bristles,
while the cost of the latter is while the cost of the latter is
saved. The sewing, we are also informed, is accomplished much more rapidly. The end of the tool is made flat, and the adjacent edges ground sharp, so as to facilitate penetration. The inventor states that he has had this awl in practical use for some time, and that its operation is uniformly successful.

Patented through the Scientific American Patent Agency, March 30, 1875. For further particu. lars address the inventor, Mr. Sylvester A. Smith, Letts, Louisa
county, Iowa.

## The Gas Wells of Pennsyivania.

The National Oil Journal says: "There is little doubt that the gas escaping constantly from oil wells is of nearly wonder that means have not long since been adopted to util-
ize this immense product of the earth. No estimate can be made of the quantity of this gas. which has for years been allowed to pass away into the air uselessly; but the yield of a few gas wells which have been tubed and their product utilized indicates that it is enormous. A gas well near Sar versville, in the Butler oil region, flows with a pressure of 300 lbs. to the square inch, and is roughly estimated to yield a million cubic feet of gas every 24 hours; and this is only one of quite a number of large gas wells, and almost num berless small ones, for it must be remembered that every well which produces oil also yields gas. A survey has jus been completed for a line of pipe from Sarversville to Pittsburgh, a distance of about 17 miles . It is proposed to lay a six-inch pipe between the points named, and to supply the gas to manufacturing establishments as a substitute for coal for fuel in Pittsburgh."

## ALLEY'S BEARING FEELER

We subjoin an engraving of a very useful instrument de signed and constructed by Mr. Stephen Alley, of Glasgow Scotland, for giving a prompt indication of a hot bearing The apparatus consists simply of a brass tube, J. which is placed in a hole bored in the cap of the bearing to receive it, the bottom of the tube touching the shaft. At one side, near the bottom, the tube, J , is partly cut away so as to admit of the ready insertion of a cylindrical plug, $L$, formed of a hard grease, or of a composition which will melt at the tempera ture at which it is desired that the alarm should be given. To insert the plug, $L$, the handle, $A$, is pulled so as to draw up the spindle, $B$, and thus by compressing the spring, $K$, making room between the bottom of the spindle and the bottom of the tube for the plug to be inserted. If the bearing becomes heated, the plug, L, begins to melt, and escapes

drop by drop through the hole, M. As this melting takes place, the spring, $K$, forces down the spindle, $B$, and in so doing gives motion by the rack, $D$, to the pinion, $G$, and thence by the ratchet, 0 , to the striking wheel, $F$. This wheel, as it revolves, operates upon the pallet, $H$, and alterwately draws back and releases the bammer, C, which, when released, is made to strike the interior of the bell, N , by the action of the spring, $F$
The instrument, says Engineering, gives a number of clear and distinct signals as the composition melts, and can scarce ly fail to call the attention of the engineer. It is, moreover, a very simple apparatus, and there is nothing about it likely to get out of order

The American Institute Fair.
The usual announcement of the coming American Insti tute Fair will be found in our advertising columns. The Institute's building on Third Avenue and 63d street will be open for the reception of machinery on August 15. Other goods will be received after August 29. The exhibition will be made public on September 9
We have come to regard the day,officially fixed, as that on which the Fair is supposed to be complete and ready for public inspection, as a mild species of fiction never by any chance realized. As for the show being then fit for examination or anywise approaching such condition,we have never found it so,and therefore expect no departure from the usual practice this year. The managers lay the blame on the exhibitors, and vice versa. The public cares not a straw for the quarrel but it certainly has a right to demand a respecta o o being deluded into paying fifty cents admission fee, for he privilege of gazing on a muddle of packing boxes, amid the din of hammering and saw
We counsel intending exhibitors to apply for space at once and at the same time take this early opportunity to commend the foregoing hint to the Fair managers, assuring them that it would, on the other hand, afford us a lively satisfacon to be enabled to chronicle that the forty-fourh annual was submitted to tors

Mr. Sylvester A Smith patented (May 25, 1875) through the Scientific American Pa ent Agency, a new mode of extracting milk from the ud ders of a cow or other animal, which consists in inserting into each teat a tube, open at the upper but closed by a valve the lower end. The annexed engraving shows the con struction of the device, which is represented in position on the teat in Fig. 1.
An aperture in the end allows of the entrance of the milk, which escapes beneath and runs into the pail when the sim ple sliding valve, shown enlarged in Fig. 2, is opened. The abes do not annoy the animal, which speedily becomes ac ustomed to their insertion. They are claimed to save all the labor of milking, and to accomplish that operation with

greater rapidity, since the nsual squeezing process by the hands is done away with, and to extract every drop of mill which may be contained in the udder. The tubes are neatly made of German silver
For further particulars, the inventor may be addressed as above

Ingenuity of the Esquimaux.
The Esquimaux have been credited for having considera. ble inventive and constructive skill. Their boats are ingen. iously made, and their ice huts are arched on correct mathe matical principles. A recent writer drscribes a cruel bu novel method in use among them for killing bears. They sharpen the ends of a piece of whalebone a font or more long then bend it double, and wrap it closely in fat meat, which is exposed to the air till it freezes. These reacherous pellets are thrown to the bear, who bolts them down. They thaw in his stomach; the bent whalebone straightens, and the sharp points pierce his vitals, when he is readily captured.

## CAVENDER AND DALLA8' OORN HUSKING IMPLEMENT

Messrs. William T. Cavender and John T. Dallas, of Au. burn, Kansas, have recently invented a corn husker, which consists in an iron or steel rod, bent to adjust itself to the hand and wrist, and provided with a curved end, whereb whe husks are stripped by thrusting the curved end through them.
In the engraving, $A$ is the husker proper, formed from a small rod of iron or steel bent as shown, so that, when the husker is placed between the forefinger and thumb of the right hand, the end, $a$, of the husker will rest at the the husker will rest at
under side of the junction of the band with the wrist; and thence it extends upward parallel with the thumb, un til the end is curved in a spi ral form, terminating in a point, $b$. The husker has fit ted to it a strap, B, one end of this strap being confinad to it in any desirable way, and the other end being prorided with
 into the hook, $a$, at the end, $a$, of the husker. The husker is operated by seizing the ear of corn in the left or right hand, the husker being attached to the other hand in the manner above mentioned; the corn is thrust through the husks, stripping the husk from the ear in a rapid manner and without injury.

According to Professor Le Conte, the rate of growth of corals in the Gulf of Mexico is from $3 t$ to 4 inches per annum.

## the cycads.

The macrozamia plumosa is certainly one of the most grace ful of all cycadaceous plants for general decorative purposes, its green feathery leafage possessing all the freshness and beauty that belong to the most elegant of ferns, combined with the permanence and stately aspect of some of the palms. This fine cycad grows well in a moderately warm greenhouse or conservatory, where, intermixed with other plants, it will prove to be of the utmost service. It has been recently im ported from Queensland into England by Mr. Wiliam Bull. From a small ovate stem, the scales of which are woolly, rise the erect spirally twisted leaves, which are from 2 to 21 feet long, and have a flattened petiole. These leaves are furnished nearly to the base with narrow are furs whis inear leaflets, which are set at incor 6 to 8 about a quarter of an inch, and are from 6 inches long. The plant is remarkable for its distinct
and elegant character, and will be acimired by all and elegant

Improvement in Soldering.
Dr. A. W. Hoffman thinks it possible that oxygen blowpipes or apparatus might be invented, whereby the soldering of metals, without alloys, can be done. He says: "It would be useful to turn our attention to the autogenous soldering of metals with the aid of the oxyhydrogen flame, a principle which has achieved such signal triumphs in the treatment of two essentially different metals. Should it not be possible, by the same means, to solder every metal and every alloy with itself, as tin with tin, copper with alloy with itself, as tin with tin, copper with
copper, brass with brass, silver with silver, gold copper, brass with brass, silver with silver, gold
with gold, and even iron with iron, just as we with gold, and even iron with iron, just as we
already solder lead with lead, and platinum with already solder lead with lead, and platinum with
platinum? The probability is present, and the platinum? The probability is present, and the
advantages of such a procedure are manifest. Let us try to conceive the neatness of a workshop in which soldering is performed, not as heretofore, with the soldering iron or at the forge, but with a light, elegant gas burner. Imagine the artisan no longer annoyed by radiant heat and by the fumes of charcoal, and able to produce in a moment any temperature required, even the very highest, and again to put an end to it by simply turning a cock. Conceive the solidity of the soldering which no longer depends on cementing two pieces of metal with a foreign matter, but on an actual interfusion of two portions ter, but on an accualinterfasion tho portions of one and the same metal, and which involves the utmost economy of materials and dispenses with all subsequent work, such as trimming the
soldered place with a file. Such evident advansoldered place with a file. Such evident advantages must overcome every prejudice, and prompt us most urgantly to commence a thorough experimental investigation of the question."

## THE FICABIA.

The common ficaria of our woods, with its myriads of polished golden flowers in spring, is well worthy of garden culture. Stull finer, however, inasmuch as it is twice as large, is the as yet uncommon ficaria or caltha grandiflora. This fine species is a native of southern France, and was introduced some years ago by a gardener, who gave some plants to Mr. Parker, of the Exotic Nursery, Tooting, England, who has since increased it abundantly, and cultivated it with success as a border flower. It is quite hardy, and tbrives to perfection in ordinary open border soil. It is, according to a writer of the Revue Horticole, as valuable a plant as the spring adonis (a. vernalis), Mr. Parker's plants were, during the past spring, 15 incbes high, and densely covered with large showy polished golden flowers.

## Dull Times in Great Britain.

 The English manufacturers are greatly alarmed at the sluggish ness of trade generally. The hardware trade, as well as the iron ma nufacture, seems to be very slack throughout England, and some of the newspaper writers, in complaining of the lack of orders from the United States, warn their manufacturers against expecting as many orders from this side of the water as formerly, and sugges that they find new markets for their products. One of our English cotemporaries mentions Japan as a good market for their hardware, remarking that the Germans and French now monopolize most of that trade. "In Staffordshire," says one of our exchanges, "the market possesses an element which militates against its general healthiness. In many branches makers are experiencing very keen competition from foreigners. The United States is a formidable business antagonist. By Pennsylvania, padlock and currycomb makers in particular are very hotly pressed, and transatlantic firms are underselling us in bright-headed bolts and nuts to the tune of 20 to 25 per cent. By Belgium we are being undersold in railway spikes to the enormous ex. tent of $\$ 25$ to $\$ 40$ : and Barcelona (Spain) makers are turning out door locks and hinges at rates which, on this side,seem mythical. And the compatition we experience is not restricted to other countries. As in the minor industries, so likewise in the heavier trades, sharp rivalry is seen. Nota bly, the steam and boiler tube makers are being hard pressed by those of Scotland."

The Foreman.
The duties of the foreman are (like the busy housewife's work) never done. If he is alive to the interests of his em
cases, the success of the manufacturing portion of the business cases, the success of the manufacturing portion of the business
devolves wholly upon the foreman. Not only is he held strictly accountable for the superiority of the work, but he strictly accountable for the superiority of the work, but he
must ever tire his never resting brain in producing fresh nomust ever tire his never resting brain in producing fresh no-
velties: novelties which will bring the work to a greater velties: novelties which will bring the work to a greater
state of perfection, and novelties which will cheapen the state of perfection, and novelties which will cheapen the
production, without lessening the wages of the operatives. production, without lessening the wages of the operatives.
If it becomes necessary to reduce force, to the foreman beIf it becomes necessary to reduce force, to the foreman beunpleasant task of saying: "We will have to diswages be determined upon, the foreman becomes the agent for promulgating the same, and if he is not possessed of the necessary amount of tact and eloquence to present the same in such a phase as to prevent the immediate withdrawal of a part or the whole of the operatives employed, his fate is anathema.
To become a thorough foreman does not neces sarily imply that he should be a thoroughly practical mechanic, or thoroughly skilled in that branc of handiwork over which he is to preside. That he must have a thorough theoretical knowledge of the same is absolutely necessary. He must be intelligent, affable, and favored with an even-tem pered disposition. In fact, he must be so favored with all the features that make up the character of man, which will allow him at once to be the engi neer, general preceptor, counsellor, judge,spiritua adviser, and friend. He must be above temptation of every kind. His disposition must be such as will allow him to chide a man gently for any fault unwittingly done. He must have firmnes enough to demand that justice be done his emplos ers, and courage enough to defend his subordinates against encroachments by his employers. He must be generous enough to advance others' claims or inventions, wi ${ }^{\text {h }}$ hout coveting them or stealing them. He must be wise enough to know right from wrong, and impartial enough to deal justly by friend or foe. He must be frank in all things, and liberal in all his expressions, and must be humble enough to be as courteous to his most humble subordinates as he is to his employer. Such are the duties and attributes which belong to a foreman. How many have them nust be determined by others than ourselves.-The Carriage Monthly.

## Management of Pot Plante

The best directions for potting plants we have ever seen published are found in the Western Rural:
Amateurs are apt, in repotting plants, to make the soil too rich, under the impression that, because the roots are confined within a small com. pass, necessarily the soil must be very fat. Such is not the fact. Flowering plants should not have the soil over rich. They do better in pure soil, free from an excessive quantity of manure. What is used should be the most thoroughly digested compost. The successful florist undertends that the soil requires only to be in the normal state tands that the soin requires only to be in the cor state stead of making the soil in the pots over rich. he depends up. stead of making the soil in the pots over rich. he depends up on stimulating, when wanted, by means of liquid manure. A mistake generally made in shifting from one pot to an-
other is the use of too large pots as the plants increase in other is the use of too large pots as the plants increase in
size. In changing, use pots only one size larger than the
omnipresent factotum. He knows of all the little domestic troubles of his subordinates, and has to advise and suggest means of bringing about (amicably) the marital relations of more than one of those ander his control; not sufficiently burdened with his own troubles. he carries the troubles and secrets of subordinates securely locked within his own breast. If any of the operatives in his department meet with reverses, he is the first one appealed to; he is the first to add his name to the subscription list for a certain amount; no matter whether he is prepared or not, he must, to prevent calumny, subscribe. Thus we might speak of him on this subject for years, and fill volumes withoutend, and then not inish this portion of our story.
All employers or factors are not practical men. In such
plant was in before. To do this in the best manner. put some drainage in the bottom of the pots, say half an inch of broken flower pots for four inch size, being careful to close the hole in the bottom by laying a piece thereon; on this place a little rich compost mixed place a little rich compost mixed with one half its bulk of sharp
sand. Then place a pot one size sand. Then place a pot one size less than the one containing the plant to be moved. Fil in around this with the same material pretty finely packed. Lift out the pot and fill with soil, just so that the ball of earth in which the plant is contaired will reach to about balf an inch of the rim of the new pot. Now set the plant in and cave the earth about it from the sides, and fill up level with more soil.

Chloral Hydrate in Neuralgia. The intimate mixture of equal parts of chloral hydrate and cam-

duce a clear fluid which is of the phor will, it is said, produce a clear fluid which is of the greatest value as a lozal application in neuralgia. Dr. Lenox
Browne states, in one of the English medical journals, that he has employed it in his practice, and induced others to do so, and that in every case it has afforded great and in some instances instantaneous relief. Its success, he says, does not appear to be at all dependent on the nerve affected, it being efficacious inneuralgia of thesciatica as of the trigeminus; it is of the greatest service in nearalgia of the larynx, and in relieving spasmodic cough of a nervous or hysterical character. It is only necessary to paint tbe mixture lightly over the painful part,and allow it to dry. It never blisters, though it may occasion a tingling sensation of the skin. For headache it is also found an excellent application.

## SCIENTIFIC AND PRACTICAL INFORMATION.

## CONCRETE TO EXCLUDE RATS

A correspondent of the Building News says: "Nothing can be better to exclude rats than to concrete the surface of the ground beneath wood floors; not only for this, but also to prevent the growth of vegetable matter, and to prevent, as well, damp rising. All ground floors, whether wood, paved or tiled, should have a layer of concrete, 3 inches to 4 inches thick, between them and the soil. I have been in the habit of doing this for years, and all such houses have dry floors, and are vermin-proof, as far as the latter are concerned, as rats cannot disturb well made concrete. The concrete should be made of moderately fine gravel (broken flint or glass added to it is an improvement), mixed with Portland cement, in the proportion of 1 of cement to 7 of gravel. Not too much wa ter should be used, but the cement must be thoroughly mixed with gravel, and, when deposited in place, well trodden or beaten with a grass beater. Three or four inches, at most, is sufficient in thickness."

a rat plague.

Strange news comes from the Hill Districts of Burmah. The English authorities-commissioners and chaplains of Rangoon and others-have sent out a pitiful appeal for help. Ten thousand villagers are starving. It is not drought, as in Bengal, protracted cold and untimely rains, as in Asia Min or, nor grasshoppers, as in Kansas, that has brought so many people to dire necessity. It is rats. An area of six thousand square miles has been overrun with these " British vermin," which have spared nothing in their widespread devastation. The appeal declares that the people are entirely destitute their accumulations have been exhausted, and they have no occupation but husbandry to depend on for daily food. With rats so numerous as to eat up everything, nothing short of aid from without can keep the people alive. As nothing is said about subsisting on the enemy, it is to be presumed that the up-country Burmese are, like the lately afflicted Bengali, confirmed vegetarians, and would sooner starve than eat flesh.

## the Japanese gold fields.

We are indebted to Professor Henry S. Munroe of the Imperial College, in Tokio, Japan, for a recent report prepared by him upon the gold fields of the Island of Jesso. The results obtained give very little promise of the precious metal being mined to any great extent, since the highest average value, per cubic yard of the gravel examined in any one field, reaches but $3 \cdot 77$ cents. In the large majority of cases, this value is greatly lessened, being reduced to as low as some hundredths of a mill. The poorest gravel worked in California by the hydraulic process yields from five to ten cents per cubic yard, while the average is said to be from twenty-five to thirty-five cents. These are thick gravel deposits, and thin places, like the Toshibetsu field, which gives the high average above mentioned, are usually much richer. The upper valley portion of this 'Toshibetsu field, Professor Mun roe thinks, might be profitably worked, as it yields 5.60 cents per cubic yard; but this view is again rendered questhe dense vegetable overgrowth, and the inefficiency of the laborers. NEW PLANETS.
During the month of June last. three new planets were discovered, two by Professor C. H. Peters, Nos. 144 and 145, respectively of the 11 th and 12 th magnitude, and one by $M$. Borelly, at Marseilles, No. 146, 11th magnitude.

## THE JAMIN MAGNET.

There are no phenomena in physical science of which the cause is less understood than the phenomena of magnetism. That there are relations existing between the latter and the phenomena of electricity is well known; the one produces the other, and reciprocally. But as to what takes place within a magnetized body-what changes occur in its interior constitution at the instant when the magnetization begins or ends-no one has yet been able to adduce a certain and definite explanation. To the very lack of this last may be ascribed the slow progress which has been made in improving the construction of the magnets themselves. The nature of the steel, its degree of temper, the number and dimensions of the plates, their form, the area of the polar portions in contact with the armature, the dimensions of the armature itself, all are important elements to be taken into consideration; but the sum of our knowledge, as to the selections to be made under these divers conditions, results in an asemblat recipes rather than in a logical and connecting series of scientific rules.
For some four years past we have had frequent occasion to allude to the discoveries and investigations of M. Jamin, a distinguished French physicist, who has succeeded in establishing a large number of important facts, thus realizing advances of great value in the construction of magnets. While it would be impossible, in the space here at our disposal, to review M. Jamin's work in detail, a few of his more salient discc⿱everies may be profitably recalled. At the outset the investigator found himself obliged to invent a method of study. The ordinary way of determining the power of a magnet consisted in applying an armatureand measuring the amount of weight which, attached thereto, the magnet would sustain. This plan, besides being crude, frequently involved error, since it may easily happen that one magnet, in reality better
than another, will gield to a less weight, while a very slight than another, will pield to a less weight, while a very slight
modification of the polar faces often results in very great modification of the polar faces often results in very great
differences in the total weight which a magnet is capable of supporting. M. Jamin's. device for overcoming these diffculties consists simply of a nail suspended by a string from
the a:m of a balance. The nail, presented at various points
of a magnetized bar or at corresponding points of sever bars, is attracted, and the degree of attraction is noted by the balance, so that it is obviously easy thus to measure the magized plates with each other. If several magnetized bars are superposed, it has been found that the attraction (meaured at the extremity of the assemblage by means of the nail) augments with the number of bars, and then be comes stationary. To illustrate, one bar or plate attracts the nail with a certain force, say 750 grains; two plates, superposed, exercise a force of 875 grains; three, 1,425 grains our, 1,575 ; and five, either the same as four, or perhaps 15 rains more. The fifth plate, therefore, adds nothing, o nearly nothing, although it has been magnetized in the same manner as the others, and when tested singly is as powerful as any one of them. This, however, is not all; if the plates e separated and re-examined, it is found that they are less powerful than before, and that their union has resulted in
oss. They have, in other words, acted upon each other un favorably.
While the facts contained in the foregoing paragraph are not novel, having alresdy been pointed out by Coulomb, it has been reserved for M. Jamin to discover that they are no exceptional or fortuitous, but absolutely constant and regu

Fig. 1. lar, and also to find a means of preventing this tendency of th superposed plates toward mutua deterioration. This means is simply the attaching, to the ends of the bundle of plates, of pieces of soft iron which partake of the magnetism of the extremities. If under these new conditions. the experiment above described be repeated, the fifth plate is found to add as much as its predecessors, and the number of plates may be largely augmented before the effects, which in the former case are noticeable manifest themselves. Finally, with a certain number of plates, 20 for example, the soft iron pieces become saturated with magnetism, and further additions are of no value or are mutually injurious. If, instead of employing bars, thin ribbons of steel be used, superposed as above explained, the magne invented by M. Jamin, and represented in Fig. 1, is obtained. The plates are curved, and the poles, brought near together, are separated by a piece of brass to which they are firmly screwed. The various advantages gained by this form, apart from those mentioned bove, we have already discussed in detail in back issues of this journal. Perhaps the most important is the facility with which the magnet may be taken apart and put together, or with which the number of plates, and consequently the deree of magnetism, may be varied.
The latest form of magnet devised by M. Jamin is repreFig. 2.

sented in Fig. 2 (which, with the former illustration, we extract from La Nature). The poles are of soft iron and are applied to the extremities of several steel leaves, which are made broad in proportion to their length. Singly the plates support but very small weights; but when combined with the iron end pieces, the latter absorb the magnetism, rendering the assemblage sufficiently powerful to carry twice r three times its own weight.
A very remarkable peculiarity of this magnet, which is not learly explained, is that neither pole, when tested separate ly , has any very marked attractive force; but when the armature is applied simultaneously to both poles, it is very strongly held, and yet the attraction does not seem to act over any appreciable distance. It appears, in fact, that the magnetic current must be completed before the maximum force is developed.

## Co-Operation in Building.

Hon. Josiah Quincy, in a letter printed in the Boston Advertiser, says: A number of Germans who were accustomed in their own country to a system of coöperation, purchased a tract of land in Dedham. Ten of them erected houses for their own use. A separate mortgage for about $\$ 2,000$ was taken on each house to secure a joint and several bond signed by the ten owners, by which they agreed to pay $\$ 6$ a week into a savings bank to the crelit of the mortgagee and trus
tee. One half of each deposit is enough to pay the interest semi-annually at seven per cent, and the other half goes on on interest, with a certainty that in a few years it will pay erincipal and leave the houses unincumbered. On the frst days of January and July, the mortgagers have sent the eposit books to the trustee and mortgagee, who has he semi-annual interest and returned the books with thei accumulations to the owners, every payment increasing hi ecurity, and the association taking only the risk that ever older of real estate takes who leases his property. Ten or more industrious and temperate men, who had confidence in one another, might form such an association with peculiar advantages. They might choose their locality either togeth
or or separately, giving an excellent security that they would or or separately, giving an excellent security that they would pay t

## The Secrets of Philiadelphia Butter

Every one has doubtless heard of the celebrated Philadel phia butter, the delicious flavor of which renders it a deli acy which, in markets outside of its place of manufacture brings prices which sometimes range as high as a dollar a pound. How it is made is told in a new and excellent little work, recently written by Mr. X. A. Willard, editor of the dairy department of Moore's Rural New Yorker, and entitled "Willard's Practical Butter Book." A notice of the volume will be found elsewhere. On the subject of Philadelphia butThe take from its pages the following
The celebrated Philadelphia butter comes mainly from Chester, Lancaster, and Delaware counties, Pennsylvania The spring house is about 18 feet by 24 feet, built of stone with its foundation set deeply in the hillside, the floor being about four feet below the level of the ground at the down hill side. The floor is of oak, laid on sand or gravel ; this is flowed with spring water to the depth of three inches, and at this hight the flowing water passes out into a tank at the lower side of the spring house. The milk, when drawn from the cow, is strained into deep pans which are set in the water upon the oaken floor. Raised platforms or walks are pro vided in the room for convenience in handling the milk. The walls of the spring house are about ten feet high, and at the top on each side are windows covered with wire cloth for ventilation. The depth of the milk in the pans is abou three inches, and the flowing water which surrounds the pans maintains a temperature of about $58^{\circ} \mathrm{Fah}$.
The milk is skimmed after standing 24 hours, and the cream is put into deep vessels having a capacity of about 12 gallons. It is kept at a temperature of 58 degrees to 59 de grees, until it acquires a slightly acid taste, when it goes to the churn. The churn is a barrel revolving on a journal in each head, and driven by horse power. The churning occupies about an hour; and after the buttermilk is drawn off, cold water is added, and a few turns given the churn, and the water then drawn off. This is repeated until the water as it is drawn is nearly free from milkiness. The butter is worked with butter workers, a dampened cloth meanwhile being pressed upon it to absorl) the moisture and free it of butter milk. The cloth is frequently dipped in cold water and wrung dry during the process of "wiping the butter." It is next salted at the rate of an ounce of salt to three pounds of butter, thoroughly and evenly incorporated by means of the butter worker. It is then removed to a table, where it is weighed out and put into pound prints. After this it goes into large tin trays, and is set in the water to harden, remaining until next morning, when it is wrapped in damp cloths and placed upon shelves, one above another, in the tin-lined cedar tubs, with ice in the compartments at the ends, and then goes immediately to market. Matting is drawn over the tub, and it is surrounded again by oilcloth so as to keep out the hot air and dust, and the butter arrives in prime condition, commanding from seventy-five cents to one dollar per pound
Mr. Isaac A. Calvert, who markets his butter at those high prices at Philadelphia, attributes his success to three points: -1. The food of his cows. 2. Temperature. 3. Neatness -1 . The food of his cows. 2 . Temperature. 3. Neanness
and dainty refinement at every step, from the moment the milk flows from the udder till the dollar in currency is paid for the pound of butter. He says: "I have found that I make my best butter when I feed on white clover and early mown meadow hay. I cut fine, moisten, and mix in both corn meal and wheaten shorts. Next to meal I regard shorts, and prefer to mix them together. I feed often, and not much at a time. I do not use roots, unless it be carrots. My pastures and meadows are quite free from weeds. I cannot make
hay.
". Temperature.-This I regard as a matter of prime importance in making butter that commands a high price. Summer and winter I do not permit my milk room to vary much from $58^{\circ}$. In summer I secure the requisite coolness by spring water of the temperature of $55^{\circ}$ Fah., flowing over stone or gravel floor in the milk house. This can be accomplished without water in a shaded cellar ten feet deep. As good butter can be made without water as with but the milk and cream must be kept at all times a little below $60^{\circ}$.
"We skim very clean, stir the cream pot whenever a skimming is poured in, and churn but once a week, summer and winter. Just before the butter gathers, we throw inte the churn a bucket of ice cold water. This hardens the butter in small particles and makes a finer grain. In the hot months this practice is unvarying.

In working, we get out all the buttermilk, but do not apply the hand. A better way is to absorb the drops with a linen cloth wrung from cold water. The first working takes out all the milk; at the second we handle delicately, with
fingers as cool as may be. The salt is less than an ounce to a pound ; but not generally much less. The balls each weigh one pound, and receive a uniform stamp. On packing for market, each ball is wrapped in a made of cedar plank, $1 \frac{1}{2}$ to 2 inches thick, and lined with tin. On the inner face are projections, on which the shelves rest. The balls are not bruised or pressed at all, and pass into the hands of the customers as firm, as perfect in outline and as spotless as when they left the spring house

We find uniformity to be a prime virtue in the buttermaker. We produce the same article whether the cows tand knee-deep in white clover blooms, or sun themselves on the lee side of the barn in February.

There is a small ice chamber at the end of the oblong butter tub which we use in summer, so that in dogdays the heat within the tub does not get higher than $60^{\circ}$ Fahrenheit I need not add that we observe a scrupulous, a religious neat ness in every act and in every utensil of the dairy. Milk which, upon leaving the udder, passes through an atmospher loaded with stable fumes will never make butter for which we can get a dollar per pound. No milk sours upon the floor of the milk room; none is permitted to decompose in the crevices of the milk pans; the churn is scoured and scalded till no smell can le detected but the smell of white cedar.
"Our customers take the napkins with the prints, wash iron, and return them when tney come to the stand on mar ket day. These are generally Wednesdays and Saturdays With these prices we have no difficulty in making a cow pay for herself twice a year; if she cost $\$ 60$, we sell $\$ 120$ worth of butter from her in twelve months.'
It may be remarked that the sour milk is employed by the Philadelphia butter makers as food for s wine. It is estimat ed that such milk will make 100 pounds of pork per cow.

The cows in the district where the Philadelphia butter is made are well sprinkled with the Jersey or Alderney blood, and about a pound per day from each cow is considered fair average for the best dairies.

The University Athletic Contests.
The annual regatta of the American Universities took plac on Saratoga Lake, N. Y., on the 15th of July. An immens concourse of spectators was present. The distance, thre miles, was accomplished by the respective crews in the fo lowing time and order
Place.

1. Cornell...
2. Columbia.
3. Harvard...
4. Dartmouth
5. Wesleyan.
6. Yale........
7. Amherst...
8. Brown....
9. Williams..
10. Bowdoin...
11. Hamilton.
12. Union......
13. Princeton.

The victory of the Cornell crew gave great satisfaction to except the losers.
During the foot races, which took place on July 16, some remarkably rapid walking and running was accomplished The first trial was a onemile run, in which Messrs. Copeland of Cornell, Barber, of Amherst, Fort, of Wesleyan, and Sinute, of Williams, took part. The Amherst representative won the race in $4 \mathrm{~m} .44 \frac{1}{2} \mathrm{~s}$., coming in about a yard ahead of the Cornell man. The others withdrew during the contest.

Cornell, Williams, Wesleyan, Princeton, and Harvard contested the one mile walk. Mr. Platt, of Williams, won in 7 m . 50 s . Times of others not given.

The quarter mile run was won by Mr. Culver, of Union, who reached the goal in 554 seconds, closely followed by Yale and Cornell. The severest contest was the seven mile walk. The record is as follows: Mr. Taylor, of Harvard, won in $65 \mathrm{~m} .51 \mathrm{~s} ., \mathrm{Mr}$. Driscoll, of Williams, second-fainted at end; Mr. Boyd, of Columbia, third. The Dartmouth and Wesley an representatives broke down and withdrew. The half mile run was gained by Mr. Trumbull, of Yale, in 2 m . 6ats. against one competitor (Amherst), who came in 50 feet be hind. The three mile walk was easily won by Mr. Taylor of Harvard, in 25 m .23 s . Mr. Platt, of Williams, came in second, in 26 m .164 s . ; the third competitor (Brown) broke Williams second, and Yale third. An exciting three mile run was won by Mr. Morell, of Amherst, in 14 m . 17 s ., the Wesleyan and Columbia competitors withdrawing before the finish. Mr. Maxwell, of Yale, won the hurdle race against three others; no time given. The graduates' seven mile run was gained by Mr. Eustis, of Wesleyan, over Mr. Gunster, of Williams, by ten feet; time 69 m . $49 \frac{?}{4} \mathrm{~s}$. Suitable prizes were awarded to the various winners by ex-Governor Hoffman.

## Cultivate Good Manners.

It is one of the laws of our being that every inward dis position is strengthened by the outward expression which re presents it. Besides this, so much of human happiness is de pendent upon the manners that no truly benevolent person if thoughtful, can disregard them. We haveall experienced the charm of gentle and courteous conduct; we have all been
drawn irresistibly to those who are obliging, affable, and sympathetic in their demeanor. The friendly grasp, the warm welcome, the cheery tone, the encouraging word, the respectful manner, bear no small share in creating the joy of life; while the austere tone, the stern rebake, the sharp and
acrid remark, the cold and indifferent manner, the curt and isrespectful air, the supercilious and scornful bearing, are responsible for more of human distress, despair, and wo han their transient nature might seem to warrant.
Whether we aim at self-improvement or the well-being of thers, success is largely dependent on our outward demeanor No one can slight it with impunity. It has many counterfeits and shams which are truly despicable; but where pure mo tives are supreme, and the aims of life are worthy, the cul ture of manners is an essential means of prugress, conferring dignity and grace upon every noble endeavor.-Philadelphi Ledger.
AT the recent Bunker Hill Celebration in Boston, the National Tube Works Company was represented by som ine specimens of lap-welded wrought iron tubing, drawn six large black horses on a wagon tastefully draped with bunting. The tubing, some of the specimens of which were very large, was effectively arranged to represent a can non on a gun carriage. The carriage was made of tubing six sections on a side, the cannon being represented by section of lap-welded tubing twelve inches in diameter, said to be the largest manufactured in the world. On each of the tubes of which the carriage is composed is the name of on of the original thirteen States, and on the large tube repre enting the big gun was inscribed:

Massachusetts, 1775-Our Union Welded-1875."
To remove fruit stains from napkins, etc., wet the spot with chlorine water

## decisions of the courts.

United States Circuit Court--District of Mansa-
david in. weston et al. ps. nathaniel machine. nase et al.-Patent sugar The fifth equity.-Before Silepiex, J.-Decided April, 1875.
 harge. [Gerge $L$. Roberts, for complainants.
James $B$. Robb, for defendants. $]$

## United States Circuit Courto-s.

William wicie vs. henry and barbara kleingnech
[In equity.-Before blatchford. J.-December, 1874.]
Where a machine was ifeensed for use in a particular territory: Held. that
the use or ti, by subsequent purchasers, in territory other than that for




## NEW BOOKs AND PUBLICATIONs.

illard's Practical butter Book-a Complete'Treatise on But-
ter Making. By X. A. Willard, M. A. Ilustrated. Price $\$ 1.00$ ter Making. By X. A. Willard, M. A. Illustrated. Price $\$ 1.00$ New York city: Rural Publishing Company. Mr. Willard has long been known to darrymen and agriculturists as Presiden the New York State Dairymen's Assoclation, as editor of the dalrydepart aker of considerable experience. Hence in the work before us- which $w$ elleve is the first ever pubilshed devoted wholly to the subject of butte nd its manufacture-the advice, practical hints, and suggestions and discussions given emanate from one certainly conversant with his subject in all its branches. The book is, in fact, a complete repertory of information
for tarmers and dairymen, as it treats of everything relating to butter, from or rarmers and dairymen, as it treats of everything relating to butter, from ries and the merits of the various patented inventions which have bee made to facilitate dairy processes. Its low price places it within the reach of every farmer
How to Teach Chemistry: Hints to Science Teachers and Students, being the Substance of Six Lectures, delivered at th land, D.C. L F. S. Propessor of Chemistry in the Royal Schoo of Mines. Price \$1.25. Philadelphia, Pa.: Lindsay and Blakiston, 25 South 6th street.
The teachers of physical sclence are largely indebted to Dr. Frankland fo this book, which is an admirable and conclse treatise on all the methods of
exemplifyling the action of the chemical forces. It conmences with the axemplifyling the action of the chemical forces. It conmences with the
ery simplest experiments, and does not quit its subject until the most elabvery simplest experiments, and does not quit its subject until the most eab
orate apparatus and its manipulation are fully described. By careful stud this intle volume, lecturers and teachers can learn the whole art of illus

位TRICTTY, its Theory, Sources, and Applications. By Joh
T. Sprague, Member of the Society of Telegraphic Engineer New York city : E. \& F. N. Spon, 446 Broome street.
Mr. Sprague is well known as a writer of authoritative papcrs on electrioa In collecting the most elaborate of these papers into a volume, he has give is a text book of the greatest value, a manual complete. exhaustive, and practical. The clapter on electrolysis is worthy of spectal commendation nd the section devoted to elcetro-metallurgy is a complete compendium of e art. The book is handsomely illustrate
The Cone and its Sections Treated Geometrically. By S. A Renshaw, of Nottingham, England. Price 12s. 6d. ( $\$ 3$, gold ond
mportane of these propertles to the art of mensuration. $T$ the gre propertles of the sections are derived from the cone itself, the author fo lowing the example of Hamilton in reverting to the method of Apollonius of nd whose system has not benic sections lald the foundation of the science, and whose system has not been superseded by the thousands of books whic heories and problems into propositions of the most orthodox form, and ha aturally succeeded in imparting comprehensibility and logical demonstr tion to a complex subject. He has produced a very interesting volume, and mill
description of and How to Reach Them, combining a Brief Description of the Principal Summer Retreats in the Unite Bachelder, Author of "The Illustrated Tourist's Guide," Illustrated with One Hundred and Fiftr-Two Engravings. Pric $\$ 2.00$. Boston, Mass. : John B. Bachelder, 41 Franklin street. The desire to travel is universal; and the favorte recreation of all classes,
e thelr lelsure hours few or many, is found elther in visitting the haunts of en, to observe the changes in soclal hre and manners, or in fleeing fro us works on the works of Nature. Mr. Jonn b. Bachetror, whose numer nown, has collected, in the volume now before us, a vast amount of infor mation on nearly all the pleasure grounds of the United States, and ha placed it before his readers in a most attractive and readable form. The liustrations are especially commendable, and the work is sure to have andboor or hand and Marise brarse, inlud ing, Construction ine Engines and Boilers. With Illustrations. By Stephen Roper, Engineer, Author of "A Catechism of High Pressure o . Philadelphia, Pa.: Claxton, Remsen, and Haffeifnger, 624 to 688 Market street.
Mr. Roper needs no introduction to our readers as a competent and trust mind ith a popular style, free from formulas and ultra-mathematical expe ons. The tables with which the book is interspersed are numerous an valuable; and there is at the end an interesting historical account of the team engine.
pactical Guide to the Determination of Minerals by the Blowpipe. By C. W. C. Fuchs, Professor in the University o Heidelberg. Translated by T. W. Danby, M.A., F.G.S., Associa of the Royal School of Mines. Price $\$ 2.50$. Philadelphia, Pa Claxton, Remsen, and Haffelfinger, 624 to 628 Market street streets.

Thiseanse is adapted to the use of any one who desires $t$ eat ine and comprehend the qualities of any mineral, provided he has an in seclitive in eld
vsects of the Field. By A. S. Packard, Jr., Editor of "The
American Naturalist." Price 25 cents. Boston, Mass. Estes and Leuriat, 143 Washington street. New York city: Dodd and Mead.

Arusal. It forms part 7 of the publishers' excellent serics of "Half Hou Recreations in Natural History
reater Chicago, tllustrating the Buildings Recently Erected in the Reconstructed City. Price $\$ 1.00$. Chicago, III.: J. M. Win \& Co., Ashland Block
This pamphlet consists entirely of illustrations, which are intended to con er indomitable energy and the public spirit of her citizens Many of the bulldings represented are of considerable architectural merti.
aright Moon, Sun, and Star Shining Pocket Mirror of th Universe. By D. L. Stinchfield, New Richmond, Ohio
"Our spiritual kingdom of Heaven is three times divided," says ou
athor, "vertlcally into the three seats. or two antagonistic, positive and egative extremes, and their saving mediator with positive electrictty found the bottom of this great spirifual and pacific and specficic ocean foun
 to confess our inability to extract it, we cheerfully resign the task.

ND DIs bushres of Emanuel Swedenborg. By the Rev. Georg banulation of Gunpowder. By Commander J. D. Marri U.S. N. Naval Experimental Battery, Annapolis, Md ird annual report of the board of managers of the Zoological society of Philadelphia, Pa.

[^0]zerent Gmericau aud forcign equtenty.
Improved Non-interfering Fire Alarm Telegraph.
Joseph W. Kates, Richmond, Va.-The object of this invention is to provide an improved electric fire alarm, in which is avoided the interference and confusion of signals caused by the sending of two separate signals from different points at the same time. It consists in a method of connecting the instruments at the different signal closed automatically to operate the armature of an electromagnet, which serves as a stop for a clock mechanism, and locks, by means of the said second circuit, all of the instruments at the signal stations except the one in operation, for the prevention of all interference between the different instruments. It also consists in the method of automatically operating the armature, having a stop for ments, by a non-conducting tape placed upon the same drums with the signal tape, and passing between contact rollers that form the electrodes of the second circuit, and perforated at its extremities, so that the second circuit is closed for this particular instrument whenever the tape is entirely wound up or entirely run down, and is opened during the operation of the instrument to lock the other with the main drum or spring shaft carrying a pinion of a rack bar that engages with a shoulder upon the stop of the armature, to pre vent the operating instrument from locking itself.

## mproved Water Wheel

Stephen R. Jenner, Milltown, Ind.-The object of this invention Stephen R. Jenner, Militown, Ind.-The object of this invention
s to utilize a larger per cent of motive power than is usually obis to utilize a larger per cent of motive power than is usually obwater ways in between two or more turbine wheels attached to the same shaft, the said water ways being detached from the shaft,
alternating with the turbine wheels, and running in direction transalternating with the turbine wheels, and running in direction transversely to the spiral flanges of the turbine buckets. It also consists n the combination with the said wheels and water ways of a cylintive to the action of a governor

## Improved Wire Fence Tightener

Warren L. Brown and Joel B. Cramer, Dunlap, Iowa.-The object of the invention is to provide, for farmers and others having occaice for tightening or straining the wires of such fences, the sa being adapted for convenient attachment to and detachment from post. The wire is attached to a pronged bar, which is adapted to slide on another bar secured to a post. The sliding bar is adjusted by a nut, and the wire is clamped by jaws attached to the stationry ba

Machine for Handling Straight-Cut Tobacco Francis S. Kinney, New York city.-This is a machine for removing straight-cut tobacco from the cutting machne, and boxing or tangled, and enabling it to be boxed or bunohed with the straightest fibers upward.

## Improved Grate

Charles C. Gates, Albany, N. Y., assignor to J. L. Mott Iron Worke, New York city.-This consists of a grate, in combination with an outer vibrating ring, the ring being corrugated on its upper sur-
face, which is in the plane of the grate. The concave parts of the corrugations incline downward radially to the periphery, to faciliy attached at the lower side to wre inke ar fis center with a center pin, on which the ring oscillates to shake the grate. The pin is pivoted in a center bearing, rigidly supported by
arms of the base of the stove. The invention also consists of a dumping hook for the grate, atcached to the center of the ring, in which a journal of the grate rests. The bearing is forward of the grate's center on the depressing side, to lessen the dip of the grate
in the ash pit when dumping, and thus affording more freedom for removing the ash pan.

Improved Stud Fastening.
John C. W. Jefferys, Tottenham Court Road, London, Eng.-This John C. W. Jefferys, Tottenham Court Road, London, Eng.-This
invention relates to articles of jewelry or fastenings for dress; and consists in the combination of a flat oblong shank, with the well known crescent shaped-back, capable of being inserted in the button hole by a rotary movement. The back is so constructed as to be turned in either direction
ing of two or more pillars.

## Improved Tram Staff.

Samuel B. Williams, Bridgeport, Ohio, asaignor of one halp his right to Seymour C. W. Dunlevy, of same place.-A tram staff about equal in length to the diameter of the mill burrs is adjustably attached by rectangular brackets to the ends of central part of stanstandard. Sleeve-ghaped projections at the central part of stan-
dard fit on a center shaft that is provided with a tripod-shaped part to be applied to the spindle of the bed stone. The center shaft is
set into a perfectly vertical position to the face of the burrs by set into a perfectly vertical position to the face of the burrs by
revolving the staff at somedistanceabove the same, and adjusting a crank screw at the top of the standard until a regulating quill or the circumference of the burr. In this manner the center shaft may be set by the adjusting screws more readily into vertical position on the burrs.

## Improved Washing Machine.

Charles E. Ross, Lincoln, IIl.-By tightening up the nuts of bolts, the staves or strips will be drawn closer together to take up any
shrinkage of the wood, and thus keep the suds box always tight. shrinkage of the wood, and thus keep the suds box always tight.
Curved cleats of the suds box and curved cleats of the rubber are placed in reversed positions with respect to each other, the result of which construction and arrangement is that the clothes will

Improved Hay Press.
William Henry Penniston, Fox, Mo.- By this construction, when the doors of the baling box are unfastened to remove the bale, the being released from both side and end pressure, may be easily removed.
mproved Cracker Machine.
Adam Exton and John Exton, Trenton, N. J.-This invention relates to an improved cracker-molding machine. The basis of the claims is the mechanism whereby the crackers are conveyed or fed
to the docker, and cleared from the table upon whichi emolding to the docker, and cle

Improved Portable Fence.
Joseph L. Welshans, Mo.-This is a portable fence panel, composed of rails pivoted in posts and secured in a central clamp, which is
tied near top and bottom. Braces are arranged to support the rails and uprights.

## Improved Calendar

L. L. Kellogg, Leon, N. Y.-The invention relates to modes of exhibiting on clocks the day of the week, the monlh, and the day of hooks and notcies with an hour hand shart and lever, as well as an intermittent pin

George Hunter, Payson, ill.-Tar Starter.
heels is rigidly attached a small gear wheel, and to the inner side the other wheel is attached a large internally toothed gear wheel shaft placed paralle with the axle is made in three parts, con the shaft is attached one end of the spring, which is coiled arrund the said shaft. The end parts of the jointed shaft engage by gears the said shaft. The end parts of the jointed shaft engage by gears
with the gearwheels above mentioned. Devices are provided which lock the levers, which hold the gear wheels in gear and out of gear When the car is to be stopped, the apparatus is so regulated that the orward movement or momentum of the car may wind up a spring When the car is to be started, the power of the spring may be ap leverage leverage, assist in starting the car. In the same way the spring may
be coiled by the advance of the car when upon a level or down grade, and held, to be applied to the car when upon a short upward grade, to assist in its propulsion.

Improved Weed-Covering Attachment.
Joseph W. Dysard, Michigan City, Ind.-A wheel, which runs in the furrow last plowed, is pivoted to theend of an adjustable bar, which is curved to correspond with the position of the furrow slice r, is the and stabble that drawn forwara, will bend down the grass, weed ${ }^{\text {r }}$ the furrow, so that they may be wholly covered.

Improved Peg Cutter.
Matthew Bubler, Lamoille, Ill.-This is an adjustable cutter and rasp, by which the pegs may be removed from any part of the bot-
tom of a boot or shoe. The face of the wheel is rigidly attached to the stem. There are two mortises for the stem, which unite at the end of the sbank, and branch obliquely therefrom through opposite sides of the latter. By turning over the shank, the position othe cutter and rasp is changed to enable the operator to cut the pegs from any part of the bottom. Cutters are arranged at both ends of the tool. The rasp follows the forward cutter. An aper-
ture at the heel of the tool has a sharp edge for smoothing off the pegs in the heel of the boot

## Improved Car Brake.

John E. Worthman, Mobile, Ala.-This invention relates to certain imprcvementsin car brakes; and it consists in the combination with a worm or screw thread upon the car wheel shaft, of an adjustable pin attached to a lever arm provided with right angular rakes are applied. The said pin is adjusted so as to be raise ove the worm upon the shaft or depressed so as to register there with and move the lever arm, in which it is contained, laterally, for the purpose of applying the brakes through the right angular arms adjustable pin, consisting of a rock shaft which has an arm that is attached to a sliding collar that raises the lever carrying the pin, and a second arm that is attached to an indented disk, so combined with a ratchet w
same movement.
mproved Check Valv
H. P. Buffon, Cleveland, IIl.-The invention consists in combining with a hollow plug valve, a check valve having its seat in a parti on of valve case
mproved Earth Auger
John T. Kemper, Hannibal, Mo.-This consists of a cast iron auger pot or body with open sides, having outer reaming plates, and de-
tachable cap sections that close the sides, and are attached to top by a set screw.

Improved Car Coupling.
eorge W. Kyle, Mylo, Ohio.-The coupling pin is suspended to the front arm of an angular frame that slides in suitable guides of the wall of the car. A lateral piece is supported on the front arm
of the frame, and is provided with guide slots for vertical rods, which are pivoted at their upper ends and at their lower ends below the drawhead to a lateral rod that is attached to the longitudina swinging arm of a fiat guide spout. An arm carries the spout up raising the pin-supporting frame. The spout serves then for taking up the coupling link of the approaching car, and for conveying it into the cavity of the drawhead simultaneously with the concus-
sion and the carrying back of the slide piece. The pin and pin frame sion and the carrying back of the slide piece. The pinand pin frame
drop thereby, and carry the spout to some distance below the drop thereby, and carry the spout to some distance below the drawhead suspended on the spring rods, but out of the way of dam-
age by the concussion of the drawheads. The pin couples in dropplng the link.

## Improved Faucet

Robert L. Hallett, Brooklyn, N. Y.-This is an improved faucet for drawiog hot and cold water, or two kinds of liquids, either at the same time and mixed or separately, and discharging them
through the same discharge pipe. The invention consists in the combination, with a spharical case having two inlets and a single
cone outlet, of a spherical valve contained within said oase, and operated yy a stem connected with a hand wheel. The said valve has an orithat the two at a time.
improved Regulator for Hemp-Spinning Machines. Christopher Herschaft, Brooklyn, N.Y.-In this invention a coun the driver for the gill bars, and the main driver belt is contrived to be automatically shifted by the upper condensing roller from on to the other of the pulleys on the countershart for turning the aforesaid pulleys. The arrangement is such that, when the sliver is to the pulley for slow speed to feed slower, or on to the loos the pulley for slow speen in feed slower, or on to the loose large. When the sliver is too small, the belt will be shifted so as to increase the speed of the gill bars and feed faster.

Impreved Horse Power Link
Barnard L. Olds, Highgate, Vt.- Many portable horse powers for thrashing grain and other purposes consist of an endless chain rether by metalic links, which links are connected by rods, and have cogs on one eide, which mesh into pinions, to produce the rotary motion required. The present invention consists in forming the body and wrought iron back the latter terminating at each end in a curve, forming a bearing for a journal within it.

Improved Extension Table
James Poolman, Providence, R. I.-This invention consists of a couple of pairs of toggle bars and a right and left tbreaded screw for working them, combined with an extension table, for extending
and contracting it by the turning of the sorew. The object is to lessen the labor, so as to accomplish it by one person, and to draw the table tightly and rigidly together, and stiffen up the middle por m,
Frederici Frederick H. Crocker, Gonic, N. H.-This is a device which throws
ofr the dricing belt in case the squaring band breaks or becomes too loose, and thus prevents the carriage being thrown off the track.

Edmund F. Krelwitz, Humboldt, Mich., assignor to himself and in made of one same place.-Thistal, bent and corrugated to form spring jaws for retaining the clothes on the line

Improved Base-Burning Stove
Melville C. Hawley and William Lennox, Mattoon, Ill.-The bar the grate are made hollow to allow air to circulate through them through the wall of the stove, some of which may be curved up wrough the wall of the stove, some of which may be curved up-
whe downward, to promore the circulation. This con ruction of the grate heats air and discharges it into the room. A nical chamber, placed in the lower fire chamber just below th grate (from which a pipe leads out through the center of the bot-
tom of the base to admit cold air), projects the products of combustion toward the walls of the stove, so as to heat said walls, and thus withdraw the heat from the products of combustion and radiate said heat into the room.
Improved Rotary Ch urn Dasher.
James J. Robinson, Gibson City, Ill.-The object of this invention patent were issued to the same inventorn dasher for which letter vention consists in a churn dasher in whi b bars provided at thei ends with cross bars and disks are attached to the shaft in an inclined position, and are so arranged that the upper cross bar an hiss of each lower bar may be upou a level with the lower cros bar and disks of the nest upper bar, and in the combination of a tion makes the cost of manufacture less, and lessens the labor of operating the dasher.

Improved Sulky Cultivator
Burton C. Cox, Cooper Hill, Mo.-To the inner side of the inne beams is secured a half keeper, to which and the said beam is piv-
oted the end of a bar, which is bent inward and downward, and projects beyond the rear pait of the said beam. To the rear part of the ar is bolted a guard, to prevent clods, lumps, and otber rubbish from being thiown against the young plants and injuring them ats holes formed through them to re more or less soil may be readily adjusted bigher or lower to bars is formed a projection, which rests upon the upper edge of the beam and serves as a stop to prevent the fender from dropping

Improved Cautery Electrode, Vesicular Electrode and Reservoir Electrode.
Jerome Kidder, New York city.-These are three new inventions, devised by a well known inventor of electro-medical apparatus The first has for its object so to improve the galvano-cautery in struments for excising tumors, etc., that they may conveniently be
operated and the circuit closed and interrupted by the use of one operated and the circuit closed and interrupted by the use of on
hand only, leaving the other hand at liberty for holding some instrua cautery electrode, with the usual vulcanized rubber handle and slide ring for drawing the incancescent cutting loop, but having the handle extended fa enough back of the lower flxed ring that the band may be applied for firmly holding the instrument, while the spring button for clos log and interrupting the circuit is placed in front of the fixed ring the slide and loop by the thumb. The second invention consists of vesicular electrode, with solid non-conducting head into whic the ends of the battery-connecting wires are embedded in such a manner as to be readily brought in contact at the side and end, ad mitting the application of electricity by a more easily manipulate device than win the vesicular electi by hitherto in use. The thir invention is an improved electrode, for common exterior applicacontact of the cold metallic or sponge surface with the body is ob viated. It consists of a common electrode, provided with a reser voir for hot water, and a tightly closed orifice for keeping the conet surface warm for application.

Improved Vegetable Dish.
Mrs. Ella Portington, Factoryvile, N. Y.-This invention consist a vessel provided with radial partitions, forming subdivisions, and a tubular center part, for being placed and r
number of dishes are thus combined in one.

Improved Bush Hammer
Charles Littlefield, Vinalhaven (Carver's Harbor P. O.), Me.-Upon the ends of the sides of the head are formed flanges, the inner edge project a little beyond the edges of the suid head to form a seat fo the curters. The side plates have curved recesses formed in them to receive and fit upon the fianges. In the side plates, near thei
ends, are formed holes to reoeive bolts, by which the cutters ar ends, are formed holes to reoeive bolts, by which the cutters are secured to the snid plates, and the cutters and side plates are secured
to the head, binding the various parts of the hammer firmly to the he
together.

Improved Coal Chute
Robert Dunbar, Mansfield Valley, and John Keegan, McDonald nected by curved adjustable guard plates to the sides of the chut ection, to be set to any angle thereto, for conveying the coal with out shoveling to any part of the car or boat.

Improved Portable Fence
Stark Olmstead, Brooks, Ind.-This consists of panels of sawn that openings are left between. There is one cross piece near th other end, beyond which the slats extend so as to be fitted in th moles between the two cross pleces of another panel. The parts ar ocked and bound fast by adjusting the paaels so connected a early in a straight line as may be, making a zigzag fence, whic Besides the binding of the panels together by the coupling effect of straightening the line, a pin is driven diagonally through the projecting end of one of the slats against the cross pieces.

Improved Hointing Machine.
-Victor Duhamel, Easton, Pa.-This invention is a machine which is put in operation by means of a pendulum and ratchet and pawls. consists of a hoisting drum, which is turned by a pawl operate ork by a spring. The drum remains motionless when the pendu um takes its return stroke.

Improved Coal Shovel.
James D. Tallmadge, of Chicago, Ill.-Four wires, more or less, are bent into shape, and are then forced into a wedge-shaped fer ule. The projecting ends of the wires are then bent by band or upon a
shovel.

## mproved Machine for Moistening Oleaginous Seeds.

 Alfred B. Lawther, Chicago, IIl.-This invention consists of a ommon or steam-heater reservs, by which the seed is thoroughly mixed and moistened under the admission of hot or cold water o steam.July 31, 1875.1
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## \%alesxampins

E. W. P. will find a recipe for waterproo lue on p. 204, vol. 31.-J. M. B. will thd a recipe . A.L. will find directions for makingsun dials on 0. 409, vol.29.- E. I. will find a recipe fer aquariun
 Fill ind an answer to his question as to propor
fioos of an osclllating engine on p. 359 , vol. $32 .-\mathrm{A}$ tioos of an osciliating engine on p. 3 . 39 , vol. 32 - -
E. M. will find a recipe for filling for black wal nut wood on p. 315, vol. $30 .-$ E. $\mathbf{s}$. H. will find de tails of a simple method of galvanizing iron on $p$ p.
346 , vol. $31 .-\mathrm{M}$. $\mathbf{B}$ will find a recipe for a cement or leather on p. 119, vol. 28.-W. C. L. will find recipe for shoe polish on p. 283, vol. 31.-E. R. B can gild devices on china by the method describe
on p. 41, vol. $27 .-\mathrm{J}$. B. Jr . can stain glass bue and red by following the directions on p. 390 , vol. 30 .G. D. Jr. will find an explanation of the silvering
 find directions for making a cool chamber on p.
251, vol. $31 .-\mathrm{H} . \mathrm{H}$. can polish tortoisesbell by fol owing the directions on p. 122, vol. 27.-P. F. T.' itterary queries are not in our line.-M. G.F. ca described on p. 90, vol. 31., Pe \& 8 Co. can ename rron by the methods siven on p. 362, vol. 32 .-L. K
Y will fnd a recipe for cement for leather on p Y. will find
19, vol. 28 .
(1) A. F. A. asks: Would a meniscus lens 1y/ inches in diameter, of 6 inches focus, do for a
camera for taking photographs ? A. Yes, with a top in front of lens.
ater
and
(2) C. S. asks: 1. How many times the fo cus of the lens must a radiant be placed so tha the rays may reach the lens sufficiently parallel to Corm an accurate image at the principal focus
A. At anite distances the image is found at the horter conjugate focus. 2. In testing an achro matic, while correcting for spherical aberration, is there any means of knowing on what surface the local correction should be made? A. The outer
surface. The modern practice is to slightly unde correct for color, the spherical aberration being some practical ed. 3. If you will favor us wit of achromatics, going into details, you will do a great deal for us who are interested in optical experiments, by saving us numerous failures merely
from our want of knowledge. A. To test an achromatic, remove the eyepiece and look at the objective lighted by the full moon. Every streak
bubble, or scratch will appear. To center the cb ject glass, put on the cap, place a cendie flame the focus, and tip the glass by bits of tinfoil unt the reflected images seen through the blue con are coincident. Repeat, revolving the tube $90^{\circ}$ at
time. In testing for spherical aberation a time. In testing for spherical aberration, th mages must be sharp, and blurred quickly hy in the sun make a gond test object. The test for in the sun make a god test object. The test for
achromatism : The edge of moon must be claret $\begin{aligned} & \text { purple inside the focus and yellowish green out- } \\ & \text { side, colorless when most distinct. } \\ & \text { Remember }\end{aligned}$ that the Huyghenian eyepiece shows color at th ${ }^{\text {edges. }}$ (3) S
(3) S. asks: 1. How long after interment in A usual mode can human remains be identified A. The time depends on the nature of the soil. 2 during in the earth than those of civilized races A. No.
(4) J. S. C. asks: What will remove the A. Try a little benzine or benzole.
(5) I. McI. asks: When phosphide of calci um is put into water, does the base reduce to powder (simultaneouslywith theevolution of sulphur-
etted hydrogen) or does it remain solid?
A. The
 (6) F. W. D. says: I am experimenting in hotography, ana meet wrup pretty good success in taking negatives; out when I come to ax the
prints, the operation baffles me. Ihave made a ver bath for the prints in two or three different ways, and the result is the same in every case, namely, the print will always turn to a tan color,
instead of remaining black or dark purple. $M y$ fixing solution is hyposulphite of soda and wate dissolved in proportions varying from 8 ozs. in 1
quart water to 8 ozs. in 3 quarts water. Tleave but they tu think the fault is in the printing, for I have ex posed them till they were so dark as to be almost
imperceptible. Where is the difflculty? A. This brick red collor will always be found in ordinary silver prints. To obtain this required depth o
colorit is necessary to subject the print to ing process, with chloride of gold or with sulphur ing process, with chiorite of gola, or wite sulp
as described in answer to W. P. K., p. 409 , vol. 32. (7) W. P. S. aeks: In parts of the west ubstance of the building. Would it not be equal y safe and much cheaper to insert platinum points from the most elevated parts of the building? A. The rods should not be insulated. Platinum points neither add to nor diminish the safety
No rod is safe unless it is continuous, and is con-
nected at its lower end with a large amount
metal or conducting material to the ground.
(8) W. P. H. asks: Do you know of any
neans by which writing on old parchment can means by which writing on old parchment can
be brought out so as to be legible? A. Cover the etters with powdered ferrocyanice of potassium with the addition of a little dillute muriatic or ni
ric acid. This treatment will cause the letters to Hic aci. Thistraatment will cause the letters to of great intensity. The superfluous fluid may then be immediately absorbed by the application of the edge of a pliece of blotting paper, carefully
handled so ss not to erase the letters, which are at handled so as not to erase the letters, which are a
rrst very soft,and also to avoid staining the manu lirst very soft,and also to avoid staining the manu (9) W. W. R. asks: Can I make a cheap nicroscope, powerful enough to show the sap cent tc.? What lenses do I want, and how shall lace them? A. Showing the sap cells of wood ban on the power of the lens. You must cut ver ine shavings (best done with a razor) in thre ways, across the fiber, paraliel to the fiber an cross the year rings. Each shows the cells in a particular way; and by combining the observations ou can obtain the best idea of the cell structure It takes onls a weak power to see these cells. Bu on not attempt to make a míroscops; rather bu one. A smail microscope, that is, one with single lens, will anywer, and this costs so irtule that y you con bus s very small lens of short focus that is, with sharp curves, you may easily mount in a stand; and a simple trial will soon show you where to place the lens and the object.
(10) I. K. says: In a dispute upon the sub ject of electricity, my friend said that it was force, and $I$ said it was a substance. Which is
ight? A. This is a question about which the best lectriclans disagree.
(11) W.P. asks: In making sulphur molds, what is used to harden the sulphur and take amay
he brittleness? A. We do not know of anything that satisfactorily fullils both these require
(12) C. G. V. P. says: Pounded glass dust d on fresh paint makes a beautiful effect for or namental work. Is such glass an article of trade A. The substance known as pounded glass is man the ordinary long metallic tube into the pot pasty or semi-fluid glass in the furnace, when on removing the rod a ball of the pasty material re mains attached to its extremity. This is blown by
the workman into a huge bubble, and until the the workman into a huge bubble, and until the sides approach the thinness of the soap bubble
film, when an additional puff of air into its interior from his lungs causes it to burst and fall in prepared for them.
(13) E. E. D. asks: How can I make a ca mera lucida? A. The simplest form of this in strument consists of a thick and finely polished
pece of plate glass placed perpendicular to the Irawing board and also to the body of the drafte man. The picture or design which it is wished to reproduce is placed with its baek upon the boar the side of the glass plate, while the paper fo the opposite side. On looking at the glass plate from above, and slightly on that side upon which the design lies, an image of the same is a:stinctly een, apparently on the drawing paper on the op
(14) B. D. asks: Can a lithographer perfec tit corners, turns, shading, ote., of imperfect
writing? A. Yes. 1. In a new schoolroom the blackboards, painte useless for several days. The room is on the lower Hoor, out not in a basement. Can you give me the
cause, with a remedy to prevent it? A. It is very ilkely due to the fact that the walls have not ye become thoroughly seasoned. Keep the interio of tho room at as warm a temperature as possibl
until the annoyance is dissipated. 2. until the annoyance is isssipated. 2. I have a pre and spirit varnish are both mentioned. Please tell me the difference between them. Is not spirit another name for alcobol? A. spirit varnish is probably a solution of shellac in alcohol. Alcohol
is commonly called spirits. Is there any method pro
Is there any method, process, or ingredient that served from freezing by enveloping the vesee served from freezing by enveloping the vessel
containing it in some non-conducting substance such as straw, sawdust, or woolen fabrics.
(15) T. S. G. asks: How high can a pump draw water upa tube ? Can it draw over 33 feet
A. No: 33 feet is the highest. The pump should never be more than 28 feet from the water, and
even then it requires a firstrate pump to suck evater.
(16) F. A. B. asks: What are the ingredients for glazing earthen or crockery ware? For ordinary earthenware use the following White sand 40 lbs., peariash 21 bs., and common salt 15 ibs. Caline them for some time over
moderate fire, and when the muxture is cold grind moderate fire, and when the mixture is cold grind
to a very fine powder. When wanted, temper it with water, and it will be ready for use.
(17) W.E. T. asks: Is there any prepara and 405, vol. 32 .
How can I take ink stains out of leather?
Try a little oxalic acid in water.
(18) F. S. asks: How can I cut glass tublng? A. We separate small glass tubing very the way around, at the point where the separation is desired, by means of a small three-cornered file. The tube is then grasped irmly with both hanas
on either side of the flle mark, with the thumb on either side of the file mark, with the thumbs
approaching it on opposite sides to within about an elghth of an inch; a quick and flrm presure
th both thumbs, simultaneously, while the rest of the hand remains in position, will do the work
 alternately in the flame of a spirit lamp or Bunsen burner for a few minutes.
(19) A. L. B. asks: 1. What is citrate of magnesia? $A$. It is a combination of citric acid
acid of lemons) with magnesia. 2. How is it acid of lemons) with magnesia. 2. How is it
made? A. It may be formed by decomposing the carbonate of magnesia by a hot aqueous solution of citric acid. 3. What are its properties? A. It used medicinally as a mild laxative.
(20) E. L. G. asks: Is there a cheap way of A suitable light for to be used for 12 hours uire an electromotive force purpose would re rove or Bunsen cells. The cost of such a ligh attery), for the period of time of zinc, etc., in the ould be considerable. The electric light may oow, however, be obtained at a very moderate cost, by means of a Gramme's machine, driven by small steam engine or other available power this case theelectric energy is not obtained by hemical action, but by the direct conversion of
(21) B. F. T. asks: Is the heaviest coal the
best? A. Not always. The impurities contained est? A. Not always. The impurities containe
(22) C. D. asks: How can I tranefer printed etters to silver or silver plate for en
(23) M. S. W. says: I desire to utilize the tape steam of an engine $12 \times 48$ inches, working
t
lbs. pressure, by passing it through ipes placed in a wooden tank 25 feet lony by 36 nches wide. I use a $41 / 2$ inch exhaust pipe of cop per, which I propose to connect with two 43/8 inc copper pipes that will run round in the tauk. 1
Shall I, in this arrangement, utilize much heat? . You can utilize a considerable portion of th heat in the exhaust steam by this method. 2 Will this make much back pressure on my en
ine? A. Not materially. 3. Would you advise team trap? A. A trap will render the apparatu more efficient.
(24) J. C. H. says: I have a 1 horse powe engine and vertical boiler. The boiler is 18 inches ndiameter, 32 inches high, with firebox 15 inches nches long. In using wood or coke for fuel works very well, but I desire to use soft coal be oft coal stops the tubes up with soot, so that the require to be cleaned every day. How can I rem-
dy it? A. Try the plan of dampening the coal edy it? A. Try the plan of dampening the coal a ittle before firing.
(25) J. M. asks: What size of boiler will uita 15 feet long boat with a 15 inch diamete nder be? A. Cylinder $21 / 4 \times 4$ inches. Boiler with 0 to 50 square feet of efficient heating surface.
(26) E. R. says: A mill takes its supply of water from a well that is dug to the depth of 4 eet, and bored 50 feet further; the well does no supply sumcient water, and r propose to remedy by closing the top of the well airtight, and con well at the top, then suspending a pipe of same size as pipe from engine from the top to within or 4 feet from the bottom of the well, and con necting the top of this pipe with the open air by means of another pipe. The well being 5 feet in wiameter, the steam would be brought in contac with over part of the steam, or enough to supply the defi-
ciency. How will this arrangement do? A. Your dea strikes us very favorably.
(27) H. E. S. asks: Is the pressure of wate greater on the bottom of a tube that is twice the aiameter at the top that it is at the bottom, than whole length? A. If the hight of water in eac tube is the same, the presgure on the bottom of ach, per unit of surface, is also the same.
(28) J. M. S.-The Chicago newspaper re ferred to had no authority for saying that the Pa ent Office had sets of from 20 to 25 volumes of them by addressing the Commissoner, enclosing a small fee to cover postage. The reports remaining in the Patent Office are not of a connected serie being mostly for years between 1859 and 1862 These are of no real service in looking up inven lons, and, whout subsequ un wes, are a de reliableindormation any who are searching fo way is to employ some one accustomed to making searches in the Patent Office to examine and re port if an invention is probably patentable. By sending a model, drawing, or photograph, accompanied with description and a fee of $\$$ to the of and a written reportsent by mail to any purt of he world.
Minerals, etc.-Specimens have been re ceived from the following correspondents,and examined, with the results stated:
R. B.-It is iron pyrites.-W. R. W.-Your speci-
men of tree lice is,so far as we know, undescribed. We have sent it to the Department of Agriculture Washington, D. C.-W. H. M.-They are fossils consisting of silex, clay, and oxide of iron, but no worthless for making porcelain.-J. McW.-The J. G. McM. - It is hematite.-W. M. S.-We did not detect nickel.
ls, well waters, who send specimens of minerjects, etc., for examination, should carefully and
same with the sender's name. Much confusion and trouble is often caused by such unmarked pack-
ages becoming separated from the letters sent with them.
W. B. H. asks: When is the best time for moving grape vines ?-S. asks; How can I make a red, blue, and white stencil ink, such as is used for marking boxes, etc.?-C. L. S. and others ask: How can I make transfer paper for marking linen in-
delibly? It is used in this way: Place the transfer paper upon the linen to be marked, and over that place a piece of ordinary white writing paper, and mark with a lead or slate pencil or stiletto Heat the writing with a moderately hot flat iron for two or three minutes, and it is permanent.- $W$. F. W. asks: What prevents bees from swarming,
and what will induce them to swarm?

## COMMUNICATIONS RECEIVED.

 The Editor of the Scientrific American acknowledges, with much pleasure, the receipt oforiginal papers and contributions upon the following subjects:
On the Keely Motor. By J. C., by E. T., by J. J. A., by O., by C. F., by W.L. D., by B. K., and by J. C. H.

On Evergreens in Orchards. By F. R. E. On Tides in the Gulf of Mexico. By T. H On Powder Mill Explosions. By J. M On the Spider's Web. By S. T.
On Melting Iron. By T. H. A
On Spring Power for Cars.
On a Singular Electrical Phenomenon. By T. P.C.

Also inquiries and answers from the following: G. H. B.-F. H.-J. D. C.-C. C.-J. D. S.-C. B. B

HINTS TO CORRESPONDENTS Correspondents whose inquiries fail to appear should repeat them. If not then published, they may conclude that, for good reasons, the Edito
declines them. The address of the writer should always be given.
Enquiries relating to patents, or to the patentability of inventions, assignments, etc., will not be published here. All such questions, when initials only are given, are thrown into the waste basket, as it would fill half of our paper to print them all; by mail, if the writer's address is giren.
Hundreds of inquiries analogous to the following are sent:"Who buys rare coins? Who makes wooden screw bungs? Who builds bridges? Where can molds for ornamental vases be obtained? Who sells pure platinum? Who solls engraver's tools?" All such personal inquiries are printed,as will be observed, in the column of "Busithat purpose, subject to the charge mentioned at the head of that column. Almost any desired information can in this way be expeditiously obtained.
[OFFICIAL.
index of inventions

## Letterm Patent of the United statee were

 Granted in the Week onding June 29, 1875.
## AND EACH BEARING THAT DATE

[Those marked ( $\mathbf{r}$ ) are relisened patents. 1
Addressing machine, E. Longley.. .............
Anchor, W. A. Currier
Anchor, A. Smith....
Band fastener, E. Dres
Basket, stave, S. H. Wheeler
Basket, wicker, U. s. Wolf.
Basket, wicker, U. S. Woir. .........
Beams, etc., making hollow, I. Hahn
Bedstead, Invalld, Deneef and Wilk
Beer, etc., compound for preserving, W. Zinsse Beer with gas, charging, J. C. Kenne
essemer converter, A. S. Dunn
Bit, expansible, F. Willig.....
Bit, wood-boring, G. L. Holt
Blacking bottles, etc., stopper for, H. D. Forbes. Blast apparatus, hot, H. Essex.....................
Boller for stoves, etc., upright,Lawton \& Gibson Boller, steam, E. D. Leavitt, Jr..............
Boflers, covering for stcam, W. Peters (r) Bollcr feed waterheater, J . Armstrong Boot, T. Powell, (r)
Boot toc protector, R. H. Brigha Boots, crimping leather for, S. W. Jamison, (r) Bottle carrier, soda, A. F. Knor Bottle dropping. C. C. Garrett., Bottles, extracting corks from, Page \& Fah Brewers washing machinc, F. Cramme. Bung and bush, w. Johnson Burner, electric gas lighting, s. Gardiner, Jr Burner, lamp, T. D. Parsons Burniag hay, straw, leaves. etc., A. Hamiliton. Bustle. C. O. Crosby
Butter box reneers,
Butter box reneers, preparing, s. F. Spaulding
Can, airtight, s . Joyce
Canes, etc., bone handle.......... .........
Cap, reversible, M. Hox. ...
Car brake, S. P. Littleffeld.
Car coupling, w. H. Bodenhame
Car coupling, , C. E. Ramage.
Car replacer, $\begin{aligned} & \text {. Elims.... } \\ & \text { Car starter, Balley \& Pool }\end{aligned}$
Car starter, G. S. Curtis.
Carbureter, J. R. Allen...
Carpet stretcher, E. P. Shaffer
Carpet stretcher and holder, D. Pet
Carriage seat, C. K. Mellinger
Carriage seat, C. K. Mellinger...................... 165,022
Cartridge oases necking, B. Payne, (r)

Casting plow points, G. Wiard.....................
Casting propeller wheels, flask for. Swift \& List Centrifugal machine, G. Dinkc
Chimney cowl, A
Chimney, planer, Prouty, Coes
Churn, rotary, Felt \& Child..
Churn, rotary, J. J. Shelton
Clgar tip cutter, etc., E. F. w. Elsenmann.
clutch, Cock, stop, A. Sny Jer,...
Cooler, milk, W. H. Johnson
Corn stalk cutter, A. C. Smith
Cotton compress, J. J. Cahoon....... Cotton pickers, beater for, G. E. Taft.
Crimpling machine, s. W. Jamison, (r) Culinary grater, E. Woodward. Cultivator, T. F. \&. W. Vandergrif
Cultivator, corn, A. F. Batcheller Dlal, gage, Crosby \& Meady..... Dredger, paeumatic, w. Smith..
Drill, steam rock, J. C. Githens Drills, chuck for rock, . c. Glthens......
Drip trough fer ice boxes, Dyer. Dryer and baker, W. P. Corsa.
Drying apparatus, L. K. Fuller Egg boxplcovers, etc., fastening Engine, air hand, c. W. Riley
Engine, electro-magnetic Engine, fire, J. Bean......................
Engine governor, steam, J. c. Hoadley Engine governor, steam, C. G. Sims.. Engine, steam, D. K. West
Eyelet, T. Garrick, (r)....
Fats, separating, C. M. Cresson.
Feed cutter. E. Wagoner
Feed cutter, T. Webh...
Fence wire, D. C. Stover............
Filling hook for weaving hair cloth, J. Turple. Firc arm. breech-loading, O. Schneeloch..... Frire frons, stand for, E. A. Jackson........ Fire place, w. Tweeddale
Food preserver, c. Brown
Foor rest, Edgcomb \& Gore....
Fork and skewer pull, combine
ork and skimmer pull, combined,E. W. Anders Frutt dryer,A. J. Reynolds.
Frutt ptcker, J. Balley.......
urnace and range, hot air, L. G. Halliberg Furnace and store, E. Hawkes.
Furne castor. J. T. Codman.
Fuse, electric, c. L. Kalmbach.
Gage dial, Crosby \& Meady...
Gas from petroleum, J. McClarty..............
Gateway, S. L. Fisher
Grain drill. E. D. Mead
Grain tally, A. K. Munson..
Harness hame, A. H. Cresap,
Harrow, J. Mastern........
Harvester, L. B. Stilson (r)
Harvester cutter, T. R. Arnold
Harvester pitman,gulde,etc.,E. F. Herrington (r) Hat and cap, Isidor \& Hein
Head block, J. F. Cook..
HeatIng buildings, etc., A. P. Pitkin.
Heating apparatus, steam, I. C. Richardson
Hinges, covering plate for, H. T. Blake Hook, snap, G. Reynolds.
Hopple, J Shive.
Horse toe welght, etc., H. D. McKinney
Horseshoe blank bar, H. H. G1lmore
Hose,hydraullc, J. M. Stone. .
Hub, A. Rimes...................
Ice boxes, drip trough for, Dye
Ironing board, G. E. Hollister
Jar lifter, W. W. Brower......
Key hole guard, J. Goldsteln.
Knife, tobacco, Lane \& Cullom
Ladle, Curtis \& Rowley.
Lamp chimney, G. Niede
Lamp chimney, G. Niedermair
Lamp, gas fitter’s, J. D. Galloway. ...
Lantern, reservolr street, A. H. Watkin
Lathing, securing metaine, J. W. Hoy
Leather, treatment of, H. Smith
Lock for doors. W. Unverzagt...
Locks, catch plate for bag, w. Roemer Locomotive,hydrocarbon burning, J. M. Good wis Locomotive exhaust, W. Stam
Loom, J. M. Linscott.......
Measuring packaged fabrics, S. C. Talcott.
Moldings, polishing, J. A. Dayton.................
Motion, transmitting and regulating, J. Zengel
Motion, transmitting and regulath.
OII tank extinguisher, R. Ditrich..
Oiler, Bohm, Stuhr, ana Joecke
Ore, treating, D. Mindeleff (r)
Organ, reed, Bach and Berg.
Organ keyboards, etc., making, M. Pratt.
Paddle wheel. J. Salter................
Painters' use, breamer for, I. Hayes
Paper barrel, J. W. Jarbee (r)
Paper box, J. R. Van Vechten
Paper cutter, rotary, A. Judson...................
Paper folding machine, etc., C. Chambers, Jr Paper folding machine, w. Daniels ...
Paper foldng machine, w. Dandels ...
Paper folding machinc, w. and C. Dancls
Pavement, composition, J. P. Cranford ( $\mathbf{r}$ Pavement, composition, J. P. Cranf.
Pencil case, w. I. Ludlow........ Pencll rubbe: eraser, J. B. Blair (r) Photographic head rest, F. M. Spencer............
Photographhc vignctting machine, C. C. Mcrril.
Photographs, burnisher for, E. R. Weston....... Plano stringing device, A. G. Gardne Picture frame, J. T. Robertson.
Pipe, smoking, C. J. Jonasson.
Pitman, J. R. Taylo
Planes, guide for bench, H. P. Taylor.
Planing machine, wood, J. S. Graham Planter check row attachment, M. Newton.... Plows, L. B. White.
Plow, sulky, G. Moore ...............
Pocket books, clasp for, L . Messer
Polishing machine feed, J. A. Dayto Posts, brick and soap. J. H. Hearn.
Press, cotton, s. Dike......................
Press, hay and cotton, J. L. De Witt. Press, hay and straw, L. Kirk...
Pump governor, C. W. Mills....


## CANADIAN PATENTS.

## List of Patkants Granted in June 18 to July 7, 1875.

## s,886.-P. Wright, Ottaw

s8a7.es. June 18,1875 . drilling machine. June 18, 1875.
cushion comblned. June 24, , 875 .
4,899.-J. E. Buerí, Boston, Mass.
time detecter. June 24,1875
4,890.-W. P. Widdiffeld, slloam, O

blind. June 24.1875.
guisher. June 24, 1875.
4, 893.-L. B. Stilson, Minn
car truck. June 24, 1875.
4,894.- E. F. Chapin et al., Boston, Mass., U. S. Lamp extingulsher. June 24, is75.
4,855.-0. Pagan et al., Philadelphia, Pa., U. S. Roll
 4,896.-J. M.
June 26. 1875.
June 28, 1875 , Montrcal, P. Q. Ventilation of sewers.
, 898.-N. Campbell, Rochester, N. Y., U. S. Curtain
nxture. June 28, 1875.
4,899.-W. T. Wood, Mo
extinguisher. June 28, 1875.
4, Joily, Thn., U. S. Lamp
4. A. Post, New York city, U. Liquid meter
Jone.-A. A. Post, New York city, U. S. Llquid meter
Jone

4, ©02.-H. Hagle, Warwick, Ont. Gate. June 28,
1885.
4,03 .-J. S. Brooks, Pittsburgh, Pa., U. S. Backlng 1875.
$4,033$.
elec

4,904.-J. C. Rorick,
worker. June
worker. June 28, 1875.
4,905.-c. J. Eames, New York city, ग. f. Hydrocarbon reducing farnace. June 28, 1875 .
4,900 .-C. Lundy, East $G w i l l$
,906.-C. Lundy, East Gwillimbury, Ont. Hay rake.
June 28, 1875 , 4,907.-J. Hewit
iron. June 28, 1875 . 4,908.-A. Beaudry. Boston, Mass., U. S. Adze and ax. June 28, 1875.
,909.J. Flower
June 28, 1875., Detroft, Mich., U. S. Street hydrant. 4,910.-A. R. M. M
June 28, 1875.
4,91. - Wm. C. Shorey. Napanee, Ont. Horse hay knives
and forks. July 6 , 1875. and forks. July 6, 1875.
,, July.-S. 6,1875 . Sper, Boston, Mass., U. S. Burial casket.
4, M13.-A. Gar
July 6, 1875
July 6, 1875
$4,914 . \cdots$. W
rita.-G. W. Walker, Malden, Mass., U. S. Portable ranges. July 6, 1875 .
4,915.-S. .o. Greening, Hamilton, Ont. Lightning rod.
July 6,1875 . ,95.-S. o.
July. 6, 1875.
4,916. -J. F. ,916.-J. F. Glldden, De Kalb, Ill., U. s. Wire fence. ,917.-C. A. S
for depositing coflins. July 6, 1875., U. S. Apparatus
fis. 4,918. M. Waterbury, Mason City, Iowa, U. S. Lamp
extingulsher. July 6,1875 . extinguisher. July 6,1875 .
4,919.-J. Bellamy, Newtonvil.
truck. July $6,1875$.
$4,920 .-$ A. D. Willams, Yorkville, Ont. Dinner pall. July 6, 1875.
4,921.-R. C.
4,921.-R. C. Lambart, Quincy, Mass., U. S. Heel and
sole trimming machine. July 6, 1875.
 chine. July 6,1875 .
,923.-E. A. Beers, De Kalb Center, Ill, U. S. Draft
equalizer. July 6,1875 . equalizer. July 6, 1875.
$4,924 .-$ W. D. Peters et al
for ships. July 6, 1875.
4,925.-A. W. Newell, Bradford, Pa., U. s. Tincture
and prescription bottle. July 6, 1875.
4,926.-C. C. Brayley, Toronto, Ont. Rotary engine.
July 6, 1875.
927.-N. W. Clark, Clarkston, Mich
Ing apparatus. July 6, 1875.
,023.-W. S. Harland, Clinton, Ont. Self-heating glue pot. July 6, 1875.
4.929.-J. Payne, New Hamburg, Ont. Thistle destroyer. July 6, 1875 .
,930.-A. H. Lafin, New York city, U. S. Disintegra Ing fiberous substances. July 6, 1875 .
,931.-A. Forbriger, CIncinnati, Ohio, U. s. Drawing
or copy book. July 6,1875 982.-D A Root South Bay
lock. July 6. 1875.

 4,935.-C. Windrath, Buffal
ing machine. July 6, 1875
4,936.-R. Patrick et al., Branchton, Ont. Double-acting
reversible rotary pump. July 7, 1875. reversible rotary pump. July 7, 1875.
,937.-G. C. Hill, Danbury, Conn., U. S.
July 7, 1875.
,938.-W. M. Fuller et a $a$., New York city, U. S. Ca heater. July 7, 1875 .
,939.-A. H. Laifin, New York city, U. S. Disintegrat Ing Iferous substances. July 7, 1875. Animal poke July $7,: 875$.
,91. Wo W. Whas, Almonte, Ont. Water filter.

 ,943.-I. M. Gover, Brocter
table, etc. July 7,1875
,944.-J. Martin, Jr., Toronto, Ont. Brick-making ma chine. July 7, 1875 .
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