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


PRATT INETITUTE FOR INDUSTRIAL EDUCATION, BROOKLYN, N. Y.-THE LARGEST.INSTITUTION OF THE KIND IN THE WORLD, [Soo p. 210.]

## Srientifir gmerican.

ESTABLISHED 1845.
MUNN \& CO., Editors and Proprietors. pUblished weekly at

No. 361 BROADWAY, NEW YORK.
O. D. MUNN. A. E. BEACH.

## TERMS FOR THE SCIENTIFIC AMEIRICAN.

Une copp, one year. for the U. S. or Canada...
One copy, six months, for the U. S. or Canada
One copy, one year, to any foreikn country b
Australia and New Zealand.-Those who desire to receive the SCIENTIFIC AMEHICAN, for is little over one year, may remit \&li in current Colonial bank notes. Address

The Sclentific Ame
The Scientific American Supplement
io a distinct paper from the Scientipic amkican. Tile SUPPLEMENT is issued weekly. Every number contains 16 octavo pages. uniform in size
with Scientigic Amikilican. Terms of subscription for Sopplement, With Scientipic ambilican. Terms of subscription for SUPPlement,
85.01 a year, for U. S. and Canada. $\$ 6.00$ a year to foreign countries belongink to the Postal Union. Single copies, 10 cents. Sold by all newsdealers throukhcut the country.
will be sent for one year, to scientific ambrican and SUpplement seven dollars.
The sufest wa

## rexistered letter

Supplemiknt will bew Zealand.-The Scirntific american and rent Colonial bank notes.

NEW YORK, SATURDAY, OCTOBER 6, 1888.

| Contente. |  |
| :---: | :---: |
| (Illustrated articles are marked with an asterisk.) |  |
| Anber. |  |
| Artosian well borins in Nevida.. 217 | Ink, nut gall, new |
| Blacksnakes, hatits of......... ${ }^{217}$ | Insane colur |
| Books and puolications, new.... 218 | Inventions, arricultaral.......... ${ }^{2,8}$ |
| Carriake, electric**............. 215 | Inventions, index of . ........ 219 |
| Cara, railroad, stray, and how re- 217 | Invertions. miscellaneous........ 218 |
|  | Leather, colored .......... 25 |
| Comet. Prof. Barnard's... |  |
| gress of America | Mexican National Railioad...... ${ }^{216}$ |
| co cians and surgeons........... 209 | Minersis, cu |
| Creepng thinus. man's war with 215 | New York. future of......... ${ }_{218}^{21}$ |
| Dreephg | Notes |
| Do tools krow tired ? ............ 212 | Rust, removal of |
| Door or window stop, improved* 217 | Spider's threat, size of.......... 213 |
| Electric street cars in New | rameisco the war ship San |
| Fall cleaning up.................... 209 | es, attachment for, simple*. 216 |
|  | 18, keeping |
| Guif stream, explorations of..... 213 |  |

TABLE OF CONTENTS OF
SCIENTIFIC AMERICAN SUPPLEMENT
NO. 666.
For the Week Ending October 6, 1888. Price 10 cents. For sale by all newsdealers.






##   




## 

II. GBOLOGY.-The Iron Ores of the United States.-By JoBN


IX. MISCELSANEOUS.-An Ancient Geographer-Johan Schoner





How best to avoid collision at sea.
The recent collision between the steamers Thingvalla and Geiser, the latter being lost, has opened anew in England the discussions regarding lights and signals. The principal objections to such codes of signals as have, as yet, been devised is that, while they give the course being held with admirable promptitude, they do not and cannot give the exact parallel upon which the ship is advancing, if there be any wind, and it is principally under such conditions that. danger menaces. Thus, if the signal meaning a stranger is advancing from E. by N. should come over the port bow, the wind being abeam or quartering, the information would be valueless, and indeed wisleading, for, should the helm be put a-port, the ship so heeding might only go out of her way to meet the stranger, while, had she heard and heeded no signal, and held her course, she would have run free and clear. Capt. Colomb and Admiral De Horsey have argued the electric side-light question in public letters pro and con. The Admiral has faith in this system because the lights can be easily regulated in intensity to suit the weather. Another authority proposes electric lights with what he calls a "holophote" reflector, the same to be put on the bridge for the use of the watch officer. An account says: The handle by which this light can be moved is to be regulated absolutely by the position of the helm. When the helm is moved, a detent is released and the ray of light sweeps over the water, giving the same signal to a passing vessel as the driver of a vehicle gives with hi hand. When the light has completed its sweep, it is to be autonatically shut out.

## colored light trials with the insane.

The experiments with colored lights in the treatment of the insane made recently at Alessandria, Italy, are being much discussed by the medical faculty, though getting little credence; the cures, if cures were really made, being attributed to unusual treatment and painstaking attention on the part of the medical staff because of the color trials rather than to anything in the theory itself. In the evidence transmitted by Dr. Ponza, he says rooms were selected with as many win dows as possible, the walls of the rooms being painted the same color as the window panes. A patient suffering from melancholia, who would not eat, was placed in a room with bright red walls and windows. In three hours he became quite cheerful, and asked for food. Another lunatic, who always kept his hands over his mouth to keep out air and nourishment, was placed in the same room, and the next day was much better and ate with a hearty appetite.
A violent maniac was placed in a blue room, and became quiet in an hour. Another patient, after spending a whole day in a violet colored room, was completely cured. American and English medical authorities seem to regard these cures as effects rather than causes of the treatment, induced, they argue, not because the light was colored, but because it was a novel sensation, waking the patients to forget their inclinations, as pebbles put into the ear of a balky horse will cause him to forget his pranks; a sudde

## Manufacture of Light without Heat.

Prof. Oliver J. Lodge has been endeavoring to manufacture light by direct electric action without the intervention of heat, utilizing for the purpose Maxwell's theory that light is really an electric disturbance or vibration. The weans adopted is the oscillatory discharge of a Leyden Jar, whose rate of vibration has peen made as high as 1,000 milion cone waves so obtained are about three yards long, and are essentially light in every particuyards long, and are essentially
lar except that they are unable to affect the retina. lar except that they are unable to affect the retina.
To do this they wust be shortened to the hundredthousandth of an inch. All that has yet been accomplished, therefore, is the artificial production of direct electrical radiation, differing in no respect from the waves of light except in the one matter of length. The electrical waves travel through space with the same speed as light, and are refracted and absorbed by material substances according to the same laws.
We only need to be able to generate waves of any desired length in order to entirely revolutionize our present best systems of obtaining artificial light by
help of steam engines and dynamos, which is a most wasteful and empirical process.

In a paper given in Nuture, Dr. Lodge further disasses the subject as follows
The conclusions at which we have arrived, that light is an electrical disturbance, and that light waves are excited by electric oscillations, must ultimately, and very shortly, have a practical import.
Our present systems of making light artificially are wastefal and ineffective. We want a certain range of oscillation, between 7,000 and 4,000 billion vibrations per second ; no other is useful to us, because no other has any effect on our retina; but we do not know how to produee vibrations of this rate. We can produce a
definite vibration of one or two hundred or thousand per second ; in other words, we can excite a pure tone of definite pitch, and we can command any desired
range of such tones continuously by wieans of bellows and a key board. We can also (though the fact is less well known) excite momentarily definite ethereal vibrations of some millions per second, as I have at length explained ; but we do not at present seem to know how to maintain this rate quite continuously. To get much aster rates of vibration than this we have to fall back upon atoms. We know how to make atows vibrate it is done by what we call "heating" the substance, and if we could deal with individual atoms unhampered by others, it is possible that we might get a pure and simple mode of vibration from them. It is possible but unlikely; for atoms, even when isolated, have a multitude of modes of vibration special to themselves of which only a few are of practical use to us, and we do not know how to excite some without also the others However, we do not at present even deal with indi vidual atoms; we treat them crowded together in a compact mass, so that their modes of vibration are eally infinite.
We take a lump of matter, say a carbon filament or a piece of quicklime, and by raising its temperature we impress upon its atoms higher and higher wodes of vibration, not transmuting the lower into the higher but superposing the higher upon the lower, until a length we get such rates of vibration as our retina is constructed for, and we are satisfied. But how waste ful and indirect and empirical is the process. We want a small range of rapid vibrations, and we know no better than to make the whole series leading up to them. It is as though, in order to sound sowe little shrill octave of pipes in an organ, we were obliged to depress every key and every pedal, and to blow a young hurri cane.
I have purposely selected as examples the more perect methods of obtaining artificial light, wherein the waste radiation is only useless, and not noxious. But the old-fashioned plan was cruder even than this; it consisted simply in setting something burning, whereby not only the fuel but the air was consumed, whereby also a most powerful radiation was produced, in the waste waves of which we were content to sit stewing, for the sake of the minute, almost infinitesi mal, fraction of it which enabled us to see.
Every one knows now, however, that combustion is not a pleasant or healthy mode of obtaining light; but verybody does not realize that neither is incandescence a satisfactory and unwasteful method which is likely o be practiced for more than a few decades, or, perhaps, a century.
Look at the furnaces and boilers of a great steam engine driving a group of dynamos, and estimate the energy expended; and then look at the incandescent filaments of the lamps excited by them, and estimate how much of their radiated energy is of real service to the eye. It will be as the energy of a pitch pipe to an entire orchestra.
It is not too much to say that a boy turning a handle could, if his energy were properly directed, produce quite as much real light as is produced by all this mass of mechanism and consumption of material.
There might, perhaps, be something contrary to the laws of nature in thus hoping to get and utilize some specific kind of radiation without the rest, but Lord Rayleigh has shown in a short communication to the British Association, at York, that it is not so, and that, therefore, we have a right to try to do it.
We do not yet know how it is true, but it is one of he things we have got to learn.
Any one looking at a common glow worm must be truck with the fact that not by ordinary combustion, nor yet on the steam engine and dynamo principle, is that easy light produced. Very little waste radiation is there from phosphorescent things in general. Light of the kind able to affect the retina is directly emitted, and for this, for even a large supply of this, a modicum of energy suffices.
Solar radiation consists of waves of all sizes, it is true; but then solar radiation has innumerable things to do besides making things visible. The whole of its energy is useful. In artificial lighting nothing but light is desired ; when heat is wanted it is best obtained separately, by combustion. And so soon as we clearly recognize that light is an electrical vibration, so soon shall we begin to beat about for some mode of exciting and maintaining an electrical vibration of any required degree of rapidity. When this has been accomplished, the problem of artificial lighting will have been solved.

## Removal of Rust.

A method of removing rust from iron consists in immersing the articles in a bath consisting of a nearly saturated solution of chloride of tin. The length of time during which the objects are allowed to remain in the bath depends on the thickness of the coating of rust ; but in ordinary cases twelve to twenty-four hours is sufficient The solution ought rot to contain a great excess of acid if the iron itself is not to be attacked. On taking them frow the bath, the articles are rinsed in water and afterward in amwonia. The iron, when thus treated, has the appearance of dull silver; but a

## The Waste of Anthracite and $\begin{gathered}\text { the supply. }\end{gathered}$

The statistics of coal production, which we publish in our usual market report, show that during the month of August the shipments of anthracite from the Pennsylvania mines to market amounted to $4,097,563$ gross tons, which is the largest anthracite output ever made in one month, and is at the rate of $49,000,000$ tons a year.
During the eight months of the present year, the shipments of anthracite to market have amounted to $23,619,291$ tons, being $1,755,495$ tons in excess of the shipments during the corresponding period in 1887. During the months of September, October, November, and December, 1887, the shipments amounted to $12,777,232$ tons, and as we shall certainly largely exceed that amount this year, it appears probable that we shall send to market this year $371 / 2$ or 38 million tons of anthracite.
If we include the coal sold and used at the mines, say 6 per cent of the shipments, the grand total output for the year will probably amount to $40,000,000$ gross tons.

The average waste of anthracite in mining and preparation for market has been carefully estimated from many reliable data by the Geological Survey of Pennsylvania, as follows

Coal left in pillars, etc.
Coal lost in mining by blasting, etc.
Total loss.
to market;
Or only about one-third of the coal goes to market; if represents the exhaustion of $120,000,000$ tons of our available supply, and this does not now much, if at all, exceed $9,000.000,000$ tons.

At the present rate of production and present percentage of waste in mining, our entire supply of anthracite coal will last only 75 years.

This statement is not based on any mere guess, but is founded on reliable data, and it is so startling in its significance that it should certainly attract the attention of the managers of our great coal companies, and even of the government of the State of Pennsylvania. It is not claimed that we have yet reached our maximum production, and every increase means that the coal will be worked out in proportionately less time than here stated.
Long before the supply has been exhausted, the demand for anthracite will have exceeded the supply, and prices will be limited only by the prices of other fuels; and as cheap fuel is the very foundation of industrial prosperity, it is not difficult to imagine the resulting effect on the industries of a large part of this country.
The present enormous, disgraceful, and unnecessary waste in mining anthracite should be stopped, and if the interests of the great coal companies are not sufficient to impel them to do this, then the government of the State, which is the guardian of the citizens' interests, should intervene to save these from the disastrous consequences of the spendthrift policy of those who now monopolize our invaluable supplies of this fuel.-Eng. and Min. Jour.

## Vegetable Cows.

Several natural orders of the vegetable kingdom include plants that are characterized by the secretion of a fluid closely resembling milk in appearance and consistency, and a familiar example of these is to be seen in our common milkweed (Asclepias cornuti), which is well known to everybody. In some plants, this milky fluid is of the most venomous nature; in others, it possesses active medicinal virtues; in others, it yields a product (such as India rubber and gutta percha) of the highest importance to the arts and industries; and, in others still, it proves of value as a human aliment. Since the same general properties characterize the plants of each natural family, it fseems an anomaly that, in the same order, we should find the species of one genus producing a lactescent fuid of a highly poisonous nature, and those of another yielding one that is entirely innocuous. Yet such is often the case, and we have a striking example of
it in the bread fruit order, the Artocarpaceæ, which, on the one hand, includes the celebrated upas tree of Java, which, when pierced, exudes a milky juice containing an acrid virulent poison (antiarin), the smallest quantity of which will kill the largest animal, and, on the fother, the famous Brosimum utili of South
America, which yields a copious supply of rich, America, which yields a copious supply of rich, wholesome 女rilk, of as good a quality as that from the cow. There are several other instances in the vegetable kingdom of such an association, in the same natural order, of plants that produce a noxious lactescent juice with others which yield a wholesone one adapted for man's use, and which may therefore be designated as " vagetable cows." To speak only of the latter class, tho most remarkable example is the species of Brosimu $n$ just mentioned, which was dis-
covered and made known by the eelebrated traveler Humboldt. This tree forms extensive forests on the mountains near the town of Coriaco, and elsewhere along the sea coast of Venezuela-growing to upward
of one hundred feet in height, with a trunk six or eight feet in diameter, and branchless for the first sixty or seventy feet of its height. It is popularly known as the cow tree, Palo de Vaea, or Arbol incisions in the trunk, so closely resembles the milk of the cow, both in appearance and quality, that it is commonly used as an article of food by the inhabitants of the places where the tree is abundant. Unlike many other vegetable milks, it is perfectly wholesome
and very nourishing, possessing an agreeable taste, like that of sweet cream, and a pleasant balsamic odor its only unpleasant quality being a slight amount of stickiness. The chemical analysis of this milk has shown it to possess a composition closely resembling some animal substances, and, like animal milk, it quickly forms a yellow, cheesy scum upon its surface, and, after a few days' exposure to the atmosphere, turns sour and putrefies. It contains upward of thirty per cent of a resinous substance called galactin by chemists." (Treas. of Botany.) Speaking of this
tree, Humboldt says: "They [the natives] profess to recognize, from the color and thickness of the foliage, the trunks that yield the most juice, as the herdsman distinguishes, from external signs, a good milch cow. Amidst the great number of curious phenomena that I have observed in the course of my travels, I confess there are few that have made so powerful an impression on me as the aspect of the cow tree. A few drops of vegetable juice recall to our minds all the powerfulness and fecundity of nature. On the barren flank of a rock grows a tree with coriaceous and dry leaves. Its large woody roots can scarcely penetrate into the stone. For several months in the year, not a single shower moistens its foliage. Its branches appear dead and dried, but when the trunk is pierced, there flows from it a sweet and nourishing milk. It is at the rising of the sun that this vegetable fountain is most abundant. The negroes and natives are then seen hastening from all quarters, furnished with large bowls to receive the milk, which grows yellow and thickens at the surface. Some empty the bowls under the tree itself, others carry the juice home to their children."
In the Dogbane order, the Apocynacew, which includes plants that are mostly of a venomous nature and possess an exceedingly acrid and drastic juice, we have a second example of a tree that secretes a tana utilis, the cow tree of Demerara, or hya-hya the natives. This tree grows in abundance in the forests of British Guiana, and its bark, when tapped, yields a copious supply of thick, sweet milk, resembling that of the cow in appearance, but rather sticky from the presence of caoutchouc. This milk mixes freely with water, is of a pleasant flavor, and the natives employ it as a refreshing beverage.
Two "cow trees" are found in the order Sapotacea, which embraces numerous plants valuable for their succulent fruits, such as the marmalade, star apple, etc. One of these is the Mimusops elata, called by the natives massarandaba or aprain, and which Professor Orton, in the Andes and the Amazons, describes as one of the noblest trees of the forests of Para. It stands from 180 to 200 feet in height, is 20 feet in circumference, and is crowned with a vast dome of foliage. The milk yielded by the bark has the consistency of cream, and is used for tea, coffee, and custards. It hardens by exposure, so as to resemble gutta percha, which, indeed, is the product of a Malaisian tree belonging to the same natural order. The other tree is the Mimusops balata, or bully tree, of English, French, and Dutch Guiana. The milk of this species is sometimes employed with tea or coffee, instead of cow's
milk, but has the disadvantage of hardening very ramilk, but has the disadvantage of hardening very rapidly upon exposure to the air.
The natural order Asclepiadaceæ consists of plants that are almost always milky, and the milk is usually acrid and bitter, and always to be suspected, yet one of the plants of the family, Gymnema lactiferum, the cow plant of Ceylon, called by the natives kiriaghuna, yields a milk which the Cingalese make use of as ood.
Another example of a "cow tree" belonging to a dangerous natural order, the Euphorbiaceæ, which embraces plants having acrid and purgative juices, is the Euphorbia balsamifera, or Tabayba dolce, of the Canaries. Notwithstanding the fact that the plants of his genus have juices that possess very active medicinal qualities, and are in some cases so venomous that they are used as arrow poisons, the juice of the species under consideration is innocuous, and, according to Leopold von Buch, is similar to sweet milk, and is eaten as a delicacy after being thickened into a jelly. Still another "cow tree" is found in the order Cluiacex or Guttifere, which embraces plants that secrete an acrid, purgative, yellow gum resin, such as gamboge. This tree is the Clusia galactodendron, a native of Venezuela, where it is known as Palo de Vaca. It has a thick bark, covered with rough tubercles, and its internal tissue becomes red when exposed to the air. In extracting the milk, the inhabitants make incisions through the bark till the wood is reached.

These cuts are said to be made only before full moon, it being imagined that the wilk flows more reely then than at any other time. One tree will yield a quart in an hour. The milk is freely used by all, especially by children, although it has a somewhat astringent taste.
In the order Moracea, which includes the mulberry and fig, there are several species of Ficus that ar known as cow trees, and the milky fluid of which is bland and used as a beverage, although in most of the species of the genus the juice is exceedingly acrid.

## Fall Cleaning Up.

The Manufacturers' Gazette suggests to its readers hat now is a capital time to prepare for winter, both nside of the mill and around the outside premises. Taking advantage of the cool, dry, and clear days to repaint sash, clean windows, and paint up your wooden buildings will be infinitely better than to leave things all demoralized for winter storms to beat upon. Now that the days are visibly shortening, it will soon be that daylight will be greatly retarded by dirty windows. Put in the odd panes of glass; do a little whitewashing or painting; in fact, clean up thoroughly. Make the mill as cheery and comfortable as possible for the help during the dark wintry days. Have your circulation piping carefully looked over, and all leaky valves and joints packed, to prevent unnecessary waste of fuel. Patch up those holes and cracks in the brickwork and floors. See that all outside doors are in working order and weatherproof. Perhaps the roof will bear a little investigation and renewing in spots.
These are all little things, but they require attention at the proper time, for if allowed to go loose they will count up in the aggregation of shiftlessness.
Out in the yard we may have a pile of scrap iron, odd pieces of lumber, and what not, which may be required during the winter. Gather this stuff all together and cover it up with a board roof if possible; if not use old drier canvas. Anything is better than to have it snowed under and hunted for some night with a lamp and shovel with the thermometer around zero. Odd machinery, like pulleys, gears, or pieces of shaft, should be blocked up off the ground, as when not so cared for they settle into the earth, and, if not frozen down, wil become badly rusted at the ground contact. Piping and fittings especially should be housed, as they are so liable to damage by lying loose outside.

## The Congress of American Physicians and

The above organization began its first triennial weeting in Washington, D. C., on the afternoon of September 18, the business of the assemblage filling up pretty well the remainder of the week. The attend ance at first included 200 members, which at the late sessions was considerably increased. Dr. John S Billings, the eminent sanitarian, was elected president The papers were read before eleven sections, each sec tion representing a body of specialists. The great number of papers thus disposed of makes even a recapitulation of their titles an impossibility. One, however, may be noted as being of sadly increased interest at the present moment. Major G. M. Sternberg read a paper upon "Recent Investigations Relating to the Etiology of Yellow Fever." He reviewed the germ in vestigations of Drs. Freire, Finlay, and Gibier, and an nounced his belief that the specific microbe of yellow fever had not yet been found. Major Sternberg is still engaged in his researches, but gave no promise that an effectual yellow fever prophylactic would be ever found.

Electric street Cars in New York city.
Electric traction cars, in the place of horse cars, began making trips in the public service on the Fourth Avenue line, New York City, on September 17, the Julien storage battery system being employed. The battery for a car consists of 144 cells, made to slide under the seats from the outside on trays. The general construction of the Julien battery, and the method of charging it, was given in the Scientific AmeriCAN of May 7, 1887. Each truck carries a motor capable of propelling four cars, to guard against danger of a breakdown, and the battery as furnished to the car is designed to afford sufficient power to drive it thirty to forty miles with an ordinary load. The same motor that propels the car furnishes the light to supersede the oil lawps heretofore used. The electric cars are two feet longer than the horse cars on the same line, which, it is said, the company intend to change into electric cars, should the new system prove to be what is hoped for in practical use for city travel.

The idea of a nation with the wealth and mechanical skill of the United States having to go abroad for its guns for warfare is ridiculous. Sporting arms, equal in workmanship to any manufactured in the world, are made in this country, and there is no reason why the heavier ordnance should not also be made here. There is a bill pending before Congress to appropriate ten millions a year for this purpose. If the bill passes, it will open an extensive field to American manu-facturers.-Stoves and Hardware.

## PRATT INSTITUTE, BROOKLYN, N. Y

In matters of education, as well as in business and all modern enterprises, concentration is the order of the day. Specific courses of study for specific purposes have become an absolute necessity ; and while a classical or scientific education is a necessary preliminary to professional occupations, it is no longer possible for a general education to cover the great multitude of known sub jects with sufficient completeness to render such an education of any practical value. A great majority of people are dependent upon trades, and these, in many cases, are quickly and imperfectly learned without even a rudimentary education as a basis. In most cases people are obliged to earn a livelihood while learning how to get a living. As a consequence, the time for learning a trade is made as short as possible. It is learned, it may be, from a master who is such only in name, and thus it is that the country possesses many workers who, for a lack of correct training in the beginning, make life a failure

There are in this cguntry several institutions for technical education which are practical, useful, and highly beneficial to those who avail themselves of their privileges, but there is nothing so good or so perfect that it cannot be improved upon. Of course, it is to be expected that every institution willso far as practicable-keep up with the times, but an industrial institute

It is undoubtedly the most important enterprise of the kind in this country, if not in the world.
The buildings of the Pratt Institute in Brooklyn contain frow three to four acres of floor space, and contain frow three to four acres of floor space, and
vary in height from one to six stories. They are


THE PRATT INSTITUTE, BROOKLYN, N. Y.-VIEW FROM THE REAR PLAYGROUNDS.

The main building of the Institute is a brick and ter a cotta structure six stories high, 100 feet wide, 50 feet n depth, with an $L 37 \times 50$ feet upon one side. In the ear of the Institute proper is the department of me chanic arts, covering an area $247 \times 95$ feet, these build ings varying from one to three sto ries in height.
A front view of the Institute buildings is presented in the upper central picture of our large engrav ing, and the rear, or Grand Avenue side, is shown in one of the smaller engravings. The buildings are pro vided with all the modern appli ances for lighting, heating, ventila tion, the prevention of fire, etc. In the main building is a large elevat r running from the basement to the tower above, adapted for both passenger and freight service. The buildings are lighted throughout by a complete system of incandes cent and arc lamps, rendering evening work in the various classroom and shops as practicable as that of the day. The buildings-as will be seen by reference to the engrav-ngs-are not wanting in externa beauty, while they are constructed in the most substantial manner being practically fireproof, and as trong as would be required for the heaviest kind of manufacturing.
Land for the buildings was pur chased in 1884. Contracts were made n the early part of 1885 ; the work of excavating began about July 1 of that year, and the construction was continued through 1886-87.
starting to-day has the benefit of accumulated experi-
ence and of being imbued with the feeling and apirit ence and of being imbued with the feeling and spirit of the present time. Aninstitute having these advantages has grown in our vicinity to gigantic proportions in such a quiet way that, notwithstanding it is more than a year old and has involved the expenditure of
ocated on a plot of land situated between Ryerand Willoughby Avenues, the main building fronting on Ryerson Street, and the buildings for the depart ment of mechanic arts fronting on Grand Avenue. Across Ryerson Streets fronting on Grand Avenue cross Ryerson Street, opposite the main building, is


THE PRATT INSTITUTE-THE FREE READING ROOM.
millions of dollars, it is scarcely known beyond its in- a plot of ground, $350 \times 200$ feet, extending through mediate locality. We refer to the Pratt Institute, of Brooklyn, N. Y. The present obscurity of this great enterprise is partly due to the innate modesty of its founder, Mr. Charles Pratt, and partly to his cautious methods.

The philanthropic scheme which culminated in the founding of this remarkable institution was the dream of Mr. Pratt's youth. In early life he was forced to learn what it meant to economize in everything. His education was secured through his own industry and perseverance. He learned the machinist's trade, and by hard work earned enough money to carry him through school. While in school he practiced the severest economy, boarding himself at the cost of a dollar a week. He kept his wants small and in every way husbanded his resources, so as to complete his education without taking upon himself the burden of debt. In these days of close calculation and denial he thought of others in conditions similar to his own, and conceived the idea of working out a scheme of some kind for the amelioration of the condition of other youth and of the world's workers generally. The jdea assumed different forms at successive stages of his career, until at length it developed into a scheme for the founding of a great institute for technical education and manual training. This institute is no longer a faint conception or well-defined scheme, but is a substantial reality; a monument to the philanthropy and wisdom of its founder, an ornament to the city in which it is located, and a credit to the country at large.
plot of ground, $350 \times 200$ feet, extending through
the block to St. James' Place, the plot serving at pre sent as a playground for the young ladies connected with the Institute. Across Grand Avenue, opposit the department of mechanic arts, is a plot $250 \times 200$ feet which serves as a playground for the boys.


THE PRATT INSTITUTE-THE FREE LIBRARY.
tures upon various subjects are to be delivered from about 4,000 specimens, being most complete in the mounds of the Mississippi Valley, with some pieces time to time. It is intended that these lectures shall bear directly upon the work of the Institute in all its phases, and shall thus include practical instruction upon those matters which pertain to right modes of living, the problems of political and social life, domestic economy, sani tary science, literary culture, eth ics, etc. While many of these lec tures may be given as a part of the regular work of the Institute to pupils only, yet many others will be so arranged as to meet the wants of those not directly connected with the Institute, but who wish an op portunity of obtaining systematic instruction upon subjects of inter est and importance. The third floor is devoted to sewing, dressmaking, millinery, and art embroidery. In the sewing department instruction is given in all kinds of hand sewing. in machine sewing, and in cutting and making plain garments from patterns. In the dressmaking department a systematic course in dressmaking is given. Each pupil, under the guidance of a competent teacher, learns to fit from measure make and drape an entire dress for herself or others. In the department of millinery each pupil makes during the course an entire hat or bonnet, combining good taste and good workmanship. The depart ment of art embroidery is intended to train women in designing, due attention being paid to harmony of colors and symmetry of forms.
One of the helpful departments of the institution is the school of shorthand and typewriting, located on the third floor. The work done in this department is thorough and practical.

The entire fourth floor of the main building and the art hall of the sixth floor are occupied by the school of art and design. A great deal of attention has been given to the arrangement of the various rooms of this department, and to the selection of examples for drawing, casts and photographs in large numbers having been purchased in Europe for the use of the students. Every facility is provided for thorough and systematic work, and pupils may here pursue regular courses in drawing and painting, design, clay modeling, wood carving, architectural and mechanical drawing. In connection with the courses, lectures are given on architecture, historic ornament, perspective, design, theory of color, mythology, and artis-

the pratt institute-the woodworking shop. anatomy. As drawing is the basis of all constructive industries, pictorial art, and Nove, Milan, Bologna, Paroes, Rome, and Naples. gas burners for cooking and drawers with shelves ant departments of shel is supplied ention will be given to instruction in sculpture and Roman earthenware and also of pottery from thensile so wood carving, with special reference to the develop ment of a high class of art work in bronze, copper and stone. This depart ment will be instituted for the purpose of encourag ing ladies desiring to become proficient in thes branches of art
The fifth floor of the main building is set apart for the technical museum The museum hall proper is provided with rows of substhantial oak cases of two celasses, vertical and horizonstal, all the cases being provided with air tight plate glass doors. In these cases are arranged various wares 'in different states of complestion; some of the finest speicimens of classare, ceramion bron glassware, ceramics, bron zes, iron and brass work to be obtained in Europe are shown in these casers. The collection of specimsens was begun in Europg in the summer of 1887 . At pres ent, the museum contain


THE PRATT INSTITUTE-THE FOUNDRY each oos in There arethree courses in cooking, of twelve lessons each, advancing regularly from the simplest to the more elaborate dishes. Every pupil is required to give evidence of her thorough acquaintance, with the elements of cooking before passing to the higher course. Each pupil is required to work out with her own hands the recipe given her. The instruction comprises lessons on building and taking care of a fire, the proper modes of measuring liquids and solids, of boiling meats, eggs, vegetables, broiling and roasting meats, making soưps, puddings, andmost important of allbread. In connection with every lesson a brief lecture of explanation is given by the teacher on the chemical and nutritive properties of the materials used, the changes produced by cooking, etc.
(Continued on page 214.)

## The Future of New York.

Mr. A. H. Green, formerly comptroller and park commissioner of New York, predicts that the town of Westehester. the whole of Kings County, of Flushing, Newtown, and Jamaica, in Queens County, and the whole of Staten Island will be absorbed in the corporation of New York, giving to the city an area of about 320 square miles, as compared with London with an area of 687 oquare miles. To effect this object, Mr. Green would remove all obstacles, open ways, build bridges, and make it cheap and convenient to live in New York. From the easternmost point of Staten Island to the northerly line of the city, being the southerly line of Yonkers, would be 32 miles. From the Battery to its extreme northerly line would be, say, 18 miles, and from the Hudson River to the easterly line of Flushing would be about $71 / 2$ miles. It cannot be kept too constantly in mind, says mr. Green, that New York is, and is to be, the $\bar{\sigma}$ :eat manufacturing center of the American continent. Its domestic is probably three times its foreign commerce. No impediment should be placed in the way of conveniences for continuing the hold of New York on the great continental traffic which by all the rights of topographical advantages belongs to it. The Hudson should be bridged, of course avoiding needless obstructions to the waterway. The great continental railway lines must be afforded facilities in establishing their terminals there. Where capitalists are willing to embark their money to open new ways to the city, to bridging and tunneling the adjacent waters, they should be encouraged, not opposed by vexatious legislation. Within a radius of 25 miles from the Battery in Jersey there are more people to-day than in Brooklyn, more than in the whole State of Connecticut, and the day is not distant when the necessities of business and the convenience of administration will force a concentra tion of the various towns, cities, and villages within the above radius into one great municipality, with immense advantages for the accommodation of domestic traffic and with excellent water facilities.
Apropos to the above, Mr. Simon Stevens, a lawyer of some note in this city, is reported by the New York Thibune as saying: "It is a curious thing in the study of the world's history to see how the commercial center has shifted, from time to time, in a general course around the globe. You can go back to a time when Antwerp was the center of the world's commerce. Next Amsterdam held the threads of commercial venture. Then the center was shifted to Liverpool. Now it is London. Next it will be in New York. A careful study of the world's commerce at the present time gives sure indications that the power and prestige of England in her commercial relations is beginning to be shaken, while the commercial empire is drifting across the Atlantic to the metropolis of the new world." And as indicating what the powerful money kings of Europe think, ex-United States Minister Noyes reports that Baron Rothschild said to him recently: "The financial prosperity of the United States is without a parallel in the history of the world. You are drawing from all the treasuries of the old You are drawing from
world to fill your own."

## A Disinfectant Suggested

The following circular has been posted in the office of the health board of this city :
Experiments by the chemist of this department, Dr. E. W. Martin, warrant the belief that great advantage would result, in places suffering from yellow fever, from a free use of bromide in solution. It has a valuable function in destroying germs by oxidation Bromine can be purchased at a cost of $371 / 2$ cents a pound, and is manufactured in a large way by William R. Stields, at New Philadelphia, Ohio. One pound dissolved in 100 gallons of water gives a disinfectant and deodorizer of great power, cheap enough to be used freely in ground sprinkling and street disinfecting. Health Officer Bayles is of the opinion that sprinkling two or three times a day in and about houses infected with yellow fever would have a very beneficial effect in checking the spread of the disease.

## How to Kill Flies.

The Louisville Commercial states how a prominent druggist of Louisville hit on a novel scheme to get rid of the troublesome insect: "Bodine, a druggist in Louisville, runs a soda fountain, and everybody knows how the flies are attracted by the sirups, etc. The druggist was alnost in despair at the pwarms of these buzzing pests which made their rendezvous at his store. He dared not use the insect powder in the ordinary way, and the fly paper was too filthy to be considered. In the midst of his dilemma he accidentally discovered that the insect powder is of almost as rapid combustion as gunpowder, though the flame lives several seconds. By a further investigation he discovered that afportion of the powder, thrown from the bellows through the flanue of a lighted match held six inches away, produced the required flame, and was capable of destroying flies by the million. He, therefore, puts out some bait for them every morning. When they have col lected in sufficient mumbers, he gets his powdertand
match, and the work of destruction is sure and swift. No guilty fly escapes the scorching of the wings. By this means all the flies in the store can be destroyed in a few minutes, and their flayed remains are dumped into the street by the gallon. In the same paper we are told that other soda fountain men have adopted the idea, and say it works like a charm."

## A SYSTEM TO HEAT WALLS OF BUILDINGS.

An invention designed to obviate the discomforts and difficulties arising from cold and damp walls, by heating the walls themselves, and thus transmitting the


## PARKER'S MURAL HEATING SYSTEM.

greater portion of the required heat to the air in the building, is illustrated herewith, and has been patented by Mr. John D. Parker, of Fort Riley, Kan. A series of flues or ducts are formed in the walls and communicate with the furnace in the lower part of the building, as shown in Fig. 1, the flues being carried around the apartments in the different stories in the body of the wall, as shown in Fig. 2. Grates are also placed in the various apartments to regulate the temperature, the greater portion of the heat being supplied by the wall flues and the remainder furnished by the grates. The everal flues are arranged in series, so that the heated air passes from the furnace to the horizontal flues of the first floor, and after passing entirely around the first floor it passes through vertical flues to the second
floor, thence around that floor and upward, and so on floor, thence around that floor and upward, and so on charging into the apartments of the upper floor.

## AN IMPROVED TRICYCLE.

A tricycle designed to be easily operated and guided s illustrated herewith, and has been patented by Mr. Patrick Gallagher, of No. 145 East Forty-second Street, New York City. It has a light but strong iron framework, and is propelled by means of a crank handle mounted in arms adjustably pivoted to uprights on the frame, one of the ends of the crank handle having a sprocket wheel connected by an endless chain with a sprocket wheel on the axle of the driving wheels, while the other end of the crank handle has a fly whee o steady the motion of the machine, aird so that but little exertion will be required to run it after a high


GALLAGHER'S TRICYCLE.
degree of momentum has been obtained. By removing or adding links in the chain, and the adjustment of the arms of the crank handle in the uprights, the machine is readily made easy of operation by persons with lopg or short arms. The guide wheel has its bearings in a fork having a post extending through bracket arms, and is adapted to be readily turned by a conveniently located foot board, the lever of a suitable rekigh menanign extending up at one ide of the

It is a common complaint among mechanics that their tools do not serve them as well some days as others.
A correspondent of tre Iron Industry Gazette says: Tools, like men, grow tired. I have seen a first class chisel get tired and act as though it was possessed of the King of Sheol. It would not keep its edge, and the more I sharpened it, the sooner it would lose its edge. I called the attention of a shopmate, a grizzled old veteran, to the peculiar behavior of the chisel. He ooked it over and handed it back to me, saying: "The tool is all right, only a little tired. Lay it away and let it rest. It will come out all right again, just like a man who is tired." I did not believe the old fellow, and I really thought he was crazy to talk of a tool getting "tired," but as there was no help for it, the tool was laid away. I do not remember how long it was was laid away. I do not remember how long it was
left to rest, but when it was again sharpened and used it appeared to hold, its keenest edge as well as it did before it got tired. Barbers tell me their razors in constant use get tired in the same way, and woodchoppers say their axes sometimes seem to get soft all at once. Possibly constant and hard usage may cause changes in crystallization that would account satisfactorily for the peculiarity alluded to. Locomotive engineers often observe peculiar misbehavior in their machines, which may possibly be the result of continued heating, friction, and pounding. When a țool gets "tired," or a machine "balky," give each a rest.

## [The Swiss Cross.] <br> Amber.

The only place in which amber has been found in paying quantities is in the Baltic Sea, and the vein extends from western Russia to Denmark, Norway, and Sweden. In former years the production of amber depended principally upon the storms occurring in the winter time, for when the sea was convulsed the amber lying on the botrom was thrown up on the shore; but human enterprise stimulated by the demand for the article has changed all this, and for the last twenty-five years various engineering appliances have been used for getting out the amber in the quickest and cheapest way.
The most profitable strata have been found in the Courischer Haaf, which is located in the vicinity of Memel, and there are twenty large dredging boats constantly at work day and night for eight months in the year. There are large strings oif iron pails that are constantly dragging along the bottom of the sea, and bringing up the sand and what amber there may bein it. This is emptied on the deck of the ship, and there it is washed, and the amber picked out from andong the sand and stone.
The little village where this industry is carried on is called Schwartzort. It is situated on a narrow strip of land that extends about ten miles beyond the mainland, and is perhaps a mile wide at its widest part. At one time this strip of land was covered with a forest, but the wood was sold off by a Prussian king in the beginning of this century to the Russians. The land has become barren since stripped of its sheltering forest, and now it is nothing but a sandy waste; and, were it not for the amber industry, this beautiful peninsula would be desolate. About ninety miles further west is another little village, called Palmnicken, and here the amber is obtained in an entirely different manner. The most approved diving apparatus is used, and the divers go out in rowboats, each of which is fitted with an air pump. They go down into the sea, where some of them remain as long as four or five hours. Each diver has a little bag around his neck, and a peculiar hook, with which he pulls up sand, and every piece of amber that he finds is thrown into his bag. An encouragement to the diver is that if he finds a piece of amber he is entitled to a prize of ten, twenty-five, or fifty cents, according to the size.
While the divers are below in the sea, engaged in hunting for the amber, the miners are just as busy on land, for it seems that the same stratum of the greensand runs, perhaps for thirty miles or more, into the land. The opening of the mine is perhaps a thousaryd feet from the shore, and it is necessary to go down about one hundred and fifty feet, which is some thfirty or forty feet below the level of the sea. To kee o the mine as dry as possible, there are several pumps frork ing day and night ; and to prevent the earth frofm falling in, the passages are propped up by logs of wood. There are about forty miles of passageway fin these mines, and there are about seven hundred finen employed for the various departments. As/soon as a passageway is opened, a track is laid, and on this track there runs a little truck, which holdos perhaps half a ton of sand. The miners simply cut fout the sand and fll the truck. It is then brought to the surface, where the whole contents is thrown into a long trough filled with rushing water, which separathes the sand from the amber, which is caught by nets of various sizes. The anber is then cleaned by machinery, and assorted according to its quality and purity. The writer believes himself to be the first American who ever went down into the amber mine.
F. R. Kaldenberg.

## Keeping Tools.

Keep your tools handy and in good condition, remarks the Manufacturer and Builder. This applies every where, and in every place, from the smallest shop to the greatest mechanical establishment in the world. Every tool should have its exact place, and should be al ways kept there when not in use.
Having a chest or any receptacle, with a lot of tools thrown into it promiscuously, is just as bad as putting the notes into an organ without regard to their proper place. If a man wants a wrench, chisel, or hammer, it's somewhere in the box or chest, or some where else, and the search begins. Sometimes it is found, perhaps sharp, perhaps dull, may be broken, and by the time it is found he has spent time enough to pay for several tools of the kind wanted.
That habit of throwing every tool down, anyhow, in any way, or any place, is one of the most detestable habits a man can possibly get into. It is only a matter of habit to correct this. Make it an inflexible end of your life to have "A place for everything and everything in its place."
It may take a moment more to lay a tool up carefully after using, but the time is more than equalized when you want to use it again, and so it is time saved. Habits, either good or bad, go a long way in their influence on men's lives, and it is far better to establish and firmly maintain a good habit, even though that habit has no special bearing on the moral character; yet all habits have their influence.
Keeping tools in good order, and ready to use, is as aecessary as keeping them in the proper place. To take up a dull saw or dull chisel, and try to do any any kind of work with it, is worse than pulling a boat with a broom, and it all comes from just the same source as throwing down tools carelessly-habit. Nothing more nor less. To say you have no time to sharpen is worse than outright lying, for if you have time to use a dull tool, you have time to put it in good order.

## Explorations of the Guif stream.

The report for 1886 of the U. S. Coast and Geodetic Survey contains, in Appendix No. 11, a report of new explorations of the Gulf Stream, illustrated with maps, by Lieut. J. E. Pillsbury, U. S. N., which closes with the following conclusions:
I have to subuit the following summary of my conclusions, based upon the information obtained during the two seasons' observations. The examination of the Gulf Stream currents having been made in Mareh, A pril, May, and June, the conclusions may be incorrect for other seasons of the year, although there are no good reasons for supposing that such is the case except, possibly, in the amount of the variations.

1. Between Fowey Rocks, Florida, and Gun Cay, Bahamas, the current varies daily in velocity, at times as much as $21 / 2$ knots.
The greatest velocity is generally about nine hours before the upper transit of the moon. The variations are most excessive on the west side of the straits, and least on the east side.
2. The average daily currents vary during the month, the strongest set coming a day or two after the greatest declination of the moon.
3. The axis of the Gulf Stream, or the position of the strongest surface flow in passing this point, is $111 / 2$ miles east of Fowey Rocks lighthouse. The strongest surface current found here was $51 / 4$ knots per hour ; the least, $13 / 4$ knots ; and the average, $3 \frac{6}{10}$ knots. The average current at other places on either side of the axis is as follows :

4. The wind probably retards or accelerates the velocity of the current. A northeast gale in the Atlantic will probably "break up" the water of the strean, lowering its velocity materially, and afterward the flow will, by the reaction, be greatly increased oker the normal speed. There is no evidence of any
change in position of the axis of the stream due to the change in position of the axis of the stream due to the wind.
5. 'Two days' observations off Jupiter Light. Florida, indicate the same daily variation as was found off Fowey Rocks, and the axis of the stream at this section is $\}$ probably about 17 miles east of the light.

## The size of the Spider's Thread.

I have often compared the size of the thread spun by full-grown spiders with a hair of my beard. For this purpose I placed the thickest part of the hair before the microscope, and from the most accurate judgment I could form, more than a hundred of such threads placed side by side could not equal the diameter of one such hair. It, then, we suppose such a hair to be of a round form, it follows that ten thousand of the threads span by the fall-grown spider, when taken together, will not be equal in substance to the size of a single hair.-Lurvertrook.

## North Atlantle Icebergs.

Icebergs are a great source of danger to transatlantic navigation from March to August every year. This is the season in which the expected proximity of these dread masses of ice demands from the mariner an increased vigilance. Sometimes, but very seldom, bergs have been fallen in with much earlier. On New Year's day, 1844, a berg was passed by the Sully in 45 N .48 W., and this year, on January 3, one was reported in alnost the same position. The northern ice barrier is broken up by the increasing power of the sun's rays as he travels northward along the ecliptic. Fields of ice, sometimes having an area of one hundred square miles, are detached, and a free exitafforded for the imprisoned icebergs. Icebergs and field ice are borne to the southward by the cold current that follows the bend of the land from Labrador to Florida. Field ice is formed on the sea surface during the Arctic winter, but bergs have their origin far inland, and are the growth of years. Greenland glaciers glide gradually down their gentle slopes into the sea, and the upward pressure of the water breaks off their snouts to form the icebergs of the North Atlantic. Some hardy Norwegians are about to cross Greenland, and intend to make a special study of the movement of the coast glaciers and this setting afloat of bergs. Ancient glaciers have written their story on the mountains of Great Britain, and bergs were formed a little way off the west coast of Ireland during the glacial epoch.
There exists a marked difference in form between the bergs of the two hemispheres. Arctic bergs are of irregular shape, with lofty pinnacles, cloud-capped towers, and glittering domes; whereas the southern bergs are flat-topped and solid-looking. The former reach the sea by narrow fiords, but the formation of the latter is more regular. It is well to give these splendid specimens of Nature's hand work a wide berth, for they frequently turn somersaults, owing to the wasting away of their immersed portions. Immense pieces of ice fell from a berg on to the deck of a ship that had approached too close to it while in this transitory state, carrying away her masts and maiming some of the crew. Again, ships have been sunk by colliding with submerged portions of bergs, extending from their visible volume like reefs of rocks from a bold sea coast. Hayes compared one that he saw to the Colossus of
Rhodes. His ship could have sailed under the arch of Rhodes. His ship could have sailed
ice formed in the heart of the berg.
North Atlantic bergs are neither so large nor so numerons as those met with in the Southern Ocean, between the Falkland Islands and the Cape of Good Hope. In 1854-55 an enormous ice island was drifting in about 32 S .24 W . for several months, and was passed by many ships. It was 300 feet high, 60 miles long, and 40 miles wide, and was in shape like a horseshoe. Its two sides inclosed a sheltered bay measuring 40 miles across ! A large emigrant ship, the Guiding Star, sailed
into this icy bay and was lost with all hands. A simiinto this iey bay and was lost with all hands. A simi-
lar, but smaller, mass of ice was met with in the North Atlantic by the Agra. She ran into a bay formed in the center of an iceberg, in 42 N ., which was $11 / 2$ miles across, and she experienced great difficulty in beating out again.
A cubic foot of ice weighs about 930 ounces, but the same volume of sea water weighs 1,280 ounces. Hence ice floats on water, and but one ninth of the volume of a berg is exposed to view. There are several well-authenticated instances of bergs one thousand feet high having been sighted in the Southern Ocean, so that this would give the total height of them as about nine thousand feet !-a fairly good sized mass of solid water. In May, last year, the Inchgreen passed close alongside of a berg that Captain Miller estimated had an altitude of seven hundred feet above the sea surface, and was seven miles long. Bergs have often been seen grounded on the banks of Newfoundland where the deep sea lead gave a depth of 650 feet. Ross saw several stranded in Baffin's Bay where the depth was 1,400 feet.
Bergs are unusually numerous in some years, and a connection is said to have been traced between the frequency of bergs in the North Atlantic and the low temperature in our islands during the summers of some
years. The ship $S$ wanton passed three hundred bergs in 1842 in 43 N .50 W . She narrowly escaped destruction during the night, as she passed between two huge bergs that alnost grazed her sides. Captain (afterward Rev. Dr.) Scoresby, while whaling in the northern icy sea, counted no less than five hundred bergs under way for the open waters of the Atlantic. Last June the
steamship Concordia passed seventy-eight large bergs in a short space of time, as they lay aground in the Straits of Belleisle. This year the ice is both late and scarce. In 1883 it was very abundant. No forecast can be made as to the probability of frequency of bergs. A eessel has been so firmly fixed in the ice in the month of March in 44 N .45 W . that her master was able to take a stroll on the ice. In 1841 several ships, stopped by ice in mid-Atlantic, availed themsel ves of the oppo
tunity to kill sonie seals that were basking upon it.
Bergs have been seen in the North Atlantic laden with lumps of rock, sand, and soil. The banks of Newfoundland would appear to have been formed in this way. Arotio lande auffer demudation by the imland ica
as it creeps along toward the sea, and the bergs, sepa rated from their parent glaciers, deposit the fragments
at the bottou of the old ocean, there to harden into rocks and help in moulding the surface of the coast. Nothing is lost, nothing is new. In August, 1827, a berg was observed stranded in eighty-five fathoms in $461 / 2$ N. 45 W . Much earth and rock were embedded in its fissured sides. Polar bears and other Arctic animals were seen on the bergs of 1883 . An abandoned ship was passed high and dry on a huge ice island in 1794 and a ship with her crew was seen similarly situated in 1845 ; but no help could be afforded.
On April 21, 1851, the brig Renovation passed an inilnense ice island; about ninety miles to the eastward of St. John's, Newfoundland. Two dismantled ships lay snugly upon it, but there was no sign of life. Captain Ommanney, R.N., was deputed to investigate this report, and took great pains to arrive at its truth, as it was inferred that these ships were the Erebus and Terror, of Sir John's Franklin's ill-fated expedition Some people are still of the same way of thinking. The crew of the German discovery ship Hansa were conpelled to abandon their vessel, crushed byice, and took refuge on an inmense floating mass of ice, where they remained for eight months. Their floating ice island was seven miles in circumference, and drifted south, until the poor fellows were able to make theif escape. During this time they had lived in a hut conatructed from the coal saved from their ship. H.M.S. Resolute was abandoned, embedded in the ice, but was picked up after a long drift southward. This ice-bearing current tends to make the American coast very cold, and, as we write, Sydney, C. B., is not yet open to navi gation, although it is 7 degrees further south than Liverpool. The warmer water of the Gulf Stream, on the other hand, enables the whalers to get far to the northward, on this side of the Atlantic, and makes the nean temperature of Ireland in 52 degrees $\mathbf{N}$. as high as that of American coast ports in 38 degrees $\mathrm{N} ., 14 \mathrm{de}-$ grees nearer to the equator.
Many losses and casualties were caused by the ice in the North Atlantic last season. Masters should take requent observations of the temperature of the sea, although it must not be relied upon as a specific indication. Warning may often be obtained by means of he echo given off from a berg when a steam whistle is sounded. No precaution must be neglected by those who navigate our floating palaces and ocean tramps, but the safest plan is to adopt a southerly route clear of bergs. The Etruria has followed this course in her fastest passages. Our Admiralty charts show the seasonable limits of berge, and the United States Hydrographical Office issues charts every month giving the exact position of each berg up to the moment of going to press. Notices of bergs passed at sea should be forwarded to Washington immediately on arrival, and every berg reported to us will receive due publicity in our columns.-Liverpool Journal of Commerce.

## The Growth of Luxury.

Prosperity encourages luxury ; luxury is enervating, and ensourages sloth; luxury tends to produce, and in the world's history has often produced, national decay. Now, the growth of luxury for the last half century has been very great and very general. We do not merely
mean that the rate of living has advanced. This of itself is not necessarily to be deplored in any class, and in some classes is a matter for serious congratulation. That an agricultural laborer, for instance, should be able to procure more food, better clothing, better housing, and better education for his children than he could fifty years ago is a matter to rejoice over, and a state of things to secure by every proper means. What we mean is, that the scale of comfort deemed necessary by every class has enormously grown. And the tendency is ever upward. Young men beginning life try to start where their fathers left off. Some quarterof a century ago there was a discussion in the newspapers as to the prudence or otherwise of young persons in the upper classes marrying on an income of three hund red a year. Three times that income would be now considered inadequate by the critics who conducted the discussion Quarterly Review.

## New Nut Gall Ink.

According to the Droguisten Zeitung, an excellent (ausgezeichnete) ink is the result of the following ormula :
Take of
Powdered gall
Cloves in powder
Sulphate of iron.
16 parts.
8 parts.
10 parts.
of rain water and or glass vessel and add 100 parts with frequent let stand for eight to fourteen days, time rhentioned decant for use. Der Pharinaceut suggests that. good as the ink may be made after the above formala, it is improved by the addition of from 2 to 6 parts of Campeachy wood. One great advantage of this ink is that it can be thinned with water at any time without injury, and that it can be converted into a copying ink by the addition of 4 parts of glucose.

PRATT INSTITUTE, BROOK LYN, N. Y.
(Continued from page 211.) In front of the cooking roons is a lunch room, where a simple meal well served is furnished at noon and at evening for a small sum. This is intended particularly for the teachers and students connected with the Institute. Communicating with the lunch room is a well equipped kitchen where the meals will be prepared for the lunch room on this floor and also for the large lunch room soon to be placed in the basement of the main building.
The department of mechanic arts is designed for the instruction of three classes of pupils. First, members of the regular three years' course, who, in connection with their studies, science, mathematics, language, and drawing, will be given courses in wood and iron work, join-


THE PRATT INSTITUTE. THE SMITH'S SHOP.
accommodate twenty-five pupils. Pipes laid under the floor carry the blast of the forges, and an exhaust fan takes away the fuiges and swoke. In this department the forging of tools and various kinds of iron work, including art forgings, is carried on.
Adjoining the smith shop is the foundry, 66 by 29 feet, with an 18 foot ceiling, provided with two skylights. The foundry equipment includes a 20 inch iron melting cupola, two brass furnaces, a white metal gas furnace, and core oven. Practice is given in green sand, dry sand, and loam moulding, and in core making. Swept-up work is illustrated, and particular attention given to the production of art castings in iron and bronze. Upon the same floor is the inachine shop, which is fitted with benches with suffi cient roon for forty-eight pupils to work at the vise. ery, pattern making, wood turning, moulding, casting, is the smith shop, a room $73 \times 29$ feet, and 18 feet| It is furnished with a full complement of engine lathes, forging, etc. For the girl students in this course, deco- high, provided with ventilating skylights. The room drilling machines, and planers, being, in fact, a fully rative work in wood and metals, cooking, sewing, is furnished with forges and anvils, and is planned to equipped machine shop. dressmaking, etc., will be substituted for advanced shop work. Second, pupils from other schools who wish to supplement their studies with manual work. Third, those who are employed during the day, but wish to utilize their evenings in acquiring a thorough knowledge of the methods and processes of the industrial arts.
The buildings devoted to this department cover a ground space of $250 \times 100$ feet. They are of substantial construction, of brick with bluestone trimmings, and vary in height from one to four stories. A bridge from the third story connects these buildings with the second story of the main building. The basement contains two boilers of 100 horse power each, which furnish steam for heating all the buildings, and supply power for the engines, elevators, electric lights, fire pump, etc. In the engine room adjoining the boiler room is a fine Harris-Corliss engine of 40 horse power for operating the machinery of the institution, and an Armington \& Sims high-speed engine, which drives an Edison dynamo for supplying the incandescent lamps in the main building. An 800 light Sawyer-Man dynamo and an arc machine of the Western Electric Co.'s system supply the shops and trade school buildings with light. Both of these wachines are driven by a 125 H . P. engine from the N. Y. Safety Steam Power Co. The remainder of the basement of the buildings of this department is used for storage. On the first floor


THE ENGINE ROOM.

The wood-working department, which occupies the second floor of the same building, is provided with 150 feet of wall benches and 36 single benches, all supplied with the latest and most approved wood-working tools. The floor also contains a number of wood-turning lathes, a large pattern making lathe, a buzz planer, a surfacer, and circular and scroll saws. Adjoining the wood-working department is a lumber and tool room for the storage of tools and lumber used in the woodworking shop.
The third floor of this building is devoted to laboratories and class rooms, and the fourth to advanced art work in metals, engravings, etc. This last department is not yet organized.
The department of building trades, ocoupying the remaining buildings of the Institute; is designed for the instruction of pupils in bricklaying, modeling, stone carving, the building of frame buildings, plumbing, etc. In bricklaying, the pupils are first taught to handle the trowel and spread the mortar properly; they are then put to work upon 8 inch walls until they can carry the corners plumb and lay the courses level. Proper care is taken that the joints should be thoroughly struck and pointed. When the student can do this perfectly, he is taught the construction of arches and ornamental brick work. In stone carving the pupils are taught to work out forms illustrating the different styles of orna-


THE PRATT INSTITUTE BROOKLYN NT. Y.-THE TRADES SCHOOL.
ment in architecture. All the students are required to evident that man has a great deal to learn yet. He take off the uncompromising squareness presented by sketch their designs and model them in clay before cutting them in stone.
The plumbing section can accommodate 54 pupils, all of the necessary tools and benches being provided for carrying on the work in the most approved manner. The course of study includes the makincludes the making of lead seams, all kinds of wiped joints, and sand bends. Instruction is also given in the working of sheet metal, in the erection of sewer pipes, etc. The instructions in plumbing amount toa course in sanitary engineering, as the principles of drainage, sewerage, and ventila tion are thoroughly considered.
A department of electrical engineering is soon to be inaugurated. This will afford to students of elec tricity rare oppor tunity to perfect themselves in this science. Other departments will be added from time to time, as circumstances may require.
Our engravings truthfully represent many of the departments of this great institution, and give an excellent idea of the activity prevailing there. There is no longer an excuse for artists or artisans or students of the fine or mechanic arts for lack of proficiency in their particular departments, for persons without some ability cannot enter this institution, and when once entered they are taken in hand by a corps of competent professors and teachers, who will carry them forward rapidly and thoroughly through the various courses of study, enabling them to graduate with honor to themselves and credit to the institution. In bestowing this great gift upon the public in the prime of his life, Mr. Pratt has enriched the world with something more valuable than gold or silver He has set an example which might be followed by other wealthy men to the great benefit of the country at large. Such institutions elevate the dignity of labor, raise the tone of society, improve the quality of work, and contribute to the happiness and comfort of wage earners.

## Man's War with Creeping

 Things.The Philadelphia Inquirer. asks: What shall be done with the pests? What brings them ? How shall they be exterminated? Year by year they seem to increase. Morelocusts, more grasshoppers, more chinch bugs, more potato bugs, more cut worms, ghore weevil, more mosquitoes, mare flies, more what not? In the struggle to maintain our lordship over all creeping and crawling things we are already having to resort to desperate remedies. In Illinois the farmrs of several counties have resolved not to raise any wheat, barley, or rye for three years in order to starve out the chinch bugs. This looks almost like a victory for the chinch bugs, and t becomes an interesting ques tion, moreover, whether such a lockout would exterminate them whether they could not worry along without wheat, barley, and rye for three years about as well as the farmers by changing their diet to something else. It is


AN ELECTRIC CARRIAGE. horse power type, a current of 20 amperes with an electromotive force of 48 volts being used. Motion is communi cated to one of the hind wheels by means of a smal pinion on the main shaft of the motor working into a pitch chain which passes over a series $L$ shaped plates attached a intervals to the inner face of the rim of the wheel, so as to constitute in effect a driving pulley forthe pitched chain to act upon. It was stated that the motor could be reversed so as to back the vehicle. The power is stored in twenty four small accu mulators of spe cial type, occupy ing the spac under the seat and said to $b$ sufficient to prd pel the vehicle a a speed of abol ten miles per hour
the life and energy of the pests materialize in the shape for five hours; but at the trial nothing more than a of wheat, barley, rye, potatoes, etc., his crops would be immense.

## AN ELECTRIC CARRIAGE

Trial was made recently at the skating rink, St. Paul's Road, Camden Town, of an electric dog cart, built by Messrs. Immisch, of London, for the Sultan of Turkey. In appearance the vehicle does not differ from an ordinary four-wheeled dog cart with the shafts removed, and in this respect the design is perhaps open
to criticism, as something might have been done to
for five hours; but at the trial nothing more than a
few runs round the rink was attempted, sufficient to afford the visitors present the opportunity of having a ride, and no great speed could be attained, on account of the confined space and the consequent necessity for frequent sharp turns. The steering is effected by a shaft projecting through the footboard, and furnished with a hand-wheel. On the lower end of the shaft is a pinion which takes into a ring of teeth on the fore carriage. The brake is actuated by a lever, placed in a convenient position for the driver's foot, and the switch for turning on the power is attached to the splash board. The total weight of the vehicle, all complete, is about 11 cwt., the accumulators weighing about 7 cwt. The carriage appeared to run very smoothly, and to be under perfect control, although the operation of backing was not shown during the time of our visit.-The Engineer.

## Colored Leather.

Modern leather manufacturers, says the Shoe and Leather Reporter, are surpassing the ancients in the diversity and beauty of the colors they are introducing. Many of the shades produced in upper leather are highly attractive. The Thebans were thought to have attained great proficiency in this art, but the variety of colors they are credited with was meager compared with the iridescent display of our epoch. Remnantsof leather found in Theban tombs reveal the use of acacia and other trees in the tanning process. The Jews, after the exodus, probably put into practice the knowledge obtained of this art under the Pharaohs, in preparing rains' skins dyed red for the service of the Tabernacle.
The love of colors is as old as the human race. The art of dyeing leather, so long practiced on the Mediterranean, was afterward attained with difficulty by other European countries. But we need no longer to go to Egypt or the Mediterranean for instruction concerning it.

## Prof. Barnard's Comet.

Prof. Lewis Boss, of the Dudley Observatory, has completed calculations of the orbit of the new comet discovered by Prof. Barnard at the Lick Observatory, September 2. Having remained nearly stationary, the determination of its path has been a work of great difficulty, and results attained can be regarded as merely approximate. According to these the comet is twice as far a way from the earth as the sun is, or about 190,000 , 000 miles, and is about $170,000,000$ miles from the sun. It is moving toward its peribelion, and indications are that this will be reached December 10. As the earth and comet are moving toward each other from opposite directions, the velocity of approach toward us is something unusual, about $3,000,000$ miles a day. The comet will consequently increase in brightness, and by the middle of November will be sixty times as bright as at its discovery. Subsequent calculations will determine whether it will become visible to the unassisted eye. It canne into our solar system with the small inclination of fifteen degrees to the plane in which the planetary orbits lie, and in such a way as to move in a direction contrary to that of the planets. The comet cannot readily be seen much earlier than 1 o'clock in the morning, but within a month it will be visible in the early evening hours, and in November will rise before sunset. The physical appearance indicates that it is intrinsically bright and that it will develop a large tail. Calculations indicate its nearest distance to the sun at $125,000,000$ miles. Should it fall below this, the comet will be a brilliant object in November.

## The Mexican National Railroad.

Rapid progress has been made this summer toward the completion of the Mexican National Railroad Company's "International" line, and President Raoul informs us that it is expected to open it for traffic before November 1, and possibly by October 15. This will make a second independent all-rail route from the Rio Grande to the city of Mexico. The Mexican Central road, from El Paso south, was opened in the spring of 1884.

At the close of 1883 the Mexican National Company pad in operation 444 miles of track in northern Mexico Texas, and 356 miles extending west and north from the city of Mexico. Owing to financial difficulties construction had been suspended, with a gap of 352 miles, lying between Saltillo, in the southern part of the State of Coahuila, and San Miguel, in the State of Guanajuato, to be finished in order to complete the connection between the capital of Mexico and the United States. In 1884 the original Mexican National Railway Company defaulted on its first mortgage bonds, and, pending a reorganization, no further building was possible. Toward the close of 1886 an agreement was entered into by the leading representatives of the first mortgage bondholders on the one hand and the Mexican National Construction Company and other creditors on the other, in accordance with which the present Mexican National Railroad Company was formed.

By the terms of the new agreement the Interoceanic line, running from the city of Mexico directly west $2 \tilde{4}$ miles to the present terminus at Patzcuaro, and the International line, completed and uncompleted, from Acambaro on the foriner, 177 miles west of Mexico, north to Laredo, together with some minor pieces of track, were turned over to the new corporation. Possession was taken in July, 1887, and during the next month contracts were executed for the completion of the missing link in the International division. Work began at the northern end in October and at the southern end in December, and the builders are obligated to finish their task by October 1. Extensive machine shops are to be put up at Laredo, the Pullman Company has supplied a lot of sleeping and dining cars, and the new route will open with fair prospects for both passenger and freight traffic.

Taking St. Louis for the starting point, the distance from the principal cities of the United States to the city of Mexico by way of Laredo and the Mexican National route will be 1,905 miles, as against 2,585 miles via El Paso and the Mexican Central Railroad. The distance from St. Louis to Laredo is about 1,080 miles, from Laredo to Mexico 825 miles. From St. Louis to El Paso it is 1,360 miles, and from El Paso to Mexico 1,225 miles. The saving of 680 miles by the new line is equivalent to nearly thirty hours' time for passenger travel and the mails. The route offers superior attractions for tourists, crossing the Sierra Madre Mountains west of the city of Mexico at an elevation of 10,180 feet, or little less than two miles above the sea. The vertical ascent from the capital is 2,700 feet, most of it in a distance o sixteen miles. That part of northern Mexico traversed by the National road also compares favorably in inter
est with the Mexican Central's unattractive territory The Central route, however, possesses an advantage in that it passes throngh half a dozen interesting cities, while the only cities of importance on the National road are Monterey, San Luis Potosi, and Toluca. The National is a narrow gauge, and the Central a broad cauge road.
The new line going south from Laredo crosses the
northeast corner of the State of Coahuila, the western part of Nuevo Leon, the southeast corner of Coahuila,
the center of San Luis Potosi, the center of Guanajuato, the northeast corner of Michoacan, and the northern part of Mexico. The ascent from the Rio Grande to the table land occurs principally between Monterey and Saltillo, the latter place having an elevation of 5,240 , and San Luis Potosi of 6,090 feet. The route lies through or near one or two important mining districts. All of the railroads in Mexico are likely to find their permanent profit chiefly in local traffic. The Mexican Central Company's domestic freight business has increased during the last four years beyond the most sanguine anticipations. The National road so far has been operated at a disadvantage, consisting of several disjointed sections and confined to local traffic exclusively. President Raoul looks for a considerable development of earnings after the line from the United States gets into operation. The new company's expenses so far have been heavy on account of needed betterments with a view to through business. Other narrow gauge enterprises to connect with the Mexican National are under way. All things considered, the outlook for this and the various other Mexican railroads appears to be brighter than at any time within the last four or five years.--Bradstreet's.

## SIMPLE ATTACHMENT FOR STOVES.

A simple device for heating two rooms by means of a single stove has been devised by Mr. Henry Mead, of this city. As this idea is very simple, and is unpatented,

it may be applied very easily to any stove in use. The purpose of the device illustrated is to utilize the heat space in stoves, which in ordinary cases is devoid of any use other than furthering the general exterior design and increasing the exterior heating surface, it not altering the outside appearance.
To accomplish this, the cover of the stove is removed, and a metal air heating chamber, having a slight flange near its upper edge, and a gas-tight bottom, is introduced. This pot or chamber should be so deep as to extend downward as far as can be done without interfering with the operations of feeding the coal to the fire. At or near the bottom of the chamber an air pipe of convenient size is fitted, and this extends to and through the side of the stove. Connection by pipe from the top of the pot to the register in the floor above completes the arrangement. Without additional fuel this plan has been found to furnish warmth enough in cold days to render needless any stove in the upper cold

The Herreshoffs as ship Bnilders.
Charles Frederick Herreshoff, of Bristol, R. I., died of pulmonary disease at his home in that city, September 8, in the eightieth year of his age. Mr. Herreshoff was the father of the famous Herreshoffs, the boat builders, whose works, as a writer in the New York Sun shows, are about the most conspicuous thing left to remind Bristol of her trading days. The Herreshoff children played about the old ship yards. The Herreshoffs took to boats. Boats got into their blood more or less from both sides of the honse. . It wasn't strange, therefore, that John Herreshoff began whittling out boats as soon as he was old enough to manage a jackknife. In his fifteenth year he built a good sized craft for sailing on the bay.
Then he lost his sight. Aradually a Alm came over
his eyes, and finally shut off forever the last dim glimpse of Bristol and her boats.
But he went on building boats just the same-not, of course, as if nothing had happened, for his methods of perception had to be radically changed. He had the task before him of carrying in his mind the models he worked upon. The objects he had seen with his eyes in the first fifteen years of his life he could summon up into his mind again.
Under the enforced habit of mental activity, without the interruption and suggestion of outside objects, his mind grew to be one of remarkable concentration and acuteness. He became able, for instance, to set up before himself, from a careful description, a piece of machinery, and to explain its workings and its faults. His sense of touch developed to a wonderful sensitiveness, too. He learned to recognize the power of lines by rubbing his fingers slowly over a marble, and how well he succeeded in finding the good and discarding the bad has been shown by many a craft.
But this was when Herreshoff was building only sailing vessels. It was not until after 1873, when Nathaniel Herreshoff became interested with his brother, that the Herreshoff steam vessels made their appearance. Mr. John Herreshoff had been thinking over the coil boiler idea for sometime, and when it was applied to steam craft it was so successful that the building of sailing vessels was at once abandoned. The industry at once jumped into prominence, and the shops were used for making every part of the vessel.
The average individual who has heard of Herreshoff would very likely expect to find him industriously at work upon a model or laying down the lines in some ingenious way for a new boat. He will be found usually in business hours sitting behind a little railing in one of the rooms of the office, quietly resting one arm on a desk at his side. He is very busy-just as busy as if his eyesight were as good as an eagle's Secretary Young is sitting at the desk by his side and reading letters, bills, orders, all kinds of business com munications. Herreshoff carries them swif tly along in his mind, one after the other. If you should happen to drop into the office about noon, say, you would see him get up, unlatch the gate to the railing with perfect ease, walk to the hat rack where his hat is hang ing, with two or three more, and take his down with out a fumble.
Mr. Nathaniel G. Herreshoff, who is not blind like Mr. John and others in his family, is the designer He works ont the models, makes his calculations, etc. Mr. John may run his hands over the models, hear the measurements read, and make suggestions. The beauty and effectiveness of the Herreshoff models are thus due, in their conception, almost wholly to the two brothers. But there are experienced inen in every branch of the business to take them up and develop them into the much admired Herreshoff yachts.
The steel yacht which the Herreshoffs are now build ing will be looked for with considerable interest. Her plates have been fitted to each other as smoothly as the tiles in a floor. She is 148 feet in length, with 18 foot breadth of beam, and a 7 foot draught. Her enf gines, also built by the Herreshoffs, are of quadruple expansion type, and are beauties of simplicity and strength, capable of 800 horse power. Her contract calls for 17 miles an hour. The interior will be a model of beauty and safety. The woodwork is of highly polished quartered oak, and there are five watertight bulkheads. She will cost Mr. Brown about $\$ 70,000$ as she comes from the Herreshoff's hands.

## Curious Ninerals of Utah.

Included in the mineral resources of Utah, apart from its precious metals, are deposits of alum, some recently discovered veins of which are eighteen inches thick and several hundred feet in length, of dazzling whiteness and great purity. Beds of niter are also found sufficiently pure to readily fuse when thrown on hot coals.
Ozokerite or natural mineral wax, a rarity elsewhere is here found in large quantities. It is air, acid, and water proof, and can be used for imparting these quald ties to other substances. As an insulator it is said 10 be perfect, and would doubtless be found a superior insulating material for electrical appliances. It could also be adapted as the base of a cheap yet desirable paving material and for indurating piles and posts to prevent decay.
A somewhat similar discovery is gilsonite, found, on analysis, to contain about eighty per cent of carbon or asphalt in pure form.
Of the latter a vein has been discovered three feet wide and over a mile in length-a supply that, if worked, would be found almost inexhaustible.

As is now well known, the Great Salt Lake is an immense, limitless magazine of salt, that can be readily obtained in any desired quantity by the simple process of evaporation.
From this lake vast quantities. of sulphate of soda are also secured, blown on shore at certain temperatures by the winds, where hundreds of tens are often piled up in a single night, that can be utilized in the cheap production of sal soda and carbenate of soda.

Stray Railroad Cars and How they are Recovered.
The way in which railroad officials keep track of their freight cars, which are run thousands of miles over other railroad lines, has, no doubt, excited the wonder of many, and were it not for the constant vigilance of the great railroad companies in keeping watch of their freight cars, the loss of rolling stock and damage resulting from delays and mistakes would prove a source of serious financial loss to all concerned.
Nearly all the great roads employ a corps of what are known as "lost car searchers "or "tracers." Every freight car is numbered and used for a certain purpose, and whether it be a "gondola" or flat open car, or a box car, it can be traced from one end of the country to the other. The "searchers" will follow a clew to San Francisco if necessary, and see that the car is returned to its proper station. The "car searcher" has been a most active agent of the railroads for many years past, but, as in every other business, improved methods are constantly introduced.

At last our great trunk line road, according to the Evening Telegram, has dispensed with the car searcher in favor of a large force of responsible clerks, with the telegraph and telephone as auxiliaries. So systemati cally is their work done that, if the conductor of a freight train were to make the slightest error in the numbers of the cars in his train or a description of them, it would be detected and the conductor called on to rectify it. If a car is reported missing in any part of tbe country, one of these clerks, by referring to his books, can tell at what point the particular car should be at the time and when it should be returned.

## Artesian Well Boring in Nevada.

We learn from the Mining Industry, of Denver, that artesian well boring is now a sort of mania in parts of Nevada, and some of the borings are proving successful. A fine flowing well was struck a few days ago in Douglas County, Carson Valley, at a depth of only 310 feet, and without encountering rock of any kind. Improved boring machinery has been ordered from the East, and we may expect to see the experience gained in the Comstock mines, in "feeling ahead" for water, brought into play. By tunneling into the mountain that forms the rim of the basin of Lake Tahoe, a very large supply of water might be obtained, and as the diamond drill will easily bore ahead 1,000 feet or more, it would be an excellent tool for use in tunneling for water. In case of striking a strong flow, several holes could be sent into the source, thus saving the cost of driving forward a large tunnel. Many great bodies of water have been thus tapped and drawn off in the deep workings of the Comstock. In the Union Consolidated mine, cocks were fitted into the diamond drill holes and the water drawn off as it could be taken by the pumps. In running the Sutro tunnel the diamond drill was sent ahead to tap shafts in which water had accumulated to the depth of several hundred feet. Good hits were nearly always made with the drill, though it was sent ahead a great distance.

## AN IMPROVED DOOR OR WINDOW STOP.

A stop to be used in the construction of door and window frames as an abutment for the door or window, while serving also to cover the crack between the door or window and the jambs, is illustrated herewith, and has been patented by Mr. Noah Van Allen, of No. 149 West Monroe Street, Chicago, Ill. The stop has a


## VAN ALLEN'S DOOR OR WINDOW STOP.

longitudinal groove, in which is arranged a packing strip of elastic material, the strip being of less thickness than the groove and secured in the groove at its inner edge only, so that it can be retracted to permit the door to have a full bearing on the stop. Fig. 3 shows an enlarged cross section of the jamb and attached stop, Fig. 2 being asectional plan view of a portal provided with the stops when the door is closed. With this construction a weather-tight joint is made obviating the necessity of using weather strips.

## AN IMPROVED WINDMILL.

A windmill designed to regulate automatically the peed of the main driving shaft, and which will alway act, from whatever direction the wind blows, without the shifting of vanes and other devices, has been pat ented by Mr. Marcus J. S. Soli, and is illustrated here with. 'The wind wheel consists of one or more turbines, one above the other, secured near the upper end of the vertical driving shaft, each wheel having top and bot tom disks, between which are held curved blades form


## SOLI'S WINDMILL.

ing orifices for the entrance and exit of the wind, and channels through the wheel, as shown in the sectional view, the turbines being arranged so that the outer edges of each blade break joints, that the wind may act from whatever direction it comes, and on leaving as well as on entering the wheel, as indicated by the arrows. The windwheel is designed to be wholly or partly covered up by a casing, to the lower end of which is secured a $U$-shaped downwardly extending rod, having a collar in its middle fitting loosely around the vertical driving shaft. The forked ends of a weighted lever, fulcrumed on the main frame, extend beneath the collar, a link connecting this lever with a lower similar one, the forks of which engage a collar on the lower end of a governor secured to the main shaft. When the shaft runs beyond the normal speed the governor balls fly out ward, raising the collar on the lower end of the governor, when the lower lever operates to pull down the outer end of the upper lever, thereby raising the casing to fully or partially inclose the windwheel, according to the movement of the governor balls.
For further information relative to this invention address Mr. B. H. Lien or Mr. M. J. S. Soli, Brookings, Dakota.

Habits of the Blacksnake.
Blacksnakes always feed on`live prey, and possess a power over their prey that is truly wonderful, and I think that birds, old and young, are their main dependence for food-old birds are captured by them with ease. I captured a snake nearly 5 feet long that had a full-fledged song sparrow in its body about 6 inches from its head. They feed on any kind of live prey within their capacity, and have been caught with a young rabbit in their body. They also are successful hunters of birds' nests for the young, and will climb trees in their search. I was once near an orchard when I heard robins making a great outcry, evidently disturbed by something. I went to see the cause, and discovered a large blacksnake at their nest in an apple tree about 15 feet from the ground. The tree was about 1 foot in diameter and 7 or 8 feet up to the branches. The branch on which the nest was, stood off at an angle of about forty-five degrees. When the snake saw me, he glided down on the top side of the branch, and when he reached the trunk he slid off and dropped to the ground. In his mouth was a young bird partly swallowed, which proved such a clog to him that he could not run rapidly in the grass, and I captured him.
Many stories are told of their chasing people. I have seen persons who claim to have been chased by them, and sometimes it was by a racer, a blacksnake with a white ring around its neck. I never saw a snake of', that description, and I know of no authority claiming the existence of such a snake. A blacksnake five or six feet long can outrum a man. Their speed I have repeatedly witnessed, when they have escaped from me. Now, if they chase people, why do they not catch them, and if they abould catch a per
son, what could they do with them? Certainly they could not use them as food. It is singular that so many persons have been chased by them, and yet no instance has been reported where they have been caught. The racer, described as a blacksnake with a white ring around its neck, exists only in the imagination of frightened people. It has no place in natural history, and yet I have known several persons who claim to have been chased by them, and were just as sure of the white ring as they were of being chased.-Forest and Stream.

The Steel Ram of the War Ship San Francisco. The rain for the San Francisco was cast at the Pacific Rolling Mills, San Francisco, last month. A pit shaped like the letter $L$ was dug in the floor of the foundry. It was eight feet deep, twenty feet long in one direction and twenty-five in the other. In this pit was placed the mould. To this pit there was a tramway upon which the ladle, being mounted on wheels, traveled. When the pit was reached, the metal was allowed to flow into the mould in a streain six inches in diameter. When the mould was filled, there was still considerable of the liquid steel left in the ladle. The actual operation of casting the ram occupied but twenty seconds. Whether the results are satisfactory can only be told after the metal has cooled, and that will take several days. It took two months to get ready to perform this twenty-second operation. The operation of casting such a huge amount of metal is very interesting to those who have no knowledge of the process. To insure the complete filling of the mould there were placed two apertures, $18 \times 24$ inches in diameter and 4 feet long, called "ris ing heads," left in the top of the mould, into which the metal rises, and as the metal cools this allows for any shrinkage in the body of the metal. The weight of these two rising heads will approximate 9,500 pounds. the weight of the ram being 13,000 pounds $-2,000$ pounds heavier than that of the Charleston.
The general shape of the ram is that of a crescent, with one point a little shorter and more curved than the other. The shorter point will extend upward at the bow, and the lower point will run aft under the ship. The curve forms the ram. When in position it will be 20 feet 8 inches from its most forward point to the end of the longer point, and will have a height of 13 feet 10 inches. Where the curve is the thickest-that is, where the vessel would strike when ramming-there is a thickness of 2 feet 9 inches of solid steel.-Pacific Contractor.

## AN IMPROVED FIREPLACE.

A fireplace designed to facilitate the ready regulation of the amount of draught necessary for free combustion, and with which the heat generated will be retained and directed into the apartment to be heated, is illustrated herewith, and has been patented by Mr. Robert B. Berrie, of Lexington, Mo. A corrugrated plate with end flanges is set into the wall, upwardly inclined above the firepot of the grate, the plate having a flat middle part, through a slot in which passes a handle secured to a regulating plate sliding on the rear side of the corrugated plate, the slot having notches adapted to be engaged by the handle to hold the regulating plate at the desired height. The edges of the regulating plate have apertures, as have also the inner ends of the corruga-


## BERRIE'S FIREPLACE

tions, to permit the free radiation of heat and prevent the corrugated plate from becoming too hot. Above the grate is held a hood, the moving forward or backward of the regulating plate decreasing or increasing the draught opening formed by the front end of the corrugated plate and the front end of the hood: Under the grate extend one or more channels leading to the chimney, indicated by the arrows, the inner openings of these channels being closed or opened by the lower end of the regulating plate.

## engineering inventions.

A car door has been patented by Mr. William J. Keyes, of Wheeling, Ala. This invention relates to improvements especially adapted for freight car doors, and provides means for effectively securing
the door, and also forreadilyopening and automatically closing it.
A car seat has been patented by Mr John O. Buerk, of Red Bank, N. J. This invention covers a novel construction and combination of parts, ordinary form of seat may be simply and readily an verted into a comfortable reclining seat.
A car coupling has been patented by Mr. Isaac Shotwell, of Bancroft, Mich. This invention for raising and dropping the pin without the necessity of trainmen going between the cars, the improvement being applicable to the ordinary form of drawhead, link and pin.
A car coupling has been patented by H. John Clarridge, Sr., of Libertyville, Ohio. In the drawhead is a spring-pressed follower adapted to erse link slot, and there being a second coupling a the rear of the drawhead recess, the device being apable of use for automatic coupling with the ordinar form of link and pin.

## AGRICULTURAL INVENTIONS

A hand planter has been patented by Mr. Thomas N. Lupton, of Winchester, Va. It is an mproved device capable of use in planting corn, beans,
and other seeds, the device being adapted to be carried by one hand and to have its movable part or parts operated by the handle grasped by the hand
A cotton scraper and chopper has been patentedjby Mr. William E. Morris, of Crutchfield, Ky weeding and freshening the earth at each side of a row of plants, and also to chop the plants to a stand, the craping and chopping devices being detachable to allow plows, harrows, etc., to be used with the sulky.
A combined plow and harrow has been atented by Anna Trexler, of Sabin, Minn. This inven ion provides a simple and inexpensive harrow attachating to pulverize the earth freshly turned over by the plow, to economically and efficiently accomplish th harrowing while the plowing progresses.

## MISCELLANEOUS INVENTIONS

A fire escape has been patented by Mr. Jacob M. Fink, of New York City. This invention provides a ladder of hinged sections, constructed and arranged to be located at the top of a building when ot required for use, but which can be readil
A bolt has been patented by Mr. John . Holland, of New Orleans, La. It is for fastening har with a hole, ora, etc., and consts of a sliding and a screw fitted to the nut and operative through the bar hole from outside the bar when the bar is projected
A wrench has been patented by Mr. William H. Brock, of Brooklyn, N. Y. It is of that lass in which a chain is used with a serrated shoe to grip the pipe or other article, a dog engaging the chain, better gripping the pipe, and a more readily operated

A duplex hand stamp has been patented y Mr. Robert Robinson, of Albany, N. Y. This invenon provides an improved providing for the distribution of coupons to the purchaser and for the retaining of a record of the amounts paid for the coupon
A wagon end gate has been patented by Mr. Ulysses S. Tym, of Ridgeley, Neb. The invention covers a peculiar locking contrivance applied to one end of the gate, with an eye bolt secured in the bottom of the wagon body, which receives a bevel-ended hising.
A button has been patented by Mr. Isaac Dreichlinger, of New York City. The invention covers an improvement in bittons on a shank having a ing or hanging down of the butto the lateralsway fastening, by the use of a novel form of doubled wir shank.
A water elevator has been patented by Messrs. John W. and John J. Adams, of Charlotte, N c. This invention relates to a form of elevator with a to a bucket, the buckets being arranged to have a re verse motion, the improvements patented consisting in the means for reversing the action of the buckets.

A piano truck has been patented by Messre. Louis Miller and Thomas A. Wheeler, of Green ville, Ohio. It has a base frame on rollers, with derace rods, and other novel features, making a movable sraffold for supporting and moving upright pianos o nd off a wagon and over steps or stairs.
A straw burning attachment for stoves has been patented by Mr. Myron T. Andrews, of Iroquois, Dakota Ter. The attachment has a pouch forming a front extension to the stove to give increased
capacity for holding straw or stalks used for fuel, with a novel construction of grate and means for adjusting it, and means for fitting the appliance to stoves

A reversing switch and rheostat for electric circuits has been patented by Mr. Charles G.
Bickley, of New York City. The invention consists in
three-part switch, a series of adjustable resistanc circuit, with especial reference to use in electroplating to avoid reversals of current from polarization of the ctrodes dipping in the electrolyte.
An automatic station indicator has been patented by Mr. Edward Blamey, of Jersey City N. J. This invention covers a novel construction and combination of parts, whereby a station or street may main and branch road may be indicated, and wherei the apparatus will automatically advance and reverse with other novel feature
A pipe wrench has been patented by Mr. Beverly Reagan, of Ouachita, La. It has a fixed jaw with ratchet teeth and a block on its shank carr ing a movable jaw, a pawl being carried by the block and arranged to be forced into engagement with the ratchet teeth of the shank of the fixed jaw, the con-
struction being designed to facilitate quick and accurate adjustment of the jaws to clamp and hold pipe of varying diameter.

A rotary corn popper has been pa nted by Mr. William C. Moore, of Springfield, Mo It consists of a receptacle mounted on a shaft, and formed with a fixed portion and a portion movable end-
wise, a fastener for holding the movable portion in wise, a fastener for holding the movable portion in
open and closed position, the shank having a crank handle and a loosely mounted supporting handle, the holder being grasped in one hand and the receptac otated by the crank handle with the other hand

## SCIENTIFIC AMERICAN

BUILDINGEDITION
OCTOBER NUMBER.-(NO. 36.)

## TABLE OF CONTENTS.

Elegant plate, in colors, of a suburban dwelling costing eight thousand five hundred dollars. Floor por
Elegant Plate, in colors, of two cottages costing swelve hundred and sixteen hundred dollars,
spectively. Sheet of details, floor plans, etc.
A residence at Richmond Hill, N. Y., lately built, at a cost of te
floor plans.
A dwelling for three thousand five hundred dollars. Floor plans and perspective.
5. Villa at Fontainbleau-M. E. Brunnarius, architect. cost, eight thousand
View of the new Protestant church at Lyons,
France. Cost, eighty thousand dollars.
Page of engravings showing the house at Stratford-on-Avon in which Shakespeare was born-Anne
Hathaway's cottage, near Stratford-on-AvonHathaway's cottage, near Stratford-on-AvonTrinity church, Stratford-on-Avon, where Shakespeare is buried. The residence of Nary Arden, house, Stratford, showing the domestic architecture of the time of Shakespeare.
The chancel, Holy Trinity Church, Stratford-on Avon, showing the Shakespeare memorial bust and tablet, and the starican visitors.
9. A suburban villa lately built at Sound View Hill, Long Island Sound, near New York. Perspective
view and floor plans. Cost, five thousand eight hundred dollars.
10. Design for a cottage by S. W. Whittemore, architect, Brick Church, N. J. Perspective and floor plans. .Cost, A Queen Anne cottage in Rochelle Park, New Rochelle, N. Y., costing five thousan
dred dollars. Plans and perspective.
12. An English double house of moderate cost. Perspective and floor plans.
13. Design for the Duquesne Club House, by Heins \& La Farge, architects, New York.
Miscellaneous contents : A new regimental armory, New York City. - Ventilating pipes. - National ing pit for burning shells.-Roman road construcing pit for burnin the larch-Sewage disposal in Great Britain.-Orchids, illustrated.-Test of fireproof wire lathing.-A clematis porch illustrated. -Some ways of using the Virginia creeper, illus-
trated with 3 figures.-Feeding coal to the fire.trated with 3 figures.-Feeding coal to the fire.Wood that will not blaze.-Fall of a stone church tower.-A ruined city in Texas.-Loofah as a
substitute for sponge. - A California farm.substitute for sponge. - A California farm.Defects in plumbing in the Maine Insane Asylum.--
An improved reversible shaper, illustrated.-Im. proved hand and foot power saws, illustrated.proved hand and foot power
Practical hints on disinfection.
The Scientific American Architects and Builders dition is issued monthly. $\$ 2.50$ a year. Single copies, cents. Forty large quarto pages, equal to about
two hundred ordinary book pages : forming, practically, a large and splendid Magazine of ArchitecURE, richly adorned with elegant plates in colors and with fine engravings, illustrating the most interesting xamples of Modern Architectural Construction and allied subjects.
The Fullness, Richness, Cheapness, and Convenience of any Architectural publication in the world. Sold any Architectural publication in the world. Sold by newsdealer

MUNN \& CO.. Publishers,
ac1 Broadway, New York.

PBusiness and Personal. The charge for Insertion under thes head is Une Dollar Advertisements must be received at publicanon office as early as Thursday morning to appear in next issue.
company having factory well fitted for manufac uring hardware specialties, tools, etc., desires some
ately patented article to make on orders or on royalty.
An Address A.S. C., P. O. box 1748, New York.

## For Sale-U. S. patent, No. 388 321, on swe

Just Published-Elements of Electric Lighting, including electric generation, measurement, storage, and istribution. By Phillip Atkinson, A.M., Ph.D., author of Elements of Static Electricity. 266 pages; 104 illus
trations. Price, $\$ 1.50$. For sale by Munn \& Co trations. Price,
way, New York.
All books, app., etc., cheap. School of Electricity, N.Y Mechanical drawing, calculations, etc., taught by Iron Planer, Lathe, Drill, and other machine tools

Pratt \& Letchworth, Buffalo, N. Y.,
solicit correspondence relative to manufacturing spec-
alties requiring malleable gray iron, brass, or steel cast ings.
For the latest improved diamond prospecting drills, ress the M. C. Bullock Mrg. Co., Chicago, ill.
Nickel Plating.-Manufacturers of pure nickel an Little Wire nickel sals, polishing compositions, etc. \$100 "Little Wonder." A perfect Electro Plating Machine. Abett for plating, etc. Hanson, Van Winkle \& Co
ark, N. J., and 92 and 94 Liberty St.. New York.
Wanted-To buy the patents or the right to manufac ture the following articles : A Spring or Compressed Air
Motor, a Pop Safety Valveand Steam Injector. Address Motor, a Pop Safety Valve and Steam I
Holland \& Thompson, St. Paul, Minn.
Perforated metals of all kinds for all purposes. The The Railroad Gazette, handsomely illustrated, pubished weekly, at 73 Broadway, New York. Speci
copies free. Send for catalogue of railroad bonks.
Wanted.-Thoronghly competent men to instruct evening classes in forging, foundry, and machine shop
work. Adress, stating experience, c. R. Richards,
The Knowles Steam Pump Works, 113 Federa t., Boston, and 93 Liberty St., New York, have just isroved forms of Pumping Machin new and im duplex, steam and power type. This catalogue will be

Link Belting and Wheels. Link Belt M. Co., Chicago Presses \& Dies. Ferracute Mach. Co., Bridgeton, N. J The Holly Manufacturing Co., of Lockport, N. Y., Will send their pamphlet, describing water works maLockwood's Dictionary of Terms used in the practice of Mechanical Engineering, embracing those current in the drawing office, pattern shop, foundry, fitting, turn-
ing, smith's and boiler shop, ecc., comprising over 600 l ine, sings. Fdited by a foreman patternmaker. 1888.
defnitions.
Price, $\$ 3.00$. For sale by Munn \& Co., 361 Broadway, New Price,
York.
Patents Bought \& Sold. H.W. Booth \& Co.,Detroit,Mich Hodges' universal angle union makes pipe connectio , The Improved Hydraulic Jacks, Punches, and Tub Wrinser R. Wrinkles and Recipes-Compiled from the Scien TFIC AMERICAN. A collection of practical suggestions, frontispiece. Edited by Park Benjamin, Ph.D. Thir edition. Price, $\$ 2.00$. For sale by Munn \& Co., 361 Broad-
way, New York. Hoisting Engines, Friction Clutch Pulleys, Cut-of Tink L. Frisbe Co.. 1 Liberts S.., N. Y. Tight and Slack Barrel Machinery a specialty. John
Greenwood \& Co., Rochester, N.Y. See illus. adv., p. 28. For best quality, order your steel castings from the

Belting.-A good lot of eecond hand belting for
cheap. Samael Roberts, 369 Pearl St., New York. Specially adapted for machine shops-Talcott's com bination patent helt hooks. Prnvidence, R. I.
Duplex S
falo, N. Y.
Send fornew and complete catalogue of Scientific
and other Books for sale by Munn \& Co., 361 Broadway
NEW BOOKS AND PUBLICATIONS
Conklin's Handy Manual of Usefu Information. Chicago: Lai
Lee. Pp. 440. Cloth, 50 cents.
This little pocket reference book is closely crowded with matters both curious and useful, such as all sorts
of people are likely to ask questions about. The book as had a
Poor's Manual of the Railloads of The UNITED States. 1888.
York : H. V. \& H. W. Poor.
This publication, which has now been issued annually for 21 years, brings together in one large volume a vast amount of information of the utmost importance ness. The general exhibit given shows that the tota length of railroad lines in the United States laid up to the close of 1887 was 149,912 miles, the mileage of the va rious roads having been increased during the last cal ndar year by 13,080 miles. The equipment consiste 20,582 were passenger cars, 6,592 were baggage and 20,582 were passenger cars, 6,592 were baggage and
mail cars, and 956,631 freight cars. The total length of track footed up 189,346 miles, and of this amount 129,959 miles was laid with steel rails, and 60,387 miles with iron rails. The manual also includes the railway of Canada and Mexico, and a directory of the various tramways in the cities of the United States, but, large as is the amount of valuable information furnished in
publishers could haveincluded in the scope of their ork a summary of the railway construction and busi-
se of the rest of the world. Such a statement would add to the value of the work.
Turning Lathes. By James Lukin. New York and London : E.
Spon. Pp. 16u. Price $\$ 1.00$.
This is a manual for technical schools and apprentices in turning, screw cutting, metal spinning, etc., being an elementary work, presupposing no knowledge
of tools or lathes. It has numerous illustrations of ools and lathes, and descriptions of various kinds of work, the directions being such as will be most simple to a young beginner.
The Mechanic's Workshop Handy
Book. By Paul N. Hasluck. LonBook. By Paul N. Hasluck. Lon-
don: Crosby, Locksood \& Son.
Pp. 136. Price 80 cents.

This book is especially for young mechanics interested in the manipnlation of metal. There are special
chapters on iron, steel, and brass working, and on the principal alloys, on solders and soldering, files and filing, tool grinding, drills and drilling, abrasive and finishing processes, etc. The book has a greater variety
and extent of matter than is ordinarily found in such and extent of matter than is ordinarily

The Sheet Jobbing and Plate RolLER's Assistant. By C. H. Kauf-
man. Wheeling: West Va. Publishing Co. Pocket book form. Pp. 267 . Price $\$ 3.50$.
This is a book full of tables designed to assist manufacturers and mill managers in saving time and labor in making calculations, also to assist the boiler maker and sheet iron worker, and the iron roofer, in making
estimates for work, and to be of advantage to any one estimates for work, a
handling sheet iron.
Three Kingdoms. A hand book of the Agassiz Association. By Harlan He H,
Ballard. New York: The Writers' Ballard. New York: The Writers
Publishing Co. Pp. 167. Cloth.
Price 75 cents.
The Agassiz Association has a membership all over The United States, and to some extent in Canada and England. It is organized in nearly one thousand ersons, young and old, the object being the systematic tudy of elementary botany, entomology, geology, natomy, physiology, etc., under the leadership of competent teachers. This book is designed to answer nquiries concerning the association and its work, and as much valuable information on the collection, pre-

Seaside and Wayside. No. 2. By Julia
McNair Wright. Boston: D. C. Heath \& Co.
This is the second of a series of "nature readers," nd describes ants and their work, the earth worm, the wase fly, the beetle, the dragon fly, etc., and all in a delightfully entertaining to the little folks.
William Shakespeare portrayed by
Himself. By Robert Waters. New
York: Worthington \& Co. Pp. 347. This work is styled by its author "a revelation of re poet in the career and character of one of his own
ramatic heroes," and the effort is made to show that dramatic heroes," and the effort is made to shat
Shakespeare is none other than King Henry v.

## 

hints to correspondents.
ames and Address must accompany, all letters,
or no attention will be paid thereto. This is for our
information, and not for publication. References to former articles or answers should give date of paper and page or number of question. quiries not answered in reasonable time should
be repeated; correspondents will bear in mind that
some answers require not a little research, and, some answers require not a little research, and,
though we endearor to reply to all either by letter
or in this department, each must take his turn. Special Whitten IIIformation on matters of
personal rather than general interest cannot be Scientilte American Supplements referred
to may be had at the oflice. Price 10 cents each. Books referred to promptly supplied on receipt of price
inerals "sent for examination should be distinctly
marked or labeled.
(1) B. J. asks (1) a process by which a rought iron rod can be converted into steel. A. Your
on rod may be made into steel on its surface only by acking it in an iron tnbe with horn shavinge, closing he ends with clay, and heating the whole to a full red for four hours. If kept too long, it will be of little is coarse in grain and blistered on the surface, a black enamel for bicycles. A. Use black japan varnish and bake in an oven at about $270^{\circ}$ Fah.
(2) C. J.-Compressing two volumes in one of air or any gas, starting at atmospheric pressure.
ives a resultant pressure of about 15 lb per square nch. Electricity cannot be utilized as a motive power xcept through the aid of mechanical appliances. It can only be generated for power purposes by chemical means (a battery) or by the expenditure of power which may be produced throngh the agency of steam,
water, or wind through engines, water wheels, or wind mil! s .
(3) W. E. L. asks the process of tempering needles-what kind of oil is used, and what
degree of heat is required? A. Use clear lard oil and herry red heat for the needles. See Scientific american Supplement, No. 54, for the process of
(4) J. D. B. .asks : 1. Why is it true that, if the direct rays of the sun are permitted to enter impinge upou the floor or wall, the tigure will be impinge upou the floor or wall, the tigure will be
round? A. The sun, having sensible magnitude, produces a penumbra. This prevents the reproduction with sharp outliues of the aperture, and hence it is somewhat confused in shape, tending toward a circle. This refers to an opening of large size. If the opening is very small, not muoh larger in area than a pinhole, then
a "pinhole "image of the sun will be produced. The production of such an image depends on the practical cutting off of all except one set of rays emerging from
the sun. 2. Do motions possess the quality of cohesive attraction? A. No. 3. Is it not true in physics, as in physic and in politics, that we are expected to accept the dictum of some man as leaving nothing further to be said, and whose ipse dixit it were rank heresy to question? A. We know of no ipse dixit in physic, politics, or physics. The assertion of the highest authority is open to contradiction or discussion.
(5) R. Y. asks: 1. Is it necessary for the discharge end of a siphon pipe to be submerged in water to insure a continuous flow? A. No; provided
the pipe is unobstructed for its full length. If partially stopped, so that there is a slow discharge, air may en ter and stop the siphon from working. 2. What is the theoretical difference in the length of the pipe from the apex to the fountain, and from the same point to the discharge in order to insure a continuous flow? A. Any diferen The height must not exceed 33 feet, as this is the limit of action.
(6) F. T. P. asks (1) how salicylic acid is made. A. Salicylic acid is made by treating so-
dium phenol (carbolic acid and soda) with carbonic cid gas. Caustic soda solution is evaporated with a proper amount of carbolic acid to a dry powder, and carbonic acid gas is passed over it while warm, the
temperature being gradually increased from $212^{\circ}$ Fah. o 482. Fah. Carbolic acid is made from.coal tar. 2 s salicylic acid injurious to the system? A. It has an injurious effect upon the system vhen taken in suffi ent quanties. The efect of established long
(7) Shep asks what commercial value (if any) solidified petroleum or solidified kerosene has and also mention some of the uses to which it could be put. A. It is impossible to say what value solidified petroleum would have. It is mainly as a method of pre upon the problem. It has been suggested that it might used as a fuel.
(8) R. B. H. asks : At what distance (in feet) would an iron steamship cause a deflection of a
sensitive compass needle? A. The exact distance candred feet would practically prevent deflective infludred
(9) F. L. writes: A sheet of zinc about a foot square was accidentally dropped into a well
Will it poison or iujure the water, so as to make it unfit for drinking purposes? A. While it is doubtful if he zinc will seriously contaminate the water, it would be good policy to remove it.
(10) J. J. B. asks: What will remove paint from window glass? A. Try solution of washing These solutions will spot any other paint that they may fall upon.
(11) J. P. S. asks: 1. If there is a remedy to stop show windows from sweating in cold weather. A. Ventilation from the top is the mos efficacious method in general use. 2. What will drive
away or kill cockroaches that infest dwellings? A.
(12) R. W. W. writes : I wish to mak balloon of 4 or $41 / 6$ feet in diameter, suitable to two-pound detective camera. What would be the best material (rubber, gutta percha, gold beater's skin, or
what), and how should the seams be cemented? What what), and how should the seams be cemented? What dimensions would be necessary if coal gas was used
instead of pure hydrogen? A. If filled with pure hy drogen, the gas contained in your balloon would hav carry the weight of the balloon as well as camera, would be far too small. With coal gas it would have about one-half the above lifting power. Silk varnished with a mixture of India rubber, linseed oil, dissolved in essence of turpentine, would be a good material In storing it, the balloon should be suspended to pre vent the varnish from heating. Your balloon should be about 8 feet in dameter for hydrogen, and 10 fee light and the varnish very thin, it is doubtful if would have enough ascensional power.
(13) A. C. S. asks: 1. How to make asbestos a conductor of electricity. A. Soak it in ittrate of silver, dry, and expose to hydrogen gas, on platinum solution, then in chloride of ammonium, and ignite. 2. If a disk of any light material, about twent feet in diameter, rests on a fine pivot (on the style o a compass dial), and the pivot is revolved very slowly will the disk make as many revolutions as the pivot or will there be a constant slip between the pivot and
the disk? A. If the point is the disk? A. If the point is sharp and has a hard
(14) D. D. C. asks: 1. Can brass or coppar be silver plated without a battery, if so, how?
A. Not very satisfactorily. 2. Will it be durable ? A. The coating will be thin and not very durable.
(15) J. N.-Block tin is the only com mercially successful luning ever used for soda wate fountains. Glass fountans inclosed in iron or stee bands or cases have been used, but are very heavy an iron, though it may affect the color and taste of the water sightly.
(16) H. P. asks: Can you tell me if
tin off the scrap from can and tinware factories? If s
what process is used, and oblige? A. This has neve been successfully accomplished, though many attempts have been made to
(17) F. E. W. asks: What is the process and apparatus used in the manufacture of gas retort as a by black 9 . A. The material in question is formed as a by-product in the manufacture of gas from bituthe heated walls of the retort, and carbon separates and deposited in hard masses upon the back and uppe
(18) S. W. R. writes: Replying to ery in your issue of September 1, youl say that there no substance that if placed between the poles of magnet and its armature will counteract or insulate the magnetism. Now, I am puzzled to understand the that I had a proper mageic watch sheld. Supposin always held that these "shields" are frauds, but I find that their popularity is increasing, and that many of the case makers make their cases so fitted or not as ordered, and I notice also that some of the railroads that require a certain grade of watch to be used by their employes, specify the "magnetic shield " among other requirements. If you can enlighten me as to the composition of these "shields," and their general use appreciated. A. Magnetic watch shields are not prauds They operate, not by insulating the magnetism, but being made of iron they practically absorb it, acting like an armature of any neighboring magnet, and dis posing of the lines of force before they can reach the inclosed watch. These lines of force are principally kept within the metal of the shield, so that the watch partially protected.

## TO INVENTORS.

An experience of forty years, and the preparation of ents at home and abroad, enable us to understand the laws and practice on both continents, and to possess unequaled facilities for procuring patents everywhere. A synopsis of the patent laws of the United States and all
foreign countries may be had on application, and persons contemplating the securing of patents, either at home or abroad, are invited to write to this office for prices, which are low. in acsordance with the times and our exMUNN \& CO.. office ScIENTIFIC AMERICAN, 361 Broad way, New York.

INDEX OF INVENTIONS
For which Letters Patent of the United States were Granted

September 18, 1888,
AND EACH BEARING THAT DATE.
[See note at end of list about copies of these patents.]
Acid phosphate, making, C. Glaser................... 839,566
ir brake, T. S. E. Dixon... ................ 389,643
 rmature winding
W. H. Knight...
Wning, D. Jannopoulo
Axle box, J. Des Brisay
xles and

Meneely....
Bag holder, J.
Bagasse furnace, W. W. Sutcliffe
Ball trap and target, Day \& Colt
Banker's case, M. F. Langfeld...
Basket or box, folding, c. R. Maguire...................
Batteries. rheotome mechanism for medical,
B. Cox........ .............
Bearing, roller, R. W. Hent

Beating engine, J. Norton, Jr
Belt faastener, M. Seebold .,

Bit. See Bridle bit.
Biter
Blind slats, machine for smoothing and fnishing,
A. F. Tyler........ .. ............................ 389,826
Block. See Snatch block.
Boat. See Portable boat.
Boiler. See Steam boiler.
Boiler cleaner, steam, J. S. Roak
Boiler furnace, W. W. Sutcliffe
Bolt, J. T. Gunniss
Bolt, J. J. Holland
Bolt cutter, D. J. Sligh...
Boot or shoe heel, J. Germun
Boring machine, H. Lonkwell..
Bosom board, F. H. Argersinge
Bottle stopper, P. Kottgen...
Bottle stopper, T. G. Turner.
Box. See Axle box. Casting box. Letter box.
Brakee. See Air brake. Sled brake. Wagon
Brat.
Bridge, D. M. Eddy.............
Bridle, B. L. E. Gowen...
Bridle btt, A. W. Helm
Broom head, G. H. Kim
Buckle, W. A. Meyer...... ...........................
W. H. Hayden, Jr............ ................... 38
Bugkies, drop reach for, R. H. Munro........ 388

Butter package, metallic, Higgins \& Wheeler.....
Button, I. Dreichlinger.............................
Button machines, nail and washer feeder for, E
B. Hamilton.....

Calipers, micrometer, J. D. Bishop
Cam machanism, C. H. Willcox
Can forming machines, horn for, B. Adriance. Cane, J. E. Haile... Cane mills, scraper for Car coupling, J. Clarridgge. Sr.
Car coupling, I. Shotwell......

Car coupling S. Shull.. Car coupling, J. F. Zeigle
Car door, w. J. Keyes.....
ar mover, M. F. Conne
Car mover, O. E. Rose......
Car, passenger, C. H. White
Car, passenger, C. H. White....
Car seat, J. O. Buerk..
Car wheel, cast steel, Bagaley \&
Carriage elevator, G. L. Loomis.
Cart. road, F. Higgins.
Cast. road, F. Higgins...................................
Casting box, stereotype, J. Thompson..........
Casting horoeshoes, flask for, F. I. Freeman..
Casting horoeshoes, flask
Chain, drive, B. A. Legk....
Chair. See Rocking chair.
Chair. See Rocking chair.
Chuck, drill, L. C. Taber...................
Cigar box trimming machine. H. Leiman
Circuit cutter, , breaker, automatic, w.......
Estabrook.
cay to make ballast, etc., feeding apparatus
use in burning, w. Davy.......................... Cleaner. See Boiler cleaner. Flue cleaner. Clips, die for formink spring head, E. J. Hess. Clock, E. M. \& M. Moulton.
Cock, stop and waste, J. Heltzle
Coffin bracket, w. Hollis.
Collar machine, horse, E. Cra
Corn cutter, T. C. Williams
Corn cutter, T. C. Williams..........................
Cot legs or other articles of like construction
bracing, at ander, and detaching, L. Banks. Couton scraper and chopper, W. L. Morris.........
Coupling. coltivator, w .
Cultivator, sulk

$\xrightarrow{\text { Ler. }}$ Darning last, C. Austin.
Decorat ons, transfer. C.
Dental engine, C. Doriot.
Desk or other furniture, school., E.... Hane...........
Die. See Screw cutting die. Sole cutting die. Distilling alcohol, apparatus for, L. Bechaux $F$ Door check. A. Sohns.
Door or window stop, N. Van Allien.
Drill. See.Rock drill.
Drills, mechanism for opening, W. Thiem.
Drum, snare, H. C. Plowe....
Dist separator, Allingt
Ear muff, A. . Britton.
Ear wire .
Egg testing packet, M. L. Windiate..................
Electric batterg cell, S. L. Trippe...............
Electric energy, means for distributing, s. z. De
Ferranti.............................78995
Electric light circuits, ground detector for, A.
Ferranti...................................399,795,
Electric light circuits, ground detector for, A.
W. Morrell............................
Electric machine, direct welding dynamo, E
Tlectric mananhine, dynamo. T. H. Hi.......................


Electro therapeutic cap, N. P. Rutter......
Elevator. See Carriage elevator. Water
Elevator safety apparatus, C. . Ongley Elevator safety apparatus, C. E. Ongle
Embroidery frame, C. Herrmenau... End gate, E. C. Ward.............
End qate, wagon, U. S. Tym...
Engine. See Beating engine.

Dental engine Engine. See Beating engine. Dental engine

Gas engine. Pumping engine. Steam engine Exercising apparatus, S. Wild......................
Fair stitch loops, machine for cutting, A.G. Wi Fair stitch
liams...
Fans, powe
Fare register, E. M. Green. ...............
Fare register, electric, , A. Scale...
Faucet attachment, W. H. Tingle et al
Fence, J. A. Harnsberger............
Fence machine, wire, J. \& c. Lane..
Fence making muchine, E. Blodke
Fence making machine, P. Miles..
Fences, machine for making picket. E. E. Witter
Fertilizer distributer, Malaier \& Smith
Fertilizer distributer. Malaier \& Smith.
Fifth wheel,,$~ . ~ A . ~ L a n e . . . . . . . . . . . . . . ~$ Fire alarm system. T. G. Turne
Fire escape, J. M. Fink.... Fish, device for stringing, F. A
Flour packer, J. T. Melich.....
Flue cleane,

## Flue cleaner, G. W. Berkshire........................ H'rame. See Embroidery frame. Paper machine

Frame. See Embroidery frame. Paper
fruit gatherer, G. A. \& C. F. Heming.. Furnace. See Bacasse furnace. Boiler .........
Puddling machine. Regenerative Puddling machine. Rege
Furnace, W. R. Jones.........
Furnace grate, Z. F. Bryant. Furnace grate, Z. F. Bryant
Guage. See Pressure auage Galley. Schniedewend \& Lee.....................
Game scoring tablet and indicating device,
 Gas, appa..
Has burne
Gas b
Gas b
Gas
Gas

## 

Gas saver. O. W. Bennett
Gas scrubber
Gas scrubber, J. F.
Gate. See End gate.
Gate, T. M. Russell.

Grader, road, J. J. Mungen.
Grain binder, S. D. Locke..
Grapple, D. S. Sanbornet
Grapple, D. S. Sanborn et al
Gridiron, J. W. Sankey.
Guard. See Bridge guard.

Harrow and seeder, eombined disk, A. Corbin,
Harvester and binder, grain, S. D. Locke....
Harvester reel support, J. S. Davis.
Hay ricking device H , A. Alden
Hay ricking device, H. A. Alden........
Heating apparatus, electrical, J. Wiest. Heel trimming mach!ne; Nob
Hing, spring, G. W. Warner.


Holder. See Bat iolder. Paper holder. Spool,
needle, and thimble holder. Stereotype plate needle,
holder.
Hook. See Checkrein hook
Hook, c. H. Thurston............................. 399,825
Horse power machine, W. H. Williscraft........ 889,623
Indicator. See Pressure indicator.
Inicator. See Pressure indicator.
Initial ring, interchangea ble, Thie $\&$ Levg. .....
Insurance policy, complementaliaccident,. F. Lee
Insurance policy, complemental!accident, J. F. L
Interlocking switch and signal., G. D. Fowle.....
Iron, manufacturing wrought L. D. Chepin 389,778
359818
389,588 ron, manufacturing wrought, L. D. Chapin......... 389,545,
Ironing machine, J. J. Daley.................. 389,794 Jack. See Lifting jack.

grove................ .............
Lamp, hanging, H. D. Richard
Lamp, kerosene, A. G. Heath
Lamps, extension, standard for. J. Kintz
Lantern or lamp, tubular, L. F. Betts.
Lathe for turning wooden dishes, W. W. Shotwel.
Lead, making white, Morris \& West.............
Ledger and bll book, combined, C. L. Searcy....
Letter box, G. H. Fister.
Lifting jack, W. Dixon.
Lifting jack, A. L. Stant......................................
Lock. See Nut lock. Permutation lock. Seal
lock.
Log turner and loader, w. A. Durrin......
Loom, take-up mech anism, W. M. Larned
Lom, take-up mechanism, W. M. Larned
Lubricator, Mattes \& Lewis.
Medicine case, W. H. Wa:ren.
Medicine, remedy for scrofula
Medicine, remedy for scrofula, H. Hel......
Metallic fastener, Mandel \& Henderson.
Metallic fastener, Mandel \& Henderson...........
Metals, material for cleaning and polishing, Metals,
Dean........................
Motor. See Weight motor.
Mower lawn, F. E. Grothaus
Motor. See Welght motor.
Mower. lawn, F. E. Grothaus. .
Mowing machine, A. O. Carman
Mowing machine, A. O. Carman
Nailing machine, W. Z. Bean..
binding machine, G. s. Ald, addressing, an

Nut lock, W. A Jordan..........
Packing, H. R. Gillingham.
Packing ring. J. J. Sullivan.
Pandle wheel, Thayer \& Phelan
Paint, asbestos, F. De Conincis
Paper holder, A. B. Sherwood...........................
Paper holder and cutter, roll, S. D. \& N. W
Locke............... ..............................
Paper machine frame, G. Kafenberger.......... 38
Permutation lock, C. Hill.....................
Pin or match box and advertising card, combined,

Pipe wrench, P. Reagan............................. 389,
Pipes, boilers, ete., , non conducting covering for
steam, H. C. Bradley........................ 389
Planter, hand. T. N. Lupton..................................................... 359
Planter, seed, H. Thaden..............
Plaster, composition of matter for, Turley \&
Plaster, composition of matter for, Turley \&
Chamberlin....................................... 389,72
Platform. See Car platform.
Plow, J. King........ ................................. 389,750
Plow and harrow. combined, A. Trexier.......... $389,6,5$
Plow attachment. J. \& s. w. Miles. ............3 389,820
Plow attachment. J. \& S. W. Miles ..................
Plows, sulky attachment for walking, D. T.
Jones ....................................
Portable boat, C. W. King.................................. 389
Postal package, H. R. Gillingham............. 389
Pot. See Coffee or tea pot.
Pre. See Coffee or tea pot.
Pressure gauge and draught regulator, combined
steam, M. Wilkes...........................
Pressure indicator and recorder, w. H. .............
Pressure regulator, c. E. Brown.................... 389
Printing machine, color, W. H. Fuller........ 389
Printing mechis
Printing machine, color, W. H. Fuller..............
Printing machine sheet delivery mechanis, J.
T. Hawkins .................................

Kendall.... .. .................
uddling furnace,
Pump, J. W. Vanmeter ........
Pumping engine, E. G. Short
Pumping engine, duplex, E. G. Shortt....
Punching and shearing machine, E. Jones..........
Punching the eyes in axes, etc., device for, A.
Garrow... .............. ............................
Railway, cable, G. W. Shepherd.......................
Railway system, electric, J. D. Nicholson et al....
Railways, turntable for street, J. W. Warhurst..... 389,620
Reel. See Warping reel.
Regenerative furnace, w. \& J. c. Swindell........ 389,671
Register. See Fare register.
Register. See Fare register.
Regulator. See Pressure requlator.
Resonator. tubular, J. Harrington................... 389:841
Ring. See Initial ring. Packing ring.
Rock drill, A. W. \& Z. W. Daw................... 389,740

Holden \& Rasmussen....................... 399.572
Rovings, etc., mechanism for evening, G. F.
Evans.................................................999

Suw mills, automatically adjustable press roll for

Scale, automatic grain, T. J. Jnderwood........... 389,884
Screw cutting die, A. Wirsching................... 389,627
Seal lock, G. W. Amos........................ 889,738
Seat. See Car seat. Vehicle seat.
Seed, delinting cotton, F...... C. Cooper................ 389,739
Semaphore, A. A. Strom..................... 389.611
Semaphore, A. A. Strom.........
Sewers, apparatus for flushing, H. H. Mitchell....
Sewing machine, buttonhole, A. L. Coombs......
Sewing machine buttonhole attachment. A. W.
Johnson................................

Sewink machines, belt removing and replactrg de-
vice for, J. Bolton........................... 3s9, 79
Shaping fleecy masses, machine for, E. Goldman.. 359,645
Shaping fleecy masses, machine for, E. Goldman..
Sheild, Leart, I. Gross...................... 88
Shive cabinet, w. S. Settle................. ....



389,781
399,712
389,547

| 389,743 |
| :--- |
| 389,46 |
| 339,755 |
| 389,621 |
| 8 | $: 89,651$

359,600

389,552

 389,542
389,709
359,76 9,724
, 750
, 655 9,705
9,817

9,565 | 39,730 |
| :--- |
| 99,$6 ; 5$ |
| 99791 | 389,650

 ,740 5 695 $\stackrel{+}{\square}$

.

Spirometer, coin-released, Howson \& Crowe....
Spool, needle, and thimble holder, combined, W. Fuller........ ........
Spring. See Vehicle spring. Square and bevel protractor, try, F. N. Violet.
Stamp, duplex hand, tand for displaying goods, H. C. Staples, machine for inserting and clinchin Mandel \& Henderson. Staves, machine for crozing, chamfering, how nag, and trimming, Hirsclineimer \& $\&$ Mu
Steam boiler, sectional. Dimmick \& Smith. Steam cylinders, throtlling
Cisco......................
Stereotype plate holder, A.
titching buttonholes, E. Fletct
topper. See Botile stopper.
Stove, open front, 'Terste
Stove polish. L. Bullard.
tove polish. L. Bullard
Support, extensible, J. Kintz
Swing, W. A. Caldwell.
Table. See T'urn table.
binski
Telephone system. mechanical, A. M. Rosebru.
Thill coupling, J. L.. Culberson.
Time recorder, electric, A. Wirschi
Trap. compound, R.
Phillips.
ruck, J. T. Tows
ruck for moving buildings, $G$. Harden
piano, opening and sha
Tubes, meechanism
Mannesmann.
Mannesmann....................
Turn table, J. D. Bowman .... .......
Type writin ${ }_{\kappa}$ machnes, type rest for, J. M. Yair
alve, balanced slide, G. W. Cisco
Valve for elevator spouts, switch, J. s. Metcalf.
Vehicle running gear, F. Dupee....
ehicle spring, E. B. Smit
Velocipede, R. J. Rombaue
Veneer, J. B. Wilson.......
entilation, system of, L. C. Tuttle
Veterinary instrument, W. Mivers
Violins, improving the tone of, C. C. Hudson
Vise, ©. A. Chandler.
Wagon brake, G. C. Thaye
Wall case, J. R. H. II Inton
Watches, cannon pinion for. H. E. Murdock
Water elevator, ©. Benker... ..........
Water \&auzes, retlector for, S. P. Gilbert....
Watering live stock, device eor, H. W. Conklin
Weight motor, B. G. Mullins.
wheel. Saw wheel.
Windmill, M. J. S. Soli.
Wire, spooling machine, E. Earley
Wrench. See Pipe wrench
Wrench. W. H. Brock
Wringer. See Clothes wringer.
Writing machine for the blind, J. F. McElrog.
inc, apparatus for condensing metallic,
equ from the vapors or fumes arising in the pro
cess of smelting, condensing metallic

## TRADE MARKS

Beverages, aerated, J. P. W. Von
Bitters, , tomach, Hostetter \& C
Brandy, cognac. Gautier Freres.
Brandy. cognac, Gautier Freres......................587,
Coffee and coffee compounds, Chase \& Sanborn...
Goods, dress, J. Meyer \& Co .....................
Goods, inclading plush, velvet, and other pile fab
rics. textile
Company.
Medical compound for external and internal use
Medicines named, certain proprietary, Tyler \&
Mineral water, natural, A pollinaris Company........
Oil cloths, etc., metallic binding for. Tuttle \& Fin

namaker Manu facturing Company................
Thread, linen, P. Vrau \& Co................ 15,882,
Tobacco, smoking, Fawcett Durham Tobacco and
Snuff Co..........................................
Underwear and hosiery for both sexes and fo
children, I. \& R. Morley .....................
Washing compound or mixture, American Soa
DESIGNS
Gimp, C. Weinberg
.. .......... ...
Gimp, C. Weinbe
Handles for spo
Dominick..

Metal binding, M. J.
Radiator, J. B. Dyar
Stuve, heating. C. W. McCutchen
Torch, campaign, I. C. Beardsley
Toy savings bank. Shepard \& Adams
Type, font of, h. C. Ruthven............
Type. font of printing, w. F. Capitain.

A lirinted copy of the specitcation and drawing of any patent in the foregoing list will be furnished from
this office for 25 cents. In ordering please state the name and number of the patent desired, and remit to Munn C.,

Canndian Patentr may now be obtained by the
Inventors for any of the inventions named in the fore-
going list, provided they are simple, at a cost of $\$ 40$ euch. If complicated, the cost will be a litule more. For Pnll instructions address Munn \& Co., 361 Broadway


COSTS IN MANUFACTURES.-A LEC ture by H. Metcalfe. U. S. A. Aelivered in the Sibley
College course.. An elaboration of a system for the
management of fictories and employes. A valuable

OIL WELL SUPPLY CO. Ltd.


PROPULSION OF STREET CARS.-
 PIEMENT. No. 533 . Price 10 cents. To ve had at this
WATCHMAKERS 4 COMPARATIVE VALUE OF STEAM

 USEFUL BOOKS.

| 389,743 | Dfdvertisements. |
| :---: | :---: |
| 389,560 | Inside Page, ench |
| 389,780 | Back Paxe. each insertion |
| 389,667 | The above are charges per agate line-abuut eight |
| 339,536 | Words 1er line. This nocice shows the width of the |
|  | tisement at the same rate per agate line, by measure- |
| -389,661 | ment, as the letter press. Advertisements must be received at publication office as early as Thursday morn- |
| 389,399 | ing to appear in uext issue. |
| 389.571 384,642 |  |



Instantaneou Pictures! No knowlede of of
photer
necessary. The latest and
hest ont ant for
teurs. Send for decrip-
tive circulares.
 E
 THE GENERATION OF STEAM-A



DELAFIELD'S PAT, SAW CLAMP



GOING INTO THE POULTRY BUSI



SHIP WAVES.-BY SIR WILLIAM


charperi g bs diline


Williams \& Orton Mgg. Co.
P. O. Box 148. STERLING, ILL NATURAL GAAS INDOUSTRY AT PITTS



INFLUENCE MACHINES.-A PAPER


## z. nmu

 LAN DUZRN'N PATENT

 FOR SALE! THE HAMPDEN WATCH CO.

 MACHINERY PALACE OF THE PARIS



PANAMA CANAL--A PAPER BY DR.



## No. 11 PLANER \& MATCHER



Special Machiners for Car
Oork
 C. B. ROGERS \& CO. 109 Liberty Street,

THE MODERN ICE YACHT - BY


 ON RED AND PURPLE CHLORIDE,






VELOCITY OF ICE BOATS. A COLLEG
 COUNTERSSINK and DRILL COMBINED.

 whey \& lusnell Mfr. Co., Greenfield. Mass.
NEW CATALOCUE




## ELECTRIC LIGNT AND POWER.






 OTHER BOOKS BY THE SAME AUTHOR.

 Meehnnical 1 "rnwing Nelf-Traught, comprising
Instructionsinthe Selection and Preparation of Draw
ig Instraments. Elementary Instruction in Practical


 Stenin Boilers.-A Practical Treatiseon Boiler Con
truction and Examination. For tue use of Practica




 HENRY CAREY BAIRD \& CO.,
 THE DEVELOPMENT OF THE MER carrial Atr Pump-By Prof. Silvanus P.Thompson.D...c.
An interesting bistorical paper in which the varius mer
curial air pumps in use fromearly times up to the present



## GUILD \& GARRISON

 Pumps, Vacuum Apparalus, eic.
WOOL HAT MAKING. -FULL DE-

 TVAMPIRE DMOTHORRE:




MADE WITH BOILING WATER.

U.S. A


## PRafer









CAMERA BELLOWS.-FULL DESCRIP
 i2.5. Price 10 cents. AMERICAN be had at this offce and
from all newsdealers.

 GIMITING NUMBERS OF TEETH IN Gear Wheels-A - valua ble paper by George B. Grant
trealing of tie different methods of determinint the
timiting nit


PHILASPECIALTY CO.



THEE CONTINENTAL TRON WORKS, IBROOIETETIN, NT. FO,

## 5 miknomis

 CORRUGATED BOILER FLUES Under their own patents and those of SAMSON FOX of Leeds, England.MADE IN ALL SIZES, WITH FLANGED OR PLAIN ENDS. TRENTON ENGINE


WEIMMYER PATENT FURNACP BOILERS OF EVERY DESCRIPTION
IDE Automatic Engines, Traction and Portable Engines BTIAMM ROAD ROMTMFRE. Manufactured by Foundry and Machine Department,
Harrisburg, Pa., U. S. A.
 AND SOUTH-
new underground rail
ind
 MUNSON'S PORTABLE MILLS,


## BARREL

MACHINERY. . \& R. HOLNF:

Put an Electric Bell in your house or shop.

$\mathbf{5 5}$ \& Ci.

## inventors and others desirin, new articles manufac- Cured and introduced, address P. 0 . Box 86 , Cleveland, $O$.

QHORT-HAND $\begin{gathered}\text { send for Catalog } \\ \text { of Books and helps }\end{gathered}$ -ELFTAUCHT ${ }_{\text {for selfs-instruction }}^{\text {of Books and helps }}$ bT BENN PITMAN and JEROME B. HOWARD, to
THE PHONOGRAPHIC INSTITUTE. CINCINNATI. OHIO.
 Situatinn Wanted as Superintendent of Oil Well
A $\begin{gathered}\text { or otter borings. on any part of the dlobe. by a man } \\ \text { on welve years experience in American, and four years }\end{gathered}$
 PLAYS ${ }^{2}=\mathbf{w s m a z}$

## The Scienific American Publications for 1888.

The prices of the different publications in the United
states, Cauada, and Mexico are as follows: The Scientiff American (weekly), one year
The Scientific American Supplement (weekly), one
 The Scientific American, Export Edition (monthly)
one year,
5.00 The Scientific American, Architects and Builders
Edition (monthly), ne vear.
. The Scientiff A merican and Supplement, . . $\quad \$ 7.00$
 Proportionate Rates for Six Months.
This includes postage, which we pay. Remit by postal MUNN \& CO.. 361 Broadway, New York. 20 (1)


W．L．DOUCLAS \＄3 SHOE．aemitimen． The only calf \＄3 SEAMLESS Shoe smooth in－
side．NO TACKS Or WAX THRREAD to hurt
the feet，easy as hand－sewed and WILL NOT RIP


 for heavy wear．Best Calf Sho for the price．
SHOE is the best in the world for rough wear；one pair ought to wear a man a year．
the Eest Schoul shas in the world．
 by your dealer，write
W．LOUGLAS，Brockton，Mass．

## Mie DUNNING BOILER

 Oldest and Best
Steam and Hot Water HEATING． Over 13，500 in use MANUfactured by Lock Box 40,
GENE

## TO BUSINESS MEN．

The value of the SCIENTIPIC AMERICAN as an adver－
tising medium cannot be overestimated．Its circulation
 pore or the to oree his A a bustiness man wants something
parer．He want circuation．This a prined news
pate has when he let the advertising akent intuence you to substitut
some other paper for the scivNTITI AMERICNA．When
selecting a list of publications in wan wou decide it in for your interest to advertise．This is frequently done for the reason trat the apent gets a larger eommission
from the papers having ammult circulation than is allow－
edom the SCIENTIFIC AMERIN


MUNN \＆CO．．Publishers


PATENTS． MESSRS．MUNN \＆CO．in connectinn with the publi
cat：on of the SCIENTHFIC A MEERICAN Continue to




 Designs．Patents．Appeais．Re，issues．Infringements，Ass
sipnments．Rejected Cases．Hints on the Sale of Pa－
 MUNN \＆CO．，Solicitors of Patente，



The Originalal Dunileainizal Pading． CALLED THE STANDARD－As it is the Pack ing by which
Accept no packing as JENKINS PACKING unless


STMロT BATLE
 ln qual
 uaracy nad ned．
dinequale
andes tiof Samples and prices on applica Simond＇s Rolling－Machine Co．，Ftechburg，Mat THE COPYING PAD．－HOW TO MAKE



## MALLEABLE

TELESCOPES－THEIR HISTORY




JAMES B．EADS．－AN ACCOUNT OF



 FEVERN AND MERSEY TUNNELS：－
 be had at this office and from all newsdealers．

##  <br> Mention this paper



HE BRIDGEPORT WOOD FINISTINE CO New Milford，CONN Mumpratu
Breinigs Lithogen Siligate Paint SILEX FLINTAND FELDSPAR． MPHLET GIVING DIRECTIONS FOR FINISHNG HARD WOOD FREE TO ANY ADDRESS．



This Company owns the Letters Patent granted to Alexander Graham Bell，March 7th，1876，No．174，465，and January 30th， 1877，No．186，787．
The transmission of Speech by all known forms of Electric Speaking Telephones in－ fringes the right secured to this Company by the above patents，and renders each individual user of telephones not furnish－ ed by it or its licensees responsible for such unlawful use，and all the consequences thereof，and liable to suit therefor．

## HW．JOHIS＇ Asembias STEAM PACKING

 Descriptive Price List AND SAmples SENT Frer
Ho $^{W}$ JOHMS MFG．CO．， 87 Maiden Lane，N．Y．

$\int$ cientific Book Gatalogue RECENTLY PUBIISHED．
INDELIBLE DRAWING INKS The best ever produced．Haveour Paten Ink Filler，which regulates supply to pen，
proventasioning outsieot pen－biades ；isthe
only




THE BACKUS EXHAUSTER ICE and REFRIGERATING MACHINES

CHALLENGE E ME RYGRINRING RRASCTORT Small Brans We，R \＆Model


The Scott linstinte of Philadelphia has awarded pany for the adaptability of their system to the LONG BIRANGH，NEW JERCEY Citles．

BIRANGH，NEW JEREEY，
NEWPORT，RHODE ISI，AND． and over 20 cities and towns have adopted this
system，which is the only successful legitimate one． We have suits apainst the National，Jewell，and other
Companies who infringe our patents． HYATT PURE WATER COMPANY，

## WIRE ROPE



Tエエ
Y̌ifutific gmbrican
The Most Popalar Scientific Paper in the World． Onls 88.00 a Yenr，including Postage．Weekly．

This widely circulnted and splendidly Illustrated
paper is pub ist．ed weekly．Every number contains six． aper is pub ist．ed weekly．Every number contains six－ teen pages of useful information and a large number of
original engravings of new inventions and discoveries， representin？Engineering Works，Steam Machinery． New Inventions．Novelties in Mechanics，Manuf：＂ctures， Chemistry，Electricity，Te egraphy，Pbotography，Archi－
te iture，Agriculture．Horticulture，Nutural IIsiory，etc． Complete List of Patents each week．
Terme of Subscription．－One copy of the Scien－ IFIC AuERICAN will be sent for one year－52 numbers－ ostage prepaid，to any subscriber in the United States or Canada，on receipt of thice dollarn by the
ishers；six months，$\$ 1.50$ ；three months． 81.00 ． Clubs．－ special rates for several names，and to Post Masters．Write for part：culars．
The safest way to remit is by Postal Order．पraft，or
Express Money Order．Monny carefully placed inside onvelopes，securely sealed，and correctly uddressed of envelopes，securely sealed，and correctly addressed，
seldom goes astray，but is at the sender＇s riski．$\Lambda d$－ dress all letters and make all orders，drafts，etc．，pay－
able to

MIUNTN \＆CO．
361 Broadway，New York． TEI
Scientific American Supplement． This is a separate and distinct publication from In size，every number containing sixteen large pages full
of engravings，many of which are taken from foreign ongravigs，many of with are taked rom forions THE SCINNTIFIC AMERICAN SUPPLKM KNT Is published weesly，and includes a very wide range of contents．I
presents the most recent napers by eminent writers in all the prinipal departments of science and the Useful Arts，embracing Biology，Geclogy，Mineralony Natural History Geokraphy，Archæology，Astronomy，
Chemistry，Electricity，Light．Heat，Mechanical Engi neering．Steam and Railway Engineering，Mining Ship Building，Marine Engineering，Photogrriphy，
Technology，Manufacturing Industries，Sanitary En Technology，Manufacturing Industries，Sanitary En
gineering，Agriculture，Horticulture，Domestic Econo gineering，Agriculture，Horticulture，Domestic Econo－
my，Biography，Medicine，etc．A vast amonnt of fresh
and valuable information obtainable in no other pub－ lication．
The most important Engineering Works，Mechanisms and Manufactures at home and abrosd are illustrate and described in the Suppiement
Canada． 85.00 a year，or one copy of United States and ERICAN and one copy of the SUPPLEMLCNT，both mailed for one year for 87.00 ．Single copies 10 cents．Addres
and remit by postal order，express money and remit by pustal order，express money order，or check Pablishers ScIENTIFIC AMEIICAN

## Builders Edition．

The SCIENTIFIC AMERICAN ARCHITRCTB＇AND Bullders＇Edition is issued monthly． 82.50 a year Single copies， 25 cents．Forty large quarto pages，equal
to about two hundred ordinarv book pares；forming a large and splendid Magazine of A rchitectire，rich 15 adorned with elegant plates in colors，and with other fine engravings；illustrating the most interesting ex amples of mudern Architectural Construction an A special feat
A special feature is the presentation in each numbe
of a variety of the latest and Dest plans for private resi－ dences，city ard country，including those of very mod
erate cost as well as the more expensive erate cost as well as the more expensive．Drawings in
perspective and in color are given，together with full Plans，Spec fications，Sheets of Details，Estimates，ete The elegance and cheapness of this mapniffcent work have won for it the Lare ent Circniaition of any
Architectural publication in the worla．Sold by al MUNN \＆CO．，Publishers，

361 Broadwar，New York．

## PRINTINE INKES

$T$ IR＂scientife American＂，in printed with CHAs

