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$\underset{\text { Vol. XXXXII.-No. 24.] }}{\substack{\text { [NEW SERIES.] }}}$
NEW YORK, JUNE 12, 1875.
[ ${ }^{83,20}$ perarar Annum,
IMPROVED COMPOUND STEAM BOILER.
better than permit him to speak for himself, only adding In spite of the economy in fuel and in the space occupied that the press appears to us to be well designed and likely by multitubular boilers, the crowding the interior with tubes, to perform its work very satisfactorily. "Much," he writes, and so diminishing the steam space, is by many engineers "has been said with reference to the breaking of tyres, and ooked upon as a serious disadvantage; and a method of the different modes of fastening them to the wheels As haif combining ample steam room and large heating surface has long been a desideratum, especially in cases where the boiler is liable to be suddenly called upon for a large supply of steam. In such cases, the multitubular boiler (which must, of necessity, carry a high; water level) is very likely to commence riming. and damage to the enpriming; and damage to the en Mr. R. Wolff (of Buckau, MagMr. R. Wolff (of Buckau, Mag-
deburg, Germany) has succeeded in constructing a triple boiler, in which the two side boilers are multitubular; while the central one is plain, affording ample space for steam and water. Moreover, the tubes of the two outer boiler can be removed to allow them to be easily cleaned out. All three boilers are connected, by vertical tubes, with a feed water heater placed laterally below them; and communication between the three is maintained by compensating tubes, so arranged that live steam is taken from the central boiler only. The hot gaees pass from the front to the rear of the boilers, then forward through the tubes, and back the outside of the boilers, and thly downward, around and lastly downward, around the feed water heater, and to the
chimney, thus utilizing a large proportion of the heat, there being no conduction by walls of flues, etc.
The inventor states that ex periments have substantiated his claims as to the efficacy of this heat generator, which deserves attention for its novelty and simplicity.


## WOLFF'S TRIPLE STEAM BOILER

no cure is so policy to has a special committee of merchants and publishers, who adopt a system for putting on the tyres, the safety of which have placed themselves in communication with all the large is to depend on the strength of the tyre more than on any cities with reference to the objectionable law on the postage particular fastening. At present the plan most generally of small parcels and publications. It is intended to introduce adopted is that of shrinking them on, but this seems rather a bill into the next Congress for its immediate repeal

DRIVING ON TYRES BY HYDRAULIC PRESSURE.
A correspondent of the Engineer has designed the hydraulic yre press which we herewith illustrate. We cannot do


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## TWO VIEWS OF THE VOYAGE OF LIFE

Taking the law of continuity as the basis of their argu． ment，the authors of＂The Unseen Universe，or Physical Speculations on a Future State＂－the latest and one of the ablest of the many aitempts to reconcile religion with Science －have endeavored to prove that the scientific view of the composition and government of the Universe is in the closest harmony with the view presented in the Christian records that Science，legitimately developed，instead of appearing an－ tagonistic to the claims of Christianity，is in reality its most efficient supporter；and that the burden of showing how the early Christians got hold of a constitution of the unseen Uni－ verse，similar to that which Science proclaims， to the shoulders of the opposers of Christianity
It is a bold attempt to carry the war intu Africa，and one well deserving the attention it is commanding．It lying without our province，however，either to oppose or to defend the claims of the Christian records，we can observe only that the authors of this clever essay，like their predecessors in the same field，are chiefly successful in reconciling a fanciful scientific conception of the Universe with an equally fanciful interpretation of the written records；and consequently，while it is exc
A characteristic illustration of the authors＇inability to ap－ preciate the position of scientific thinkers is afforded by their comparisons of the two sorts of in restigators－those who study the How of the Universe and those who study the Why：in other words，the men of Science and the men of religious speculation－to two sets of passengers on a great ship plying between two well known ports．The one set，they say，keep on deck and try to make out，as well as they can，the mind of the steersman regarding the future of their voyage after they have reached that port to which they know they are al fast hastening，while the other set keep down below and ex amine the engines．Occasionally there is much wrangling a the top of the ladder where the two sets meet，some of those who have examined the engines and the ship asserting that the passengers will all be inevitab $y$ wrecked at the next port， it being morally impossible that the good ship can carry them further．To whom those on deck reply that they have perfect confidence in the steersman，who has informed some of those nearest him that the passengers will not be wrecked，but will be carried safely past the port．And so
the altercation goes on ：some who have been on deck being unwilling or unable to examine the engines，and some wh The work professes to regard the problems of below．
The work professes to regard the problems of the unseen
Universe from the stand point of Science，but the writers have Universe from the stand point of Science，but the writers hav been quite unable to divest themselves of their theological prepossessions：from first to last，as in the foregoing com parison，the theological bias is paramount．Science does not and cannot look upon the voyage of life，or the voyagers，in any such manner．Mankind are not all passengers in the same ship，though they may be regarded as sailors on the same sea．Each has a vessel to himself－the fragile craft he finds himself in possession of when his day of self－conscious ness comes－and must guide it with such knowledge as he may gain by his own observation and the advice of those who have been longer afloat．
The sea is stormy，the winds conflicting，the currents baffling．Out of the mists on every hand，new crafts ere con stantly appearing；and on every side，at every stage of wind and weather，multitudes are disappearing：now in the calm noonday，now buffeted by midnight storms，now wrapped in fog and mist，they go down like so many Schillers，and the survivors drift on，knowing that the same fate will sometime vertake them also
But what is that fate？Why was their voyage cut short， nd what was the purpose and the purport of it？
These are the questions of the disciples of the Why：and their answers are confident．＂The Great Pilot knows，and he has told the pilot of our fleet that those who sail with us are not wrecked but translated to another sea，where，with a better craft，they shall sail eternally in fair weather．It they have swerved from the right track，then their wreck is dire indeed ：on

How shall we know the right way？＂the anxious voyager asks．
＂Sail with us，＂is the reply．＂Long ago，the Great Pilot gave the captains of our fleet a chart of this sea and one of
the seas to come．He still guides the winds and the waves the seas to come．He still guides the winds and the wave for our good．If we follow his chart（or the leaders who re
main in communication with him），we shall surely suffer no wreck，but shall be transferred to the halcyon sea，for the avigation of which we are now in training．＂
But the disciples of the How remain aloof．
＇Whither are you going？＂our voyager asks．
We do not know．
Do you not sail for the halcyon sea，or fear the sea of darkness and great storm？＂

We have no knowledge of them，＂is their reply．
＂But the charts which the Great Pilot gave：have you not een them？＂

We have seen many that claimed that title，＂is their reply：＂we have studied them with care．We find little in－ formation of the sea we now are sailing，and in what they give they conflict with each other and with what we know to be true by our orn observation．And they differ still
more with regard to the seas unseen．Wherefore should we trust them？
＂Worse：the seamanship of the followers of these charts is deplorably bad．They come to untimely disaster：and some times sanguinary battles occur between these fleets whic claim the special guidance of the Great Pilot，each striving to compel those they deem perversely sailing to tack about and go with them．We cannot trust them．＂
＂What seek ye then？＂
＂These things，＂the disciples of the How reply：＂to learn the sea that surrounds us－the ways of the winds and the currents，the places of the quicksands and the reefs：to learn
the nature of our fragile crafts that we may make them the nature of our fragile crafts that we may make them staunch and keep them from all avoidable risks；to perfect our seamanship as best we may，that our voyage may be long and helpful to our fellow voyagers：all these for our own good，and for the good of those who shall sail this sea when we are gone．＂

And what of the seas unseen？＂
＂We know them not：we have no means of knowing them ：no time to waste in speculations regarding their pos－ sible existence and character．If such there be，and we go to them when our voyage is ended here，of this we confident good seamanship here is not likely to be bad seamanship there：the study of the Now will not unfit us for the enjoy ment of the Then．
＂But have you no care for the Why of all these things？＂
＂Indirectly we have；but the faculties we possess give us no clue thereto except through the How．When we have mastered the laws of this perplexing sea of phenomena，when we have learned the nature of this environment of ours，what it is and how it came to be，we may be prepared to consider Why it is．Until then we must wait；for there is no one to tell us for the asking．＇
Such are the real relations of the two orders of men－the men of Science and the men of religion－to each other and to the Universe．And theology will have to change its plane of thought and ways of thinking more than the authors of＂Th Unseen Universe＂have been able to do，before they can establish for themselves even a theoretical oneness with the purposes and conclusions of Science．

## THE SECRET OF SPRING WEATHER．

Our late erratic spring has provoked the usual amount of comment and discussion，yet we have failed to notice any attempt co trace the causes of the persistent chilliness of the air in the face of the sun＇s manifest power，or to ac－ count for the sudden summer heat of May．
Not that there has been anything extraordinary in the con
ditions of the weather this year．Spring in our climate is
always an uncertain blending of winter and summer，each retaining much of its native peculiarity；so that it is no un common thing for a morning mild as June to be followed by a snowstorm in the afternoon，or for an icy wind，piercing as an arctic blast，to sweep the open country，while in shel tered places the sun burns with midsummer intensity．Such contrasts are tiresomely common，yet they never cease to strike us as something abnormal．In spite of our yearly ex－ perience to the contrary，we persist in thinking that winter＇s severity ought to let up gradually；that the transition from winter to summer ought to be as gentle and uniform as the change from summer to winter．Why it is not and cannot be aay be worth a moment＇s thought．
It is well known that one of the chief factors of climate is the sun＇s altitude．The more nearly vertical its rays，the greater its power．The sun＇s position，however，is not the only factor．If it were，February would be as mild as Octo ber，April as hot as August．When under favorable condi－ ions we experience the sweltering heat of the sun＇s untem pered rays in spring time，we are apt to say that it must be rhrough contrast with the winter＇s cold that we feel the heat so keenly．But we deceive ourselves．During the months when winter lingers in the lap of spring，the days are as long， the altitude of the sun is as great，and the heating power of his rays is as intense as in midsummer．Their failure to mitigate more rapidly the severity of the season is due to the simple fact that they have other work to do．
To change a pound of ice at $32^{\circ}$ to water of the same tem－ perature requires the expenditure of 143 units of heat，each capable of raising，when converted into mechanical motion， a pound weight 772 feet high．In melting a pound of ice， therefore，more than fifty－five foot tuns of solar energy is exhausted．Think what an incalculable amount of solar radiation is required to melt the millions of tuns of ice and now every spring between this and Greenland！
During the fall months，immense amounts of water are converted into ice in the northern hemisphere，setting free an enormous amount of heat to reinforce the rays of the de clining sun，giving us an Indian summer at a season when the weather would be coldest did the temperature depend upon the sun alone．
This year winter lingered nnusually late，and summer came with a burst．The ice in the lakes and rivers was un commonly thick，and the ground was covered deep with snow． To convert this snow and ice into water taxed the sun＇s pow er，so that it was not until after it had reached the northern tropic and was southward bound again that it began to gain on the wintry weather．It will be remembered also that the greater part of the snow was not merely melted，but evapo rated．It disappeared while we were anticipating disastrous floods－not through the rivers，but into the air．
Had the snow gone off in the form of water，each pound of would have exhausted 55 foot tuns of solar energy．To convert it into vapor required aboutseven times as much，o $372 \frac{1}{2}$ foot tuns，that being the mechanical equivalent of one pound of water vapor．In view of the vast amount of snow and ice evaporated this spring，it is not surprising that the approach of warm weather was so dilatory．It was the price we had to pay for exemption from floods and freshets．
Having cleared the ground of snow and snow water，the sun was free to give its full force to the earth，which，in the absence of the usual spring rains，was speedily put in condi tion to convert the sun＇s rays into heat for the warming of the air．Consequently the interval was brief between reports of ice floes in the harbor and sunstrokesin the streets．

## THE RIGHT TO INTERFERE．

The right of every man to dispose of his labor as he sees fit，or to conduct his business affairs according to his own ideas，so long as the rights of the community in general are not trespassed upon，is so well founded in common sense and justice that it seems hardly to require a judicial de cision to add to its truth．Still the principle is one which，as the recent labor strikes in the coal regions and in various trades throughout the country fully evidence，the trade anions persistently ignore，and probably will continue so to do until the law becomes stringent enough，and is administered with sufficient vigor，steadily to crush out any proceedings savoring，however slightly，of conspiracy or undue coercion． We do not believe that any right－minded laboring man will indorse the lawless actions of the＂Molly Maguires＂of the mining districts，or of any of the misguided people who re sort to violence to obtain their ends；nor should the course of such bands be taken as exemplifying the usual mode of trade union coercion．When men commit deeds，no matter under what guise or for what object，which put them under the ban of the law，they become equally criminal with the thief or the assassin，and their punishment is identical．We think，or at least we want to think，that ruffianism is fast reaching a low ebb in our trade societies，and that misguided actions are done more through error of judgment than with criminal intent．Certainly we adhere to the belief that good intentions on the part of the men predominate over bad； but on the other hand it is not to be lost sight of that the very best of motives may underlie practice which in itself is highly prejudicial to the rights of other people．And here we reach the boundary，on one side of which lie those appeals to a man＇s cupidity，or sense，or honor，or any other senti ment he may possess，which are perfectly justifiable from his friends or from others interested with him in a common pur suit if made in one way，and on the other those same appeals made in another manner，which，from its very nature，includes an apparent conspiracy against a third person．Thus，there is certainly no harm in A endeavoring to show to $B$ that $B$ and that he could improve both the affairs of himself and
also of his brothers in trade by seeking labor elsewhere But if A and his friends should post themselves in front of C's door, and tell B, D, and E, and every other employee of C's whom they met, that C would not accede to prices fixed by A and company, and that the shop was black-listed, and then should endeavor to make $B$ and his comrades leave their work, not directly for B 's benefit, but first to injure C , and thus coerce him into benefitihg A: such is clearly wrong since it is an invasion of the rights of C
A recent case decided in England exemplifies this point very clearly, and at the same time adds another to the precedents which stand to mark how far trade unions can law fully interfere with trade. Messirs. Jackson \& Graham, large upholstering firm in London, altered their system of paying per hour to that of piece work throughout their entire establishment. The operatives at once, with a few exceptions,struck, whereupon the firm promptly supplied their places with non-society men, and continued business. The strikers then through their association, stationed pickets in the vicinity of the shops, waylaid the workmen going and coming, and "for the space of three months persistently labored, though with little success, to iaduce the new hands to join them. No physical intimidation was employed, and nothing but verbal persuasion used to discourage the men from their labor. Finally the proprietors caused five of the ringleaders of the pickets to be arrested on the criminal charge of conspiracy. The trial involved the services of very eminent counsel, and lasted two days. Baron Cleasby, the presiding judge, in his charge laid down the law clearly and emphatically, that it was an offense to offer any molestation or obstruction to a working man, to coerce him to quit his employment, or to a master, to alter his mode of carrying on his own business. Picketing, he said, might not be unlawful under certain circumstances; but it is when carried on in sueh a manner, and to such a degree, that it might be expected to influence other persons to the extent of annoyance apprehension, or loss. The case went to the jury on a mere
question of fact; the defendants were found guilty, and question of fact; the defendants were found guilty, and sentenced to brief imprisonment.

## THE IRON HORSE.

On page 340 of our current volume, we published a lette from Mr. Flower, President of the West End Railroad Com pany, of Philadelphia, Pa., in which he offers a premium of $\$ 5,000$ to the inventor of a substitute for horses, to draw street cars, on condition that he gives the company the control of the invention. It appears to us that, considering the difficultie of the problem and the immense value of a successful solu tion thereof to those having the control of it, the compensa ion is rather trifing. This practical problem has been occu ping many minds for several years, and many others are working at it now; but the difficulties are scarcely realized unless we consider the great advantages possessed by the living horse, in case only the power of one, two, or thre horses is required. When we need the power of ten,twenty, or more horses, no doubt the locomotive is preferable; but we doubt if locomotives of one or two horse power will eve be found to give satisfaction even when well constructed, a they can never compete with a living horse, the trouble o raising which is less than the labor of building a locomotiv in a shop. And the horse takes its own water and fuel when needed, and needs no stoker; it also continually repairs it self, until it is entirely worn out. Even then, at its dissolu tion, there is no danger of bursting a boiler. It is alway ready, and needs no firing up; and finally, having a sense of self-preservation, it will not blindly go ahead, and run in the river off an open drawbridge, as locomotives have often done. If it is objected that occasionally the control of horses has been lost by the driver, and that they ran off, it must be re membered that runa way locomotives are by no means uncom mon. Taking all things into consideration, we believe tha the ordinary horse is a good institution, which it will b very hard to surpass by labor in a machine shop.

## GRASSHOPPER INVENTIONS WANTED.

The grasshoppers have appeared in the Western States in such countless throngs that the terrible devastation worked by them among the crops of last year bids fair to be repeated In the neighborhood of St. Joseph, Mo., it is said the gar dens are literally black with the insects, and that the land extending from that city southwest, across the Territories to the Rocky Mountains, is covered for miles in breadth. The size of the locust is from that of a flea to that of a house fly but, in spite of its lack of growth, its iaroads on vegetation are none the less severe. The Colorado journals think that the crops, not merely of that State, but of five or six States to the eastward, will be entirely ruined. This is certainly a very gloomy prospect, and the wholesale destruction of the wheat will make itself felt over the entire country.
It is getting high time that the extermination of this nuisance should engage more widely the attention of inventors. A machine, for example, which can be dragged over the fields before the crops are put in, and which will destroy the eggs deposited in the ground, is needed; or a device might be produced for killing the grown insects without injury to the crops. The Greeley Tribune, located in the midst of the ravaged district, says: "We want the same acutenesss, the same nice observation applied to the grasshopper question, that is applied to abbreviating labor by mechanical contrivances and in constructing works of beauty and skill. Enough ingenaity is displayed in the sewing machine to catch every , grasshopper in our valley and skin him into the bargain." There have been already several attempts made to invent the grasshopper out of existence.
simply a grate on runners. Theinventor says that "pitch pine is used for fuel, and our Colorado zephyrs fan it into a miniature hell." The fire is made on the grate, and a shee iron cover directs the blaze downward. This machine is
dragged by a team around in circles of large diameter, burning the hoppers which get under it and driving others before it, " corraling" them, in fact, in the scorched circumference. It keeps on its circuitous route in gradually decreasing circles until every insect within an extended radius is burned.
Ditching entirely around the fields,and filling the cut with water, is said to keep the grasshoppers out. This is probably of little use, however, after the insects are able to fly. Another plan is to keep the entire land wet (a rather difficult operation, we should imagine), it being found that the hopper prefers dry localities to damp ones. A farmer who has adopted this mode of protecting his fields combines it with the ditch system, keeping the ditches filled with running water, which is made rough by passing over a number small dams. He cuts the ditch first around the plot, and then wets the enclosed area. The grasshoppers try to crawl off, and then tumble into the ditches where they are quickly drowned and washed away. If he finds an army marching in from a new quarter, he directs a stream of water on the threatened point and thus heads off the column. Another individual has saved a ten acre patch by putting a little kerosene oil just above the head gate which admits water to the enclosing ditch. The oil floats on the surface and is held in place by a board, the edge of which touches the water. Under this board it gradually leaks out, forming a film over the entire ditch, rendering the latter a river of death to the insects. We notice also another fire invention somewhat similar to that already described. It has wings on which fires are kindled, and a fan which blows the insects into the flame.

It seems to us that a good road engine, rigged with an ex tra boiler to make steam which could be directed in jets downward-something after the fashion of the numerous snow-melting inventions-might be usefully employed. It conld go over the ground quickly, and one machine would serve to protect a large area. Or there is that apparatus we
described a short time ago, which makes a fearful heat underneath it by a current of superheated steam entering ignited naphtha gas. This melts thick ice by merely passing over it at the rate of some four miles per hour. Judging from this effect, the machine would readily destroy grass hoppers.
The Governor of Missouri has appointed a day of prayer for relief from the scourge. If these supplications are as ear nestly supplemented by products of our inventors, we have not the slightest doubt but that they will be answered Meanwhile, we commend to the people of Missouri the old maxim : "Help yourself and God will help you;" in other words, invent first and pray afterwards.

## climate of the ice age.

The science of meteorology has, of late years, been growing more and more in popular favor. The revelations of the United States Signal Service, and the valuable practical deductions that have been made from them, have created an interest in the subject which will not soon die. And while the climatology of our own day has commanded the careful study of our best scientists, that of earlier times in the earth's history has received equal, if not more profound, consideration. The stady of the plants and animals which previously xisted on the globe-including the vexed questions relating the development of organic forms-has largely to do with he climate and state of the atmosphere that prevailed in hose earlier periods.
It has long been supposed, and taught by text book and eacher, that during the carboniferous age, when the sun's etc., the atmosphp gas; but recent investigations have rendered this extremely improbable, and some late experiments have demonstrated that plants are killed by a greater amount of this poison gas than is ordinarily found in the air. But doubtless the great est intellectual capital has been invested in a consideration
of the meteorological conditions of the glacial period; and the conclusions which have been reached on the subject are as widely apart as the antipodes. While all agree that the northern part of our continent, down to $40^{\circ}$ of north latitude, was almost completely covered with a sheet of ice from one to three miles thick, during this period, some make it a season of intense cold, and others claim that it must have been a time of moderately high temperature. Many theories have brought the alternations of heat and cold to our earth during the past ages. One of these is the supposition that the sola system, in its translation through space, may have passed alternately through regions of estreme cold and great heat. Another is that the earth may have changed the position o between the equator and the poles. Still another is the wild supposition that the earth's crust has gradually slipped on its nucleus, so as to bring the equatorial belt nearer to th pole than usual, and then away from it again. Lyell has at ributed these changer to a supposed change of place between the land and the sea. He argues that, if the land were accumulated most in the tropics, the vast amount of solar
heat which it would "soak up" would be carried by currents o the polar regions, and afford nearly or quite a summe climate to any islands that might be situated there. And if
the land were accumulated about the poles, it would result the land were accumulated about the poles, it would result which is exposed, in this case, to the direct rays of the sun has far less heating power than the land. Professor Shat
has advanced the idea that these changes may be explained on the supposition that our sun, like many other suns in the universe, is a variable star, and makes our earth warm or cold according as its brightness varies. Whether any one of these is the real cause of past cosmical climatic changes, we cannot say; but we can reasonably conceive that the first and the last two may each be considered a true cause.
Among those who believe the ice age to be one of extreme cold, stands prominently Mr. James Croll. His theory for explaining the cause of this cold is based upon the eccentricity of the earth's orbit, the precession of the equinoxes, and the obliquity of the ecliptic. The orbit of the earth is an ellipse, varying in eccentricity as the planets are variously situated in their orbiss, being most elliptical when the plan. ets draw it farthest from the sun. Its rate of variation is very variable. If a plane pass through the sun's center, parallel to the plane of the earth's equator, it will cut the earth's orbit in two opposite points, namely, at the vernal and autumnal equinoxes. The line between these points does not divide the earth's orbit into equal parts, on account of its eccentricity. The earth passes through the perihelion part of its orbit in seven or eight days' less time than through its aphelion part. Hence, now our winter is shorter than our summer, and vice versat in the southern hemisphere. The action of sun and moon on the protuberant equatorial mass of the earth is constantly changing the plane of the earth's orbit, and hence, also, the position of the line joining its equinoctial points. These make a complete revolution in about 21,000 years. Now, when the earth had its winter in the northern hemisphere, while it was in aphelion, its winter was longer than the summer, hence extremely cold. In this case, the ice and snow of winter will not be entirely melted during the summer, because much of the sun's heat is taken up in melting ice, and therefore does not ameliorate the temperature. The result is that, during this long period, ice and snow are accumulating in the northern regions. The vapor from melting ice would obscure the sun with cloudy atmosphere in the summer, and thus make the air raw and cold. It is said by antarctic explorers that the summer there is even colder than summer in northern regions of the same latitude, though the latter are millions of miles farther from the sun.
Another consideration, Mr. Croll thinks, would make great difference with the cold at the north pole, when its winter occurred in aphelion. Ail permanent oceanic currents originate in the Antarctic Ocean. The chief one divides into two parts: one goes north to the East Indies; the other goes west
through the Indian ocean, is deflected round the Cape of Good Hope, follows up the west coast of Africa for some distance, then crosses the Atlantic and forms two currents: the Brazilian, going south, and the Gulf Stream, going north. Now the sun causes the air at or near the equator to give place to cold currents from the poles, which rush in to produce equilibrium. During the long cold of the northern hemisphere, the north currents would be stronger than those from the south, where the climate is, at the time, warmer. He thinks this stronger current from the north might be able, by its friction on the water, to entirely stop the Gulf Stream, and leave the northern hemisphere to unmitigated cold. Croll's theory supposes that the time of the ice sheet in the northern and southern hemispheres was not synchronous, but distant by at least 10,000 years. He supposes that glacial time began some 240,000 years ago, and terminated about 160,000 years ago, that the most intense cold was about thirty or forty thousand years after the period commenced, and that there were several great changes of climate during its continaance.
Mr. Murphy claims that, if the climate at any given elevation is cold enough to form glaciers, no decrease of winter
temperature will increase their magnitude, while, on the ther hand a low summer temperature is shown, by the facts of physical geography, to be eminently favorable to glaciation. He therefore concludes that the glacial age occurred when the earth's greatest distance from the sun was in summer rather than in winter
Another theory, still more at variance with Mr. Croll's, is that held by Mr. Thomas Belt and many others. Savants of his school believe glaciation was not due to extreme cold, but to excessive precipitation. They hold that the ice was thickest over the American continent, because the great evaporating area of the Pacific lay to the southwest of it, and counter trade winds swept across it, and precipitated the moisture with which it was laden. While Mr. Croll makes the ice six miles at least in thickness at Greenland, it was probably thicker south of the poles than near the poles, be cause the water from warmer regions would be precipitated before reaching the poles. The glacial age probably existed n both continents at the same time, as traces of glaciation north and south of the equator nearly inosculate, and the character and appearance of the morains is the same in both. This supposition only could make correct Mr. Darwin's ex planation of the fact that forty flowering plants of North America and Europe are also found at Terra del Fuego. He says that plants were driven to the equator during the ice age, and then foll

## equator.

Agassiz considered the glacial period a cold time followed y a much warmer one. He thinks it not long and slow else boulders would have been carried as far south as the ice heet extended, but sudden and short, as is proven by Siberian elephants caught in the snow and frozen so that their flesh is preserved for recent dogs and wolves to

To harden a wooden pulley, boil it for about eight minute

## ZIMMERMAN'S HYDRO-ELECTRIC LAMP AND EXTINGOISHER.

We illustrate in the annexed engraving, Fig. 1, a curious1y ingenious lamp, which has been recently invented by Professor Wm. H. Zimmerman, Vice President of Washington College, Cbestertown, Md. The lamp is self-lighting, and this, although any form of burner, or wick, or any kind of illuminating fluid be used. To effect this, the inventor has arranged a combination of Professor Döbereiner's well known hydrogen lamp with a small galvanic battery, in a neat and even graceful design, so that the whole apparatus takes up no more room than the ordinary German student's lamp, which in fact, in exterior aspect, it somewhat resembles.
The Döbereiner lamp serves as the pedestal. A is the receptacle for the acid and water, and within is seen the inverted bell glass, in which the zinc is suspended. When the acidulated water attacks the zinc, hydrogen gas is evolved, which fills the interior bell glass, and forces out the water, until the latter, falling below the zinc, no longer acts upon it , and the evolution is arrested until, the gas being allowed to escape, the water again reaches its former level. This is the regular action of the hydrogen lamp, with which every stuaent of chemistry is familiar, and regarding which nothing further need here be said. In the present instance the gas further need here be said. In the present instance the gas
ascends the vertical tube, B, passes through the valve at C, when the same is opened, traverses a flexible tube, and finally escapes from a side orifice in the small vertical pipe, $D$, placed just beside the burner. Before leaving the hydrogen generator, it may be noted that the vertical tube is free to revolve in the metal cap which covers the glass pedestal, and may be secured, as desired, by the thumbscrew providel, also that said cap has a filling cup through which a fresh supply of acid and water may be poured into the pedestal. E is a small galvanic battery (bichromate of potash or otherwise), the zinc in which is attached to a vertical rod, a spiral spring on which keeps it raised, thus holding the metal out of the exciting fluid, and normally keeping the battery out of action. To the upper end of said rod is pivoted an ar-row-shaped lever, F, which connects with the valve, $C$, in the hydrogen pipe, so that, when horizontal, or rather when its rod-supporting end is held up by the spiral spring above referred to, the valve, $C$, is shut. The conducting wires from the battery lead to binding screws on the chimney frame, and thence connect with two electrodes which stand vertically beside the hydrogen outlet, D. Between these electrodes is extended a fragment of fine platinum wire.
The automatic illumination of the lamp will now be readily understood. The operator simply pushes down the knob on the end of the battery rod. By so doing, he lowers the zincs, establishing a current which heats the platinum wire,

between the electrodes, red hot. As the rod descends the lever, $F$, tilts, and so opens the valve, C. A stream of hydrogen then escapes at $D$, strikes just above the incandescent wire, becomes inflam
The inventor states that he has had the device in operation since last November, and that during this period he has re newed the solutions but once. The ignition, he states, is now instantaneous on touching the lever.
In connection with the apparatus described and applied to lamps of other patterns, in Figs. 2 and 3 we represent a nove device by the same inventor for extinguishing the light, the object being to avoid the danger resulting from the common habit of blowing down the chimney. A hollow rubber bulb $G$, is connected by flexible piping to a metal tube, H , which passes up inside the burner, as shown in section in Fig. 4. Around the upper extremity of said tube are a number of small apertures, through which, when the bulb, $G$, is compressed, a number of radial jets of air are directed upon the burner, blowing the flame away from the wick and quick ly causing its extinction. The lamps are provided with aper-
tures for filling without necessitating the removal of the tures for filling without necessitating the removal of the
wick and chimney. As represented in Fig. 2, the device will prove particularly useful in lamps hung high and out of reach, as the flexible conducting tube may be of any length to render the bulb convenient to the hand.
These inventions were patented through the Scientific American Patent Agency, respectively March 9 and 16, 1875. For further particulars address the inventor as above.

## THE DISEASES OF THE SILK WORM.

M. Pasteur, the distinguished French chemist, has recently published an exhaustive treatise on the above subject, the same being the results of his investigations conducted in the Fig. 1

heart of the French silk-manufacturing district and unde the auspices of the French Government. The enormous mor tality which, during certain years, has happened among the silkworms, M. Pasteur ascribes to two diseases, each perfectly distinct. The first he terms pébrine, and it is character ized by the presence, in all the organs of the worm or butFig. 2.

terfly, of small ovoid corpuscles, invisible except when mag nified four or five hundred times, and then appearing under the microscope as represented in Fig. 1. The other disease, the microscope as represented in Fig. 1. The other disease,
called flachérie, is an enfeeblement of the vital force of the

Fig. 3.

worm, and is recognized by the presence of a particular ferment in the digestive tube or stomach. The malady first mentioned attacks the worm at all ages, and is eminently he-
reditary and contagious. Its progress is very slow. The
worm, born healthy but subsequently contracting the germ, generally has time to make its cocoon before falling a vic tim. The disease is, however, transmitted to the offspring which perish prematurely. The way to avoid the trouble is to raise only such worms as come from eggs deposited by healthy butterflies. The cultivator, although by no means sure that the worms will not becom 3 diseased during their lives, is, however, secure in ultimately having cocoons which will remunerate his labor.
Fiachérie is a disease more alarming than pébrine, because it attacks at the end of the fourth age, after the rearing is accomplished, and the cultivator expects soon to realize the fruits of his outlay of time and money. Within a few days every worm dies, leaving at the foot of the shrubs, which it had been hoped would be covered with cocoons, nothing but a mass of infected bodies. The effect of the disease is shown in Fig. 2. The malady is either accidental or hereditary, and may be caused by careless sanitary measures, in the conservation of the eggs, during the rearing, or more fre quently by feeding on a leaf of bad quality. The heredita ry transmission is only to be guarded against by careful selection of the butterflies which are to furnish the eggs for the crop of the following year; and those attainted, after a little experience can easily be recognized by their lack of vigor and the slowness of their movements.
M. Pasteur gives the following instruction for obtaining eggs which are almost sure to yield a remunerative harvest In selecting the cocoons, preference should be given to those from a healthy stock, which are appear to be the finest. Afte the butterfies emerge, those which seen at all diseased should be carefully eliminated, and the others coupled and deposited on little squares of linen or calico suspended so that the insects cannot crawl from one to the other. As soon as the fecundation is terminated, the male is imprisoned by closing with a pin either one corner of the cloth or a little tuck previously made at the lower edge. (See Fig. 3.) After the deposition of the eggs, the female should be shut up in like manner, and the whole should be kept in a dry, wel ventilated place, submitted to all the variations of the exterior temperature. Nothing remains further than to examine the butterflies for corpuscles, a proceeding to which the en tire winter may be devoted, as it can be done just as well when the butterflies are dried. The examination is accom plished by grinding one or both of the insects on a cloth, in a mortar, with the quantity of water necessary to obtain a thick paste. A minute drop of this is placed beneath the microscope and examined rigidly. If any corpuscles characteristic of pébrine are recognized, the whole batch of eggs on that cloth are at once destroyed, and so on through all, keeping only such eggs as are entirely free from infection.

## CURIOUS EXPERIMENT IN INSTANTANEOUS CRYSTALLIZATION

It is well known that various salts dissolve in water in dif ferent proportions, and that the solution usually takes place more readily when the water is warm. After cooling, crys tallization of the fluid takes place, but this may be prevented by leaving the solution in absolute quiet and protecting it

from contact with the air. It is then said to be supersatura ted, and the least shock, or the addition of a minute crysta of the salt, is sufficient to cause instantaneous crystallization of the whole. A curious experiment, based on the above, has recently been devised by M. Peligot: 150 parts, by weight, of hyposulphite of soda are dissolved in 15 parts of water, and the solution is turned into a large test tube, pre viously warmed, so as to half fill the same. Another solu tion of 100 parts, by weight, of acetate of soda in 15 parts of boiling water is made, and this is carefully poured in on top of the first solution, so as to float on and not mingle with the latter. To theabove two solutions is then added a little boiling water, and the whole is left in quiet to cool.
After the cooling is accomplished, a little crystal of hypo sulphite of soda may be let down into the liquid. The frag. ment will traverse the acetate solution without effect there on; but on its reaching the solution below, instant crystalli; zation of the same will take place, as shown in the figure on the left of the illustration. As soon as the reaction in the hyposulphite is finished, a crystal of acetate of soda may be caused to produce a similar result in the acetate solution

## The invento IMPROVED SAW GUMMER.

 the device illustrated in the annexed en using various kinds of saw gummers, as the result of such experience, he has produceu the present machine, whish he believes to be the best yet invented. It is a very strong apparatus, as will be seen from the heavy semicircular iron apparatus, as will be seen from the heavysframe with which it is provided, the ends of which are cast solid. The cutter is jourof which are cast solid. The cutter is jour-
naled in the carriage, A, which slides on naled in the carriage, A, which slides on
guides, B, and is fed to its work by the guides, B, and is fed to its work by the
hand wheel, C. The cutter is rotated by the crank shown. The thumbscrews, $D$ and $E$, hold the gummer upon the saw.
It is stated that any gullet can be started without filing or without danger of breaking the cutter by slacking the thumbscrew, $E$, on the lower part of the frame, until the circle of the cutter is formed.
The same is done to direct the cutter to ward the center of the saw and to make a large gullet, the feed screw being operated during the turning of the crank. The screw, $D$, then holds the gummer upon the blade, and at the same timeserves as a center about which the instrument works. There are no boxes liable to get out of order, and the bearings can be easily Babbitted. Finally , the inventor claims that the saving in cutters alone will soon cause the device to pay for itself.

For further particulars address Mr. Walter B. Noyes, Three Rivers, P. Q., Canada.

## SPAR TORPEDO WARFARE

Mr. A. Sedgwick Woolley, Associate and Secretary of the Institution of Naval Architects, England, recently read before that society an able resumé of the torpedo system of attacking the enemy's vessels, by, means of boats specially constructad for this submarine warfare, which carry their deadly bombs on the ends of spars, extending usually from the bows of the boat. We give a condensed abstract of the paper illustrated by a series of engravings selected from the pages of Engineering:

Spar torpedo launches are being so generally adopted at present into the service of all foreign nations that a short sketch of the origin and his tory of this form of submarine warfare may be in teresting before discussing the merits and deme rits of the plans now in vogue.

The first idea of an offensive attack by means of a boat, specially constructed to carry a torpedo seems to have originated with Captain David Bushnell, of Connecticut, about the year 1775, but it had little in common with the boats now used for the same purpose. This boat, an account of which was read by the inventor before the Ameri can Philosophical Society, in 1798, was only in tended to accommodate one person, who sat in a watertight chamber capable of containing sufficient air to support him for thirty minutes, and who could cause the vessel to descend and ascend at will, by letting the water into a chamber below will, by letting the water into a chamber below
him, or expelling it therefrom by means of two brass force pumps, at the same time letting fall about 200 lbs. of the lead, by which the vessel was ballasted, at the bottom. An attempt was made with this boat to blow up the English 64-gun ship Eagle, during the campaign of 1776 ; but the operator, from some reason or oiher, was unable to fix in the screw, and had to desist from the attempt.
The next step in the same direction was made by the celebrated Fulton, who proposed a similar diving boat to the French Government about the year 1801, and made several successful experiments in the harbor of Brest, blow ing up a small ressel by means of a torpedo, which he placed under her bot tom. In this boat Fulton seems to have employed a screw, operated by a crank as a means of propulsion The French Government however, would not adopt his invention, and Fulton forthwith withdrew to England, in 1804, where under the assumed name of Francis, he obtained the support of Mr . Pitt. A commission was pointed to examine int pointed to examine int and report upon his inven tion, which they at onc pronounced to be imprac ticable. Fulton then returned to America, where he also gained the ear of the minister, and had a commission appointed ; but he met with great opposition, and was so unfortunate in his experiments that he gave up the attempt to introduce a system of torpedo warfare in order to turn his attention to steam navigation, which he may be said to have
introduced into that country. It may be remarked, however that, during the course of his torpedo experiments, he deve loped the first notion of the torpedo steam launches of to day. This idea, which never got beyond the state of a mo del, consisted of a vessel of 300 tuns, shown in Fig. 1, wit sides 6 feet thick, designed to be cannon-proof, and musket proof decks six inches thick. She was to be propelled by
back safely to Charlestown. The next attempt was also made off Charlestown, with a plunging boat, against the United States steamer Housatonic, which was sunk by the explosion, the torpedo boat, however, going down as well. This boat had already drowned sixteen men during the trials made with her in Charlestown harbor, the last time going down with a crew of nine persons, and not again appearing till she was fished up and put in order; and a fifth crew of six persons, under a Captain Dixon undertook the attack on the Housatonic She was propelled by means of a scre worked by a crank, which required the six men, sitting three and three opposite each other, to turn it.
The confederate ship Albemarle was sunk by a torpedo launch, commanded by Lieute nant Cushing. The launch, however, wa also sunk by the explosion; and out of a rew of fourteen persons, only two saved themselves by swimming. Both sides were employed in preparing special spar torpedo boats when the war terminated. Just be fore the close of it, however, a remarkable attack was made, in the James River, on the merchant vessels which had brought sup pies to Grant's army, by the confederat leet of three ironclad rams and seven gun boats, all armed with torpedoes, fixed on the end of spars, 30 feet or 40 feet long which projected from their bows, and could be raised or lowered by a tackle. This fleet was stopped by a boom, and tro of the ironclads got aground, where they remained all

## NOYES' IMPROVED SAW GUMMER

scull wheel, and was intended to carry two torpedoes on each side, fixed on the end of spars 96 feet long, supported by guys from the masthead.
It was not, however, until, during the civil war of Ameri ca, the Southern States, being overpowered by the force and resources of their adversaries, resorted to a most extensive
 night, under fire from the banks; but although their torpe does were completely riddled with rifle shot, not one was exploded, as it so happened that the fuses were in no case struck. The Southern States had throughout employed per cussion fuses, which were exploded on contact, the shape of their torpedoes being cylindrical with hemispherical ends, into which seven fuses were inserted, as shown in Fig. 2; these fuses (shown in Fig. 3) consisted of a cap of lead, $a$, containing a glass tube, $b$, filled with sulphuric acid, and surrounded with a mix ture of chlorate of potash and white sugar, $c$, com municating with a primer, $d$, of mealed powder; on contact, the lead cap being crushed, the glass bottle was broken, and the sulphuric acid ignited the chlorate of potash and sugar, and fired the torpedo. The danger of a torpedo, furnished with these fuses, being exploded by contact with any floating $\log$ of wood or boom, before reaching the enemy's ship, and the extreme caution required in handling it, led the Federals to adopt a torpedo made as shown in Fig. 4, which could be detached from the spar, and having an air chamber provi ded to keep it nearly vertical when so detached, a tube being placed in its center, at the upper end of which an iron ball was kept in position by a pin; this pin was released by means of a rope leading into the boat, and dropped on to a cone of fulminate.
Captain McEvoy, of the London Ordnance Works, invented the mechanical fuse, A, shown in Fig. 5, provided with the safety cap, B; but be ing afterwards impressed with the advantage arising from the use of electric communication, he [invented, in 1871, the plan shown in Fig. 6. This consists o a metal bushing, $a$ a, having its upper end closed by a thin metal dome, $b$, and a metal plug, $c$, screwed into its lowe end. A metal spindle, $d$, is supported on a spiral spring, $e$ inserted in a recess, $f$ in the plug, $c$ a thin insulated bridge $g$, is attached to the spindle, $d$ under which are two termi nals, $h h$ of insulated wires, $i$, one of these wires is nected with the battery and the other, to which is attached the electric fuse has either an earth or oth er connection with the bat tery. When the torpedo with this closer attached, is projected against a ves sel or other body, and re ceives a shock sufficient to crush in the thin meta dome, $b$, the spindle, $d$, is forced down until the me tal bridge, $g$, is brough into contact with the tw terminals, $h h$, thus com pleting the circuit of the electric fluid, and firing the fuse The wires would of course, only be connec ted to the battery just be fore the action of ram ming. It is, however, evi dent that the thin metal dome might be crushed in through some accident beforehand, and that then,

## SPAR TORPEDO LAUNCH.

## tion of the explosion, and thinking that their boat would pro

 bably be sunk by it, her crew jumped overboard before ram ming. The explosion, though severe, failed to effect any ole in the bottom of the Ironsides; the boat was also unin jured, and was found drifting, half full of water, by her en gineer, who climbed into her, made up his fires, and steamedsoon as the wires were connected, the torpedo would $b$ fired at once. To overcome this difficulty, thare has been sub stituted for the metal dome, $b$, one made of india rubber fixed in a peculiar manner, which would always retain it orm and allow the spring, $c$, to keep the circuit uncomple ed. The torpedo is shaped as shown in Fig. 7, in order to
and the case as above cited should be placed in the hands of prised of the responsibility they assume in not enforcing strict compliance with orders for the security of life and limb.

## Comespyuflute.

## Hard Rubber Thermometers.

## To the Editor of the Scientific American

In 1852, I noticed the electric properties of hard rubber or rulcanite; and in 1853 ,I made arrangements with the owner f the patent for the manufacture of insulators for telegraph wire from this substance. The first orders for them were received from California; and as transportation was very expensive on the Isthmus route, they were made very light, weighing but half an ounce each. On arrival they were heated to about $300^{\circ}$ Fah., by which they were expanded and while in this condition, they were placed upon iron pins, 0 which they were held firmly by contraction.
My attention having been thus called to the dilatability o ard rubber, several thermometers were made from it. One was made by riveting it to a thin strip of steel, about a foo in length, and one fourth of an inch in width. The bottom of this was held fast, while the top was free to move, and o to indicate the temperature on a graduated arc. This one, ow in use, has a range from zero to $90^{\circ} \mathrm{Fah}$., and is as sensi ive as the common mercurial thermometer. It is well adapted or the ordinary range of the atmosphere, but is not suitable for indicating high degrees of heat, as the rubber softens at about $200^{\circ} \mathrm{Fah}$. One of them was made by perforating thin strip of steel, at intervals of an inch, and placing pon it a strip of rubber compound when in a plastic state This was coiled, with an intermediate strip of metal, which forced the rubber through the holes. It was then vulcanized in the usual manner; and when cold, the intermediate strip was withdrawn, leaving an open space between the coils This saved the trouble of riveting, and gave to the rubber an unbroken and smooth surface. The coil is held fast a the center, and the outer end is left free to move. Anothe thermometer was made of glass and hard rubber, the latte in the form of an arc, being riveted at both of its ends to glass plate. which formed the chord.
Instruments of this kind are much better than mercuria hermometers for making electric connection with alam to indicate excess of heat.
Boston, Mass.
J. M. B.

## Coupling Machine Belts.

To the Editor of the Scientific American:
Seeing a query in your issue of March 13 about putting ogether belts which have to be frequently uncoupled, send you an illustration of a 0 -inch belt, which I have been running for over a year, reversing it from one to four time


In Fig. 1, A, B, C, and D are pieces of No. 16 sheet iron riveted to the ends of the belt; E E are hooks, shown in th natural size in Fig. 2, riveted to B. After the belt is laid over the pulleys, the hooks, F and G, of the lever, shown in Fig. 3, are placed in the holes at $C$ and $D$. Now the tw ends of the belt are drawn together by the lever, $H$; and the hooks, E, are put in their places at A. Then the lever is taken out, leaving the joint finished.
By this method, two men can set and couple a belt in th least possible time, obtaining an effectual joint, which wil never allow the belt to run out of true or to reverse.
W. Kapp.

## HOUSEHOLD HINTS.---I

'The melancholy days have come, the saddest of the year," ejaculates paterfamilias as he lugs the stove down into the cellar. There has been for the last twenty-fou hours a reeking atmosphere of soap and soda and step ladders
and moist scrub women pervading the house. Rest, there has been none for him indoors, and so he has made a virtue of necessity and has worked manfully at taking down the stoves, wrapping them, we hope, in old carpet,and fastening the legs and pipe together so that they cannot escape and hide themselves in ingeniously inaccessible places, as he vehemently affirmed they did, when he found them in the garret and under the coaland in the chicken house last fall Materfamilias, we trust, has fully perused the recipes w have been publishing for the last six munths, and the know-
ledge thus gained has been practically applied in cleaning the paint and the windows, destroying vermin, and putting the house in "apple pie" order generally. At last it is all
over, the rooms are "painfully clean," and the bright sun-
ght pouring into the open windows is revealing the thread bare spots in the carpets, and the cracks and knocks on the urniture only too plainly. A high court of inquiry has been held, and the superanuated veterans which have done long and faithful service on the floors, or have survived many a year's hard usage about the rooms, are at last condemned. Then the heads of the family, who, like sensiblepeople,have waited for the high prices peculiar to Mayday to subside prepare to sally forth on visits to carpet and furniture stores,and paterfamilias figures up his check book ordraws his winter's savings from the savings' bank ready to withstand the coming financial strain.
(' I don't see nuthin' about Ssience in all that. What's it got to do with masheens?' interrupted the practical man who happened into our sanctum just in time to hear us read ver the foregoing paragraph to ourselves. "Nothing, exellent and anti-theoretical friend," wereply," nothing about masheens' is therein contained ; but as to Science, it relates the science of home, the science of making one's life some. thing more than one "demnition grind " for existence, byas you will perceive if you continue looking over our shoulder as we proceed with our writing-rendering that home more attractive, more cheerful, and so making for yourself and ours a sanctuary, at the doors of which the cares of labor may be laid aside." He said that it must have cost "an awful lot to polish that 'ere model with the file," from which we inferred that our previous remark was lost upon him, so we esumed our pen, oblivious to his further presence.)
We were about to observe that, before buying furniture and carpets-if we may venture to intrude upon the family iscussion which is taking place previous to the exodus to he shops above mentioned-there are several facts well worth remembering, which may assist one in selecting goods, and besides tend to save money; and at the same time there re a few more hints which we have to offer which mainly relate to simple decoration, and which,we think, may result making the rooms which are to be renovated look perhaps a littlemore tasteful and pretty. Let us suppose that sitting room which also does duty for a parlor is to be newly urnished. The walls are now either plain white or else the old paper has been scraped off and new hangings are re. quired. The first question is of a carpet. Some people beheve that the English article is the best ; so it is we think, as general rule, so far as colorsare concerned, but if durability is considered a first requisite, then the American goods, if of first quality, are fully equal to those of foreign make. A good carpet is thick, pliable, and well woven, and it is better economy to buy a good article like a real Brussels at the out. set. Ingrains are now made to go with Venetian borders, but these do not wear equal to Brussels, and besides with the border costs nearly as much. In this city the best body Brussels costs from $\$ 1.75$ to $\$ 2.50$ per yard, and the lining which consists of layers of stout brown paper with cotton batting between, and which saves carpets wonderfully, par ticularly if the floor be at all uneven), is easily made,or costs when bought 10 cents a yard. For those who can afford a little extra expense, it may be well either to mat the floor or else plane it very smooth, putty up all the cracks, and stain brown, finishing with a coat or two of shellac dissolved in alcohol. Then cover the middle with a large rug, leaving a vard of uncovered space around the walls. Handsome druggets can be bought very reasonably for this purpose; or two Turkish rugs (each about $4 \times 6$ feet, such as are sold for $\$ 15$ to $\$ 18$ a piece), placed side by side, would be large enough for a good-sized apartment, though costing more than the drugget. These can be easily taken up and shaken, or in summer can be removed altogether, leaving the cool matted or painted floor. Turkish rugs, besides, are like camel's hair shawls; they will accord with any color of furniture or wall, and are almost indestructible by wear.
To return to the carpet: supposing such to be the choice: we should advise the selection of that and the wall paper at the same time. It is a good plan to procure a roll of the intended hangings as a sample, and carry it to the carpet store for direct comparison. This will save many awkward contrasts of color. If a green carpet be decided upon, then a plain paper of a rose tint,or with that shade prevailing, accords handsomely, the same paper goes well with the unobtrusive gray-patterned carpets now very much in fashion. If the walls be tinted French gray,in kalsomine or paint, this shade will suit almost any colored carpet,especially red or rrimson. Big-figured papers and huge medallion carpets are abomina tions only fit for hotels and steamboats. Bright tinted papers may go with a rich-toned carpet,or with one in which the colors are mingled; but we never should select hangings printed with impossible birds and animals, or a carpet covered with gaudy flowers, hideous designs in red and yellow which look like a petrified firework explosion, or incompre hensible and huge scroll work. A neat,small,quiet figure is by far the most genteel and appropriate, while it is much more economical, as none of the stuff is ever wasted in atching.
Before laying the carpet,if moths are suspected, it is well o rub the boards over with turpentine; sprinkling with very dilute carbolic acid, about a tablespoonful to a gallon of water, is also a good precaution. This last should be rubbed ver the walls before the paper is put on.
Now comes the matter of furniture. Do not buy the so called " cottage" stuff. It has no merit save that of cheap ness, and our own experience in its use has left us with the firm conviction that glue was too expensiveand it was stuck ogether with gum arabic. A hearty sneeze from a stout per son is ordinarily sufficient to completely disorganize the chair he may be sitting on. Besides, it is usually of pine wood, for wifch bedbugs havelan extraordinary predilection Do not bay veneered furniture, especially if there be furnace
heat, for the veneering, generally after short wear, manifests heat, for the veneering, generally after short wear, manifests substantial solid work, not machine-made, as it is termed in contradiction to hand-made. Machine furniture is sold by the cheaper dealers, and it is put together with wooden dowels. It is, besides, turned out in largequantities of the same $p^{a^{+}}$tern at a time, and too often hastily glued together. It looks all enough at the start, but its lasting qualities are poor. \& and-made furniture, though its integral parts are of course machine work, is produced with greater care. The wood used is thicker and more carefully selected, and iron dowels are used as fastenings. It is well to look carefully this difference, as it much more than compensates for th disparity in price
In our next issue we shall have something further to say about furniture, before passing to the other subjects to which, in these papers, wo propose to allude.

## ARCTIC NOTES

Captain Nares, who is in command of the new British arctic expedition, recently made an address at Winchester, before the college boys, in which he gave a variety of inter esting particulars connected with his previous experience in the frozen regions.

## ice water as a heater.

Speaking of sledge expeditions, he said they always made it a point to encamp on the level snow, over the water, the heat given off by the water underneath warming them considerably, and the tent was warmer when spread over the ice than over the snow.

BOOTS AND OTHER CLOTHING.
He next described the interior of the tent, the clothing, etc., and stated that their footgear was the only thing they took off. When they took their boots off, they were necessa rily damp, and unless they put them under their beds they would freeze; so they lay on them all night to keep them warm for the morning.
While on board the ship, taking short walks and retiring to a dry cabin, sealskin clothes, be said, were very good but as soon as they started on a traveling expedition, having only a common light tent to which to retire, they could wear nothing but flannel and cloth clothes, covered with a light, outer duck suit, which casht the snow. They start ed wearing their skin dresses, but though they were lim enough the first evening, in the morning they found them
frozen as hard as boards. It was impossible to put them on, and they were left on the ice for the bears.

## freezing of water bottles.

Captain Nares next referred to the water bottle, which was worn inside the dress next the skin. Though the in ner side of the bottle was warm, the outer skin froze. A layer of ice collected on the outer side of the bottle, and
day by day gradually became thiciar, and in a week they were all thrown away. For the present expedition they were trying to cover the bottles with flannel, but these would be just the same.
He called attention to the fact that they gradually became reconciled to the want of water, and they merely had half a tumblerful in the middle of the day when they stopped for lunch. This was exactly the experience of all arctic travellers. He mentioned that when the men in his party. on leaving the tent, were offered an extra quantity of either tea or grog, they all chose the tea.

## arctic temperature.

On the 4th of November, Captain Nares's party saw the sun for the last time until the 5th of February, after an absence of 93 days. Hestated that the coldest temperature of
all was $62^{\circ}$ below zero, which was equal to $92^{\circ}$ of cold, or the same amount of cold as would balance a hot temperature of $126^{\circ}$, and this agreed with the highest heat ever reg. istered. As long as they were on board the ship in calm, they could walk about, but immediately there was the slightest wind they were frostbitten.
aims of the new expedition.
Captain Nares said, in conclusion, that in the present ex pedition it would all depend on the favorable or unfavorable state of the ice how far they got north, and where they should leave the depot ships. Should they be fortunate enough to reach latitude $82^{\circ}$, as Hall did easily (to which they knew the land extended), they would have every prospect of being able to journey the 500 miles still cutting them off from the pole. Of course, if there were land there, they could only skirt round the shores. If there were water, one of the ships would be taken up as far as possible. The previous expeditions in this direction had never been suffi ciently equipped for traveling. In the last voyage, by the Polaris, no traveling, to speak of, was attempted, and they merely knew that the land extended to some 50 or 60 miles further on without any appearance of its coming to an end. Of course, in the present expedition, they would push as near the pole as possible; but after the first week in Septem. ber oneran the risk of the ship ne ver being actually stationary in a harbor, and unable, therefore, to be made the base of departures for sledge journeys. She might even be drift ed by the current ignominiously and helplessly to the south ward, perhaps passing the consort, who would necessaril be snugly posted in a protected harbor. However, with God's help, they would do their best, and the meeting might depend on it they would not fail through want of persever ance.

## arctic amusements.

A sick man in the arctic circle would not only be a bur-
o putin jeopardy the success of the undertaking. Absolute health has, therefore, been made a sine qud non; and it may be assumed that all truly healthy men are of a cheerful disposition.
But the expedition is provided with artificial aids to good ellowship. The Admiralty have not made it a condition that the officers should be able to sing a good song or dance a hornpipe, but such like accomplishments are of great importance under the circumstances, and measures will be taken to encourage the histrionic powers of the ships' companies.
Mr. Clements Markham remarks that the " most valuable" qualifications for arctic service are aptitude for taking part in those " winter amusemants which give life to the expedition during the months of forced inaction," and in his arcic navy list he has recorded the part which each officer took in the polar theatricals. Captain Nares, while mate under Kellett, sustained the character of Lady Clara in the historical drama of Charles II.; and he will probably see that the stage of the Alert does not lack novelties. Admiral Sherard Osborn was manager of "the Arctic Philharmonic Entertainments," on board the Pioneer; Admiral Omman ney was manager of the "Royal Arctic Theater," on board the Assistance, and acted the part of Mrs. Crank in the farce of Did you ever Send your Wife to Camberwoll? Admiral N.ias performed Sir Simon in Miss in her Teens, Perriwinkle in A Bold Stroke for a Wife, and other parts; General Sir Edward Sabine was also a member of the now historic " Arc ic Theater," and acted Lord Minnikin in Bon Ton.
In fact, the majority of our most noted arctic navigators ere, from the exigencies of their position, admirable amaeur performers; and in furnishing a theaributing ino mean appartenances, the government are contributing and, perhaps, to a much greater extent than mean
they supposs, to the success of the arctic expedition of they s
1875.

## Patent Rights.

Among the many improvements in commercial law recenty advocated in England, one of the most remarkable is the demand for the abolition of patentright. Not only, it is said, is the advancement of the nation in material prosperity indered by the protection hitherto accorded to inventors, but those unfortunate persons are themselves injured by the aws intended to preserve to them the fruit of their time and labor. It is urged that the inventor cannot be restrained from inventing; and that there should be a system of national rewards for conspicuousimprovements, and that pure ly honorary distinctions should be liberally bestowed. Inter ference with the freedom of trade is, moreover, declared to be only one of the evils arising from the protection of the inventor, and a whole catalogue of difficulties is assigned to the same source. English manufacturers are said to be put at a disadvantage compared with those of other countries where there is no patent law. A patent once granted bars the way for further improvements in the same direction patents are granted for useless things, and for already old contrivances. In addition to these disadvantages, the exist nee of patents gives rise to expensive and tedious litigation and to sum up, patentees are themselves, in the gross, grea losers.
In a paper "On the Expediency of Protection for Inven tions," recently read before the London Society of Arts, thes objections, not to the present patent law prevailing in Eng land, but to all patent laws whatever, were very ably com bated, and the rights of the poet, even, if his creative faculty take a mechanical turn, were vigorously maintained. Those who perase the history of inventions can hardly lay asid the sad narrative without a feeling of pity for the melan choly destiny of the men whose patient thought has enriched the world. Palissy burned the bed from under him to feed his furnace; Dud Dudley was ruined by the sheer brute strength opposed to him; and Crompton, the in ventor of the spinning mule, who, to protect his unpatented invention, commenced a secret manufacture at his house, called the "Hall in the Woods," found it besieged, and ultimately broken into and rifled by those who were destined to profit by his labors. Over and over again occurs the same dreary story of hope deferred, resources exhausted, and health broken. For it must be remembered that the contriver of a great improve benefactor of his species, by no means appears in this envia ble light to those whose work he designs to improve. The wealthy manufacturer doing a profitable business dislikes to stop his costly and extensive works to test a new invention, and his work people resent any attempt to teach them new ways. Hence the poor inventor is often regarded rather as a nuisance than a benefactor, and finds himself opposed in stead of encouraged.
The charge that the growing strength of foreign competi ion in departments of industry over which England has been accustomed to reign supreme is due to patent rights can hardly be sustained. The practical answer lies in the fact that Great Britain, the United States. and France all have efficient patent laws, and yet in no other countries are manufactures so vigorous and improvement so rife. Few countries claiming to be civilized are without patent law. Switzerland try is famous are alpen stocks and long hotel bills.-Inter Ocean.

When ir is not convenient to take a lock apart to fit a new key, the key blank should be smoked over a candle, inserted in the keyhole, and pressed firmly against the opposing
wards of the lock. The indentations in the smoked portion wards of the lock. The indentations in the smoked portion
made by the wards will show where to file.

One of our New England exchanges has come across an old almanac, dated 1755, edited by Dr. Nathaniel Ames, who lived in Dedham, Mass., published in Boston, and in one of its articles Dr. Ames made use of these prophetic words

There lie buried in all this vast region materials for the art and ingenuity of man to work upon-treasures of immense worth, concealed from the poor, ignorant, aboriginal natives. The curious have observed that the progress of human literature, like the sun. is from the east to the west ; thus it has traveled through Asia and Europe, and now has arrived at the eastern shore of America. As the celestial light of the Gospel was directed here by the finger of God, it will doubtless finally drive the long, long night of heathenish darkness from America. So arts and science will change the face of nature in their tour from hence over the Appalachian Mountains to the western ocean; and as they march through the vast desert, the residence of wild beasts will be broken up and their obscene howl cease forever, instead of which the stones and trees will dance together at the music of Orpheus, the rocks will disclose their hidden gems, and the inestimable treasures of gold and silver be broken. Huge mountains of ore will be discovered, and vast stores reserved for future generations. This metal, more useful than gold and silver, will employ millions of hands, not only to form the martial sword and peaceful share alternately, but an infinity of utensils, improved in the exercise of art and handicraft among men. Nature through all her works has stamped authority on this law, namely, 'that all fit matter shall be improved to its best purposes.' Shall not, then, those vast quarries that teem with mechanic stones-those for structure be piled into great cities, and those for sculpture into statues to perpetuate the honor of renowned heroes, even those who shall now save their country? Oh! ye unborn inhabitants of America, should this page escape its destined conflagration at the year's end, and those alphabetical letters remain legible, when your eyes behold the sun after he has rolled the seasons round for a century to come, you will know that in Anno Domini, 1755, we dreamed of your times!"

## The Electric Light.

Dr. Wilde, of the Academy of Sciences of St.Petersburgh, and Director of the Certral Physical Observatory, has recent ly made a report to the Academy upon the new mode of producing the electric light proposed by M. Ladiguin, of that city, and mentioned on page 227 of the Scientific American, present volume. Since the discovery of the voltaic arc in 1821 by Davy, many attempts have been made to utilize it practically for illumination. But in spite of the regulators devised for the purpose, it still remains variable and inconstant: being too intense, used at a single point, it is yet incapable of division. Since the improved magneto-electric machines have reduced the cost of the electric light to only one hird that of coal gas, these efforts to utilize it have been redoubled. And, as a result, M. Ladiguin has made an invention which, in a very simple way, resolves both problems, rendering the light steady, and at the same time capable of division. It has long been known that the electric light proper comes from the intensely heated carbons which the current traverses, the resistance of the air between them developing this heat. So the resistance of a platinum wire placed in circuit causes it to be highly heated; but the light thus obtained, though constant and entirely controllable, is ton feeble for practical use. M. Ladiguin has conceived the idea of replacing the platinum wire in this experiment with a thin rod of gas carbon, and with complete success. Carbon possesses, even at the same temperature, a much greater light-radiating power than platinum; its calorific capacity is less than one half that of platinum; it is, moreover, a sufficiently good conductor of heat; so that the same quanity of heat elevales the temperature of a small rod of carbon to nearly double that of a wire of platinum of the same size. Again, the resistance of the carbon employed is 250 times greater than that of platinum; hence it follows that a rod of carbon may be fifteen times as thick as a wire of platinum the same length, and yet be heated by the same curent to the same degree. Finally, the carbon may be heated the most intense whiteness without the danger of fusion, o which platinum is liable. These are some of the advan tages of carbon; its only disadvantage is that heated in air it burns, and so gradually wastes. But M. Ladiguin has hap pily obviated this difficulty by enclosing the rod of carbon in a glass cylinder containing no oxygen and hermetically sealed, Dr. Wilde asks. in conclusion, that the Academy ecognize the fact that M. Ladiguin has resolved the grand problem of dividing and rendering steady the electric light, in the simplest possible manner, and that they award him in consequence, the Lomonossow prize.

## White Ants at St. Helena.

White ants were introduced into the island in 1840 in some timber from a slave ship. Mr. M‘Lachlan has identified the species termes tenuis, Hagen, peculiar to South America The mischief which it has done is almost incredible, and it appears to bave simply gradually destroyed the whole of Jamestown. A considerable portion of the books in the public library, especially theolngical literature, was devoured by them, and the whole of the interior would be destroyed without the exterior of the volumes seeming otherwise than intact.

A GOOD cement for chemical and electrical apparatus may be prepared by mixing 5 lbs. resin, 1 lb . wax, 1 lb . red ocher, and 2 ozs. plaster of Paris, melting the whole with moderate heat.

## IMPROVED ELEVATOR.

We illustrate herewith improved mechanism for elevators, in which will be found combined several novel devices, tend ing to simplify the apparatus as well as to render the same strong and safe. Among the new features are the means for holding the platform should the hoisting rope break, the use of a single belt running in one direction to actuate the hoist ing gear, an improved clutch, and a simple arrangement of an idler on the belt, in connec tion with abrake lever, which last, on the breaking of the belt, at once throws the brake into action, and so stops the machiners.
We also illustrate, in Fig. 2, the direct application of a steam engine to the hoisting gear, in cases, for a... nple where power cannc: ? ob tained from some main source in the building. The engine is built by the same manufac turers, and is of neat and compact pattern, well adap ted to this special purpose. Referring to Fig. 1, it will be seen that the driving belt, A, is caused to lap over both pulleys, B and C, thereby rotating the same in contrary directions, and, through its application to a large pulley surface, communicating an increased amount of power without slipping. D is a bar pivoted to the center and provided at each side of its pivot with clutches which engage with pulleys on the shafts of wheels, $B$ and $C$ It is ob ious that but one clutch ca thrown into action at time, and this is done by the end of the bar. D, at.E, being provided with a projection which enters a worm on a shaft, at the extremity of which is a pulley, F. Cords from this pulley are led down longside the elevator carria pulley, $F$ may be turned ine. By means of said cords the pulley, F, may be turned in one or the other direction, so moving correspondingly the end of bar, $D$, and thus throwing into action one or the other of the clutches. The latter are of novel construction, and consist essentially of cones which, on entering the pulleys, expand movable pieces which enter V-shaped grooves and tightly bind. The effect of ope rating the clutches is, as will be obvious from the gearing represented, to transmit motion to the hoisting drum in one or the other direction, and so to hoist or lower the carriage. In order to hold the mechanism during the instant when, in shifting the clutches, both are thrown out of gear, a bell crank lever, connected with the end of the bar, $D$, is provided. This, when the bar is moved either way, pulls down the brake on the brake wheel, G. The same, of course serves as the means for stopping the car riage at any desired point. Connected also with the brake is a long lever, I, which ter minates in an idler which rests on the belt. Should the latter become ruptured, the lever falls, and its weight, applying the brake at nce, prevents accident by arresting the mo ion of the mechanism. This arrangemen obviates the necessity of the governor usually provided.

Aninspection of the standards in which the platform travels will show that the rack, ordinarily placed on the inner sides, with which pawls engage, and so prevent the fall of the platform in event of the breakage of the hoisting, is here done away with. The safety mechanism substituted is much simpler and, at the same time, cheaper. It is shown in the broken away portion of the upper crossbar of the platform, and consists of a reversed T-shaped piece of iron, the vertical portion of which passes through the bar and serves as a point of attachment of the hoisting rope. The horizontal part of the T underneath connects with a leaf spring, and this with a toothed pivoted eccentric. When a strain is on the $T$ piece, the spring is held out of action; but on the breakage of the rope the $T$ piece falls, the spring is thrown out ward, and the cam turned so that its widest portion becomes jammed, and the teeth bite in the wood of the standard, thus holding the carriage securely. The same arrangement son each side of the crossbar, which is also steadied and held in place by the guide rollers shown at I.
The mechanism generally is of excellent construction, and, judging from practical trials which we have witnessed, appears to show that the claims of its manufacturers are fully substantiated.
For further particulars address the Holske Manufacturing Company, 279 Cherry street, New York city.

IT is said that a few drops of oil of anise or oil of rhodium, placed upon bait, will entice animals into a trap.

and without punching or mutilating in any way, all kinds of papers, such as bills, statements, deeds, manuscripts, etc., of any size, either folded or open, and in such a manner that ny heading can be found at once, and so that one or several papers may be removed or inserted easily and quickly, with out disturbing those not wanted. It adapts itself to any un. even thickness which may exist in the folds of the papers. When the file is full, the papers are already partially compressed and in propershapefor tying up and putting away in bundles.
In the bed are shallow cups, A, holding conical spiral springs, which bear upward with a constant pressure against a piece on which rests a table The piece beneath the table has on its under side small cups for confining the upper ends of the springs, and on its back edge a cross, Fig. 2, which works in a slot in the upright portion of the bed, and hold the table in proper position The table is of wood; the balance of the file is metal. The papers are inserted at a single movement by being taken at both ends between the thumbs and fingers and introduced between the table and he top plate, B.
The file can be suspended on a wall by the ears, as shown, but ordinarily it will rest upon a desk or writing table. The conical shape of the springs allows them, when the file is full, to be received entirely into the shallow cup, thus giving the entire space (about three inches being a convenient size) for the reception of the papers. There is not a screw, rivet, nor fastening of any kind used in the construction of the file, all parts being neatly fitted together.
Patented through the Scien-
Patented through the Scien e of lime, and they are mixed without hard grinding, the tific American Patent Agency, March 2, 1875, to Richard H product, with or without the addition of chalk, zinc white, Hoffman, of Keyser, Mineral county, West Va. The excluetc., when added to caoutchouc softened in bisulphide of sive right to the patent is offered for sale. For further incarbon or oil of turpentine, causes so-called vulcanization at $\mid$ formation, address the patentee as above.
$\left|\begin{array}{l}\text { carbon or oil of turpentine, causes so-called vulcanization at } \\ \text { the ordinary temperature, or upon slightly warming. With }\end{array}\right|$

## Improvement in Music Printing.

For printing music it is necessary to have, first of all, the composition lightly sketched on sheets of tin, after which it is engraved on the plate by a workman, who holds a punch in his left and a hammer in his right. As the design has to be transferred, it is engraved reversed, which requires both an experienced eye and a steady hand.
M. Lourdel, the weli known photographer, of Paris, thought it would be a great saving to suppress the sheets of tin, which cost generally about 82 cents. To do this a piece of transfer paper is taken, which has been previously lined and spaced. The workman has before him a composition case like a printer's, which contains in each division a ool, at the extremity of which is a musical sign. Beside him is a pad impregnated with transfer ink. He lays the ruled transfer paper before him, and with the right hand he takes the musical signs, notes, etc., inks them, and prints the paper without the slightest effort. It is simply a matter of regularity
chloride of lime in excess, the mass remains pulverulent, instead of becoming pasty.

## MPROVED BILL FILE

The device herewith illustrated is designed to hold firmly,

and rapidity, speed being easily acquired after a little prac tice. The music is then transferred to the stone and proofs taken at will.

## Penikese Schoo

It is certainly a misfortune that the Penikese school, after so promising a start and with its usefulness so well demon strated by its work during the two summers which it has een in existence, should now be compelled to suspend for lack of funds. Mr. Alexander Agassiz states that the An derson donation has sufficed to equip the school in an inexpensive manner and to support it up to the present summer but that this is now exhausted. As an attempt to levy a charge upon the pupils has proved fruitless, nothing remains bu to close the doors.
The usual class of scholars who have hitherto taken advantage of the summer session have been principally teachers and students of natural history, of straitened means, and who, although enthusiasts in study, are as a rule unable to contribute toward any educational project, however beneficial, out of their scanty earnings. Consequently, when it was announced that the Penikese school was no longer free, a few individuals responded and the large majority stayed away; and hence the suspension of operations. An excellent opportunity is here offered by some friend of Science to revive the school by means of a liberal endow ment, and to avoid the scandal that must certainly be caused if Mr. Anderson's generosity is allowed to be nullified fo want of a few dollars.

## ENGLISH GARDENS.

Carclew House, Cornwall, England, the residence of Colonel Tremayne, has a high renown among the horticultural establishments of the West of England, a district enjoying a very mild climate, even for that country, and peopled by a race who are, like the Scotch, gardeners by instinct and inherited disposition. "In this favored spot," says a recent visitor, "rhododendrons of all kinds seem quite at home, and the same may be said of the camellia and Indian azalea, noble examples of which were every now and then to be met with. A Loquat tree, eriobotrya japonica, was 10 feet high, as much through, and in the most robust health. The same may be said of escallonia pterocladon, quite 15 feet high, having white fow and marg white flowers, and more treeother species. The singular other species. The singular
colletia Bictoniensis was also colletia Bictoniensis was also
here in the shape of a dense here in the shape of a dense
bush quite 7 feet in diameter; and there were specimens of fabiana imbricata quite as large. I noticed a fine mass of hedychum flavum or flavescens, which, to all appearance, had not been disturbed for many years, and was flowering most abunand was flowering most abun-
dantly. I noticed a rhododendron of the true arboreum section, or one very near akin to it, with a clear bole more than 6 feet high without a branch, and stout enough to form a gate post for a carriage road. The general character of the place must be extremely rich at the time these shrubs are in flower; and when it is understood that some of them flower in winter, accompanied by camellias, the effect must be gorgeous. Intermixed with these rhododendrons, etc., were magnolias of the deciduous class, assuming the character of timber trees, and there was no lack of flowers, on open standard trees, of m. grandiflora."
Although these various semi-tropical shrubs grow freely in the open air, Nature is liberally supplemented by every


## GARDEN AT CARCLEW, ENGLAND.

 gardens, with the fountain and basin in the center. Thelsimilar dealings with M. de la Bastie on account of the im garden is geometrical, consisting of twelve beds with bur- mense price asked by him, over eight million dollars. ders at the sides, etc., on gravel, the beds edged with box. The four beds through the center in line with the basin are carpet-bedded; four others, flanking the basin, are all planted alike with geraniums, calceolarias, perilla, and lobelia. Out side these, and, as it were, surrounding them, are four other large beds, which are planted with herbaceous plants, etc. and a row of dahlias down the center. In front of $t$ re hot house can be seen a mass of belladonna lily, myrtle bushes,etc. Besides the pampas grasses, in the angles of four her baceous beds stand colletia Bictoniensis and hypericum oblongifolium. In the fountain basin are limnocharis Humboldtii' and aponageton distachyon. The terrace above is also a geo metrical garden of twenty-seven beds, with borders, on gravel, with box edging, and planted miscellaneously with annuals. violas, etc.; the vio-
las, with a bed of lobelia carlas. with a bed of
dinalis (St. Clair), being a great success. Behind the pampas grass, to the right can be seen the spreading head of linus patula.

If any of our readers journey towards the Land's End in the course of this sum mer, we recommend them to visit these gardens, which have been under the high est cultivation for many cen turies past.

## Tough Glass.

An inventor, Mr. Charles Pieper, has devised a way of toughening glass. which the German papers pronounce superior to that of M. de la Bastie, recently described in these columns. The Pieper glass is fully as strong as that of the latter inventor, and its appearance is much purer and clearer. Extended experiments upon it have been begun in Germany. The Association of German Glass Makers have already entered into negotiation wilh Mr. Pieper for the use

## THE BIRDS OF BRAZIL.

Our engraving exhibits two remarkable ornithological specimens from Brazil, domesticated in the gardens of the Royal Zoölogical Society, Regent's Park, London.
The first is the bell bird, the celebrated campanero of the Spaniards, called dara by the Indians. He is about the size of the jay. His plumage is white as snow. On his
improved appliance in the way of hot and forcing houses Orchids of the tropics and all other exotics are grown in great profusion; and the vineries and orchard inouses are of great extent, and are renowned for the handsome fruit of nearly all kinds grown in them.
We give herewith a view, showing one portion of the

forehead rises a spiral tube, nearly three inches long. It is jet black, dotted all over with small white feathers. It has a communication with the palate, and when filled with air looks like a spire; when empty, it becomes pendulous. His note is loud and clear, like the sound of a bell, and may be heard at the distance of three miles. In the midst of Brazil's extensive wilds, almost out of gun reach, you will see the campanero. No sound or song from any of the winged inhabitants of the forest, not even the clearly pronounced "Whip-poor-Will" from the goatsucker, causes such astonishment as the toll of the campanero.
With many of the feathered race he pays the common tribute of a morning and evening song; and even when the meridian sun has shut in silence the mouths of almost the whole of animated nature, the campanero still cheers the forest. You hear his toll, and then a pause for a minute, then another toll, and then a pause again, and then a toll, and again a pause. Then he is silent for six or eight minutes, and then another toll, and so on. "Actæon would stop in the mid-chase," says Waterton, "Maria would defer her evening song, and Orpheus himself would drop his lute to listen to him, so sweet, so novel, and so romantic is the toll of the pretty snow-white companero. He is never seen to feed with the other cotiogas, nor is it known in what part of Guiana he makes his nest.'
The second specimen is a relative of the bell bird, and is known to ornithologists as the cotinga cincta. Of these, in their natural state, even less is known than of the bell birds. The cotingas are distinguished by the brilliancy of the coloration of the males. In the species at present under notice, the under parts are of a deep plum color, while the upper parts, with the band or cinctus across the breast, are of a magnificent ultramarine blue. In size this cotinga equals a blackbird. Their food consists of fruits, which their wide gape enables them to swallow with ease. Like their allies the bell birds, they are solitary in their habits, keeping to the topmost branches of trees, and generally residing in the dense forest, though at times they approach the cultivated grounds in search of their food.

## Useful Recipes for the Shop, the Honsehold, and the Farm.

According to Niedling, a beautiful orange-yellow tone, much admired in a chest at the Vienna Exhibition, may be imparted to oak wood by rubbing it in a warm room with a certain mixture until it acquires a dull polish, and then coating it, after an hour, with thin polish, and repeating the coating of polish to improve the depth and brilliancy of the tone. The ingredients for the rubbing mixture are about 3 ozs. tallow, $\frac{8}{4}$ oz. wax, and 1 pint turpentine, mixed by heating together and stirring.
The following is said to be all there is of the cook's secret for producing those world-renowned potatoes served at Moon's Lake House, Saratoga Springs, every summer : Peel good-sized potatoes, and slice them as evenly as possible; drop them into ice water. Have a kettle of lard, as for fried cakes, and very hot. Put a few at a time into a towel, shake them about to dry them, and then drop into the hot lard. Stir them occasionally; and when of a light brown, take them out with a skimmer. If properly done, they will n be at all greasy, but crisp without, and mealy within.
A French journal says that, of the score of fireproof compositions that have been brought forward within as many years past, there is scarcely one that possesses superior or even equal adaptation, to the purpose, to the following : Dissolve, in cold water, as much pearlash as it is capable of holding in solution, and wash or daub with it all the boards, wainscoting, timber, etc.; then, diluting the same liquid with a little water, add to it such a portion of fine yellow clay as will make the mixture of the consistence of common paint, and then stir in a small quantity of paperhangers' flour paste to combine both the other substances. Give three coats of this mixture, and, when dry, apply the following composition: Put into a pot equal quantities of finely pulverized iron filings, brickdust, and ashes, pour over them size
or glue water, set the whole near a fire, and, when warm, or glue water, set the whole near a fire, and, when warm,
stir them well together. With this liquid composition, stir them well together. With this liquid composition,
or size, give one coat, and, on its getting dry, give a second coat. It resists fire for five hours, and prevents the wood from ever bursting into flames; that is, it so resists the ravages of fire as, at most, only to be reduced to coals or embers, without spreading the conflagration by additional flames. It is found that a quantity equal to twenty pounds of finely sifted yellow clay, a pound and a half of flour for making the paste, and one pound of $p$
sufficient to prepare a square rood of deal boards.
sufficient to prepare a square rood of deal boards.
Mr. James Hinton, in his "Physiology," affirms that the passage of the ear does not require cleaning by us. Nature undertakes that task, and in the healthy state fulfils it perfectly. Her means for cleansing the ear is the wax, which dries up into thin scales, and peels off and falls away imperceptibly. In health the passage of the ear is never dirty, but an attempt to clean it will infallibly make it so. Washing the ear out with soap and water is bad; it keeps the was moist when it ought to become dry and scaly, and makes it absorb dust. But the most hurtful thing is the introduction of the corner of a towel screwed up, and twisted
around. This proceeding irritates the passage and presses down the wax and flakes of skin upon the membrane of the tympanum, producing pain and inflammation and deafness. Washing should only extend to the outer surface, as far as the finger can reach.
An ink composed of copper 1 part, dissolved in 10 parts ful for marking on tin or znic plant labels.

A simple mode of keeping butter in warm weather is to set over the dish containing it a large flower pot or unaround the covering vessel, and place the whole where there is a draft of air.
Rats detest chloride of lime and coal tar.
White horn buttons may be made to imitate mother of pearl by being boiled in a saturated solution of sugar of lead and then laid in very dilute hydrochloric acid.
The following is a simple way of obtaining copies of writing without the use of a copying press: Mix white sugar with the ink, $1 \frac{1}{2}$ drams sugar to 1 oz ink. Use this with an ordinary pen, and place over the writing a moistened sheet of unsized paper. Lay both leaves between two layers of carpet; put the whole under a piece of board large enough to cover. Then stand on the board for a few seconds. An To extract rust from steel, immerse the article to be cle
To extract rust from steel,immerse the article to be cleaned
in a solution of $\frac{1}{2}$ oz. cyanide of potassium to a wine glass in a solution of $\frac{1}{2} \mathrm{oz}$. cyanide of potassium to a wine glass
full of water until the dirtand rust disappear. Then clean by means of a tooth brush with a paste composed of cyanide of potassium, Castile soap, whitening, and water.
A wnings can be rendered waterproof by plunging the fabric into a solution containg 20 per cent of soap, and afterwards into another solution containing the same percentage of sul phate of copper. Wash, and the operation is finished.
The cbest pine wood evaporates 5 lbs. of water pe cord of wood can be consumed per hour on 60 square fee grate. One pound carbon burnt to carbonic acid requires the oxygen of 153 cubic feet of atmospheric air
Iron filings in a weak solution of sal ammoniac, mixed with Portland cement, are said to double the strength of the latter
The following compounds are useful for soldering or tin-
ning: Tin, 1 part muriatic acid with as much zinc as it will dissolve; add 2 parts water and some sal ammoniac. Brass and copper, 1 lb . muriatic acid, 4 ozs. zinc, 5 ozs . sal an moniac. Zinc, 1 lb . muriatic acid, 2 ozs. sal ammoniac with all the zinc it will dissolve, and 3 pints of water. Iron, 1 lb. muriatic acid, 6 ozs. sperm tallow, 4 ozs. sal ammoniac Gold and silver, 1 lb . muriatic acid, 8 ozs. sperm tallow, and ozs. sal ammoniac.
For silvering metals, 10 parts nitrate of silver, 10 parts Moisten the powder with water when ready to apply.

## Hardening Glass.

This is a process that has been patented by Mr. Macintosh of Westminster, a civil engineer who has devoted much tim and attention to the hardening of iron, steel, and alloys. Starting on the broad ground that, the lewer the degree of tempera ture of the liquid in which certain heated bodies were plunged, the harder such bodies became, Mr. Macintosh has found that glass, graphite, uncrystallized carbon, slag, and other analogous substances may be rendered exceedingly hard by means which are usually indicated for metals. Colored glass may, by this treatment, be rendered so hard as to be effectively used as a substitute for gems, and, what is curious, may be
pulverized and used in the same way as diamond dust or emery powder.

In hardening the substance, the method pursued by the patentee is to place a smill quantity of fused or nearly fused c'ear or colored glass in iron or other molds to shape the glass, and the substance is taken out of the molds and placed in platinum molds, and fused or nearly fused, and suddenly deprived of its caloric by frigorific mixtures of iced water and salt, or any of the freezing compounds that produce extreme cold; the sum and substance of which is that the glass i heated to a very high degree of temperature and then rapidly cooled in a very frigid fluid. A startling statement is made by Mr. Macintosh when he asserts that, when the component parts of gems are treated by the above process, he is real diamonds.

## Velocity of Light.

Professor Cornu, of the Eeole Polytechnique, Paris, has put into successful use a new instrument for measuring the ve locity of light between two stations, in which an electrical
registering apparatus is used, giving, it is believed, more accurate measurements than the well known toothed whee arrangement of Fizeau. Foucault fixed the velocity of light, by his instrument, at 185,157 miles per second Professor 186,660 his new instrument, fixes the velocity 186,660 miles p
than Foucault.

An Engineer on Bollers.
Then there's the boiler; that takes a heap of watching all the time. We have steam enough ordinarily, might say when we don't want it; but there are times when we can get it to save our souls; no more than enough to get along much boiler; nor no other man. Yet tell the owners that or the makers of the engines, and they will say: ' Oh, big boilers take up too much room;' and then they go and put in a little kettle with not enough fire surface in it, and burn coal enough in a year to pay for a decent boiler. The best made boilers in the world will bear a heap of watching. You know the engine pumps water into them all the while to keep up the supply. Well, the pumps will work all right for months at a time; first thing you know of, sometimes when you are in trouble about other things, the pumps will stop working, and you can't get a drop of water in her to
save you, then you have got to look sharp. What makes it
act what makes everything go wrong in this world That's what I want to know; when it's once set right, it ought to go right, but it don't. Sometimes the check valves get held up, and the water don't go down in the boiler at all, but just surges back and forth from the pump pressure and the boiler pressure alternately; sometimes dirt gets under them, chips and things; then, again, joints will blow out in the band hole plates, and make a heap of trouble. No matter how trifling a thing is to us, it is sure to make a disturbance with the passengers, and that's what we have to avoid as much as possible, for they are easily scared."-New York Sun.
The well-known Leclanché's cell is now in use for many purposes, giving a very constant current, but which, bow ever, is much decreased by the resistance of the tar corering the top of the porous cell, and by the decomposition of the manganese dioxide, which is transformed during the action of he cell into oxide; the latter oxide closes the pores of the cell. Sergius Kern's cell is a modification of Leclanché's one, and the experiments proved it to act very constantly.
Two parts of cleanly washed coke, and one part of man ganese dioxide in the state of powder, are well mixed together with a small quantity of water acidulated with some drops of nitric acid; the mix ture then is strongly pressed into brown paper cartr dges 5 inches high and $1 \frac{1}{4}$ inclies diameter. The resulting coke-manganese cylinders are dried in a warm place, but not over a fire, because the heat, as it is nown, decomposes the manganese dioxide.
The dried cylinders are placed in glass jars containing con entrated solution of ammonium chloride, and surrounded with zinc plates curved in the usual manner. By this arrangement the use of porous cells is avoided, and a battery of such elements acts more constantly; besides this, the con struction of it is cheaper. Instead of having glass jars, Kern uses wooden boxes, the size of the glass jars; the internal parts of the boxes are covered with the following mixture, melted in an iron cup :-2 parts of wax, 10 parts of common resin (colophony), 2 parts of red lead, and $\frac{1}{8}$ part of gypsum. The zinc of the element is the negative pole; the coke, the positive pole.

## zecent gamertiau aud fortiqu zatents.

## Improved Steam Boiler Furnace.

Walter Dawson and James Hughes, Scranton, Pa.-This invention tect the corner joints and flanges from the intense heat of the fire In ordinary bollers, the side sheets, which lap on to the flanges o the front and tube sheets, are straight sheets, which leave the flanges and rivets exposed to the full heat of the firc. The furnaoe caused by the increased thickness of iron at those points. The ob ject of the improvement is to prevent this, and to make the corne joints as durable as any portion of the furnace; and for this pur pose the side sheets bulge inward throughout the entire width where the central portion of the sheet is on the same plane as the joints, with bulges adjacent to the flanges to protect the joints. By this means the joints are protected from the intense heat of the fire
and are preserved and rendered as durable as any part of the fur nace.

## Improved Mechanical Movement.

James R. Devor, Goshen, Ind.-This invention relates to a new nechanical device, by means of which belt pulleys, cogged gearing, parallel to each other. Balls are fastened tightly on the shafts. A portion of the ball sockets consists in two disks, having each a broad slot through which the shaft passes. These slots allow the shaft to turn in either direction. The inside pulleys form the box, and are made concave to fit the ball, having flanges which lap on the disks. and the slots in the ball revoritesides. Attached to the pisks each or opposite sides of the ball are yokes connected together by a rod, which support the belt guide. The spaces inside the disks are for allowing the box lateral play on the ball.
Improved Construction of Watch Movements. James H. Flynt, Duluth, Minn.-This is a watch movement in which motion is communicated from the mainspring barrel to the being of nearly the through a single pinion andar plate, and arrange between the face ard the pillar plate.

## improved Milk Cooler.

Henry S. Murray, Andes, N. Y.-The outlet tube consists of an annular socket with a shoulder, which is soldered around a botton perforation of the milk pan, and seated on a circumferential colla of an exit tube of the tank. A top flange of the exit tube extend
into the socket, forming, in connection with the shoulder of the socket, the seat for the circumferential flange of a short tube which screws into the threaded part of the exit tube so as to bind he socket, exit tube, and connecting tube firmly together. Inter mediate packing rings produce the water and milk tight connection of the pan and tank, so that the milk may be drawn off withou leaking, or mixing with water from the tank. A screw cap is screwed into the binding tube of the faucet, for closing the same, in the same manner as in the water exit tube, and retained until it
is necessary to draw off the milk, in which case the screw cap or plug is withdrawn.

## Improved Seed Sower.

John W. Talley, Paxton, Ill., assignor to himself and Thomas W. working the slide, which is moved in one direction by a vertical ever at the end of the roller, so as to be operated by tappets thereon. It is connected to the slide lever by a rope going around guide pulley at one corner of the machine. In the other direction the slide lever is worked by a spring, which is forced as the tappet scape from the lever. A stop cord is connected to the tappet leve The machine is designed for sowing itfand the slide lever too far The machine is designed for sowing grass, flax, and other smal ground at the same time; l it it may be used with wheels.

1 inpros d Milking Tube.
Sylvester A.Sm . . , Muscatine county, Iowa.-': 'is invention conralve, while the body is tapered to an open end that enters the teat and udder of the cow.

## Improved Hod Elevator.

William Murphy, New York city.-This invention oonsists in rods attached to the framework of the elevator in such position as to be over the inner part of the side bars of the base of said elevator
frome. These receive hooks attached to the handles of the hods. Hooks are attached to said handles to adapt the hods to be hung upon and d
elevator.

Improved Mode of Inlaying Jet with Metal. William Stephans, New York city.-This invention consists in a mode of inlaying jet with metal, by burning a recess of the proper size and form in the jet, by means of a recessed die and a sheet
metal guard plate. In this way pieces of metal of any desired form, metal guard plate. In this way pieces of metal of any desired form,
no matter how irregular or complex, may be easily and quickly inno matter how irregular or complex, may be easily and quickly in-
laid in jet, ana the work may be done without danger of cracking laid in jet, ana the work may be done without danger of cracking or chipping the jet. When the pieces are large, pins m
applied to their ends to assist in securing them in place.

## Improved Cloth-Measuring Machine.

Joseph S. Gold, Washington C. H., Ohio.-The cloth roll is turned by the cloth, which is drawn through the machine by winding it on cloth rollers with a crank, and the cloth is pressed on the cloth ro
by a roll with sufficient force to cause it to turn the machine. by a roll with sufficient force to cause it to turn the machi
tape shows, by the marks upon it, the measure of the cloth.

## Improved Gang plow.

Thomas M. Nichol, Sparta, Ill.-By suitable construction, by operating levers, the axles may be adjusted to cause the machine to run level upon sliding ground, or when one of the wheels is running in a furrow. The points of attachment of the plow beams may be
raised and lowered to adjust the plows to run deeper or shallower in the ground, as may be required. This manner of attaching the in tow beams allows their rear parts to have a free vertical movement. The plows are held at the same distance apart, and each plow may be allowed to rise independently of the other.

Improved Reversing Pulley or Gear Wheel. Henry W. Sherrill, New York city.-This invention relates to an improvement in pulleys or gear wheels, whereby the same pulley or
gear is used for reversing the motion of the shaft or arbor. The advantages of the arrangement are found in the small space occupied by the single pulley or gear, and in a single belt to serve in the place of a number of belts and pulleys for producing the same effect, and in the facilit
in the reverse motion.
Improved Twister for Making Thread, Twine, etc. Lavancia M. Sutherland, Catskill, and Thomas Groves, Brooklyn,
N. Y., administrators of James Sutherland, deceased, This N. Y., administrators of James Sutherland, deceased.-This inven-
tion consists of a slitted bent pipe, hinged or jointed to a water pipe, and interposed between the fliers and the tension rollers for wetting the strands while being twisted; also the combination of the cock of the water pipe that supplies water to wet the strands,
with the ordinary belt shifterof the machine, so that the flow of the with the ordinary belt shifter of the machine, so that the flow of the
water through said pipe may be stopped and started, and by the water through
same operation.

Improved Locking Device for Machinery Timothy D. Marsh and Franklin M. Crane, Jersey, Ohio.-A hub sing lever connected with the hub. Extending in opposite direc-
tions from it are two loose arms, the outer ends of which are fitted into slots of two friction shoes. In the cap plate are two pins for each of the arms, arranged to give the arms a little play and allow
the shoes to bind against the frictional surface and hub. In reverthe shoes to bind against the frictional surface and hub. In reverfrom one side to the other of the stud on the cap plate. When the lever is moved over the stud, the action is reversed; and when the lever is moved over the stud, the action is reversed; and when the
lever is left on the stud, the arms bind when the shaft is turne 1 in either direction and prevent all motion, from the fact that, when the shaft is turned either way, the movement of the square hub causes the arms to bind and the shoes to catch against the frictional surface.

Improved Wagon Jack.
William Henry Horn, Santa Cruz, Cal.-In using the Jack a lever
is turned up to lower the bar to its lowest position. A block is then is turned up to lower the bar to its lowest position. A block is then adjusted to the hight of the axle to be raised, and the jack is ad-
justed to bring the block beneath said axle. The lever is then turned down to rest upon a stop. This movement raises the bar and block raising the axle. As the lever is lowered, a loop or link
passes back of the axis of the hinge of the said lever, and the various parts of the jack are locked, supporting the axle in its raise position.

Improved Nursery Chair
Calvin A. Watson, New York city.-This is a nursery chair con-
structed of a seat board with central aperture, supported on hinge structed of a seat board with central aperture, supported on hinged
legs, and provided with hinged side boards held open by a removlegs, and provided with hinged side boards held open by a remov-
able brace piece. It may be readily folded into a small compass for packing, etc.

Improved Draft Equalizer.
William Snow, Waverly, Il., assignor to himself and Joseph H. Challen, same place.-This is a draft equalizer, formed by connect with its ends projecting past the inner ends of the single trees, which form part of the double tree proper

Improved Steam Boller Furnace.
Walter Dawson and James Hughes, Scranton, Pa.-This invention
relates to the flre boxes or furnaces of steam boilers, and consists in the formation of the side sheets of the furnace to protect the corner joints and flanges from the intense heat of the fire. The side sheets are bulged or projected inward.

Improved Milk Cooler.
Daniel Gurnsey, Watertown, N. Y.-This invention is intended to in ordinary mill coolers, which enters at one side and is gradually warmed up on its passage through the cooler, so that the tempera-
ture at one end of the pan, where the cool water enters, is considerably lower than at the other end. The uneven temperature of the milk retards the progress of raising the cream and decreases the
yield of butter. The apparatus consists of devices for admitting the cool water simultaneously at the end and at central points of the bottom of the cooler, and drawing it o

Improved Retrigerator.
August F. Bronner, New York city.-This invention consists of an ce box with double unfiled walls, of which the side walls are emto the bottom part, for utilizing the cooling effect on the air passing in the same direetion. The drip water is conveyed by inclined
troughs of the side walls to a front channel, and then through perforations of the same over the inclined bottom to the rear exit

## Improved Carbureting Gas Machine

Elon Foster, New York city.-This improved gas machine, for
carbureting air or gas, is so constructed that it will operate equall carbureting air or gas, is so constructed that it will operate equally tank. The air or gas is brought into contact with the hydrocarbon
twioe before it escapes through the outlet pipe.

Improved Gas Burner for Heating Purposes. Anatole Ehret, San Francisco, Cal.-This consists of a chamber in
the standard on which the burner is mounted, into which the gas pipes entering from the base of the stand, so as to draw in an abun dant supply of air to mix with the gas. The invention was described and illustrated on page 290 of our current volume.
Improved Portable Tollet Waters and Extracts. A. Gibbs Campbell, Paterson, N. J.-This is a compound for the
production of toilet waters or extracts by lixiviation with alcohol, the compound consisting of a mixture of carbonate of magnesia with one or more fragrant attars.

Improved Pitman Connection for Pumps James M. Langley, Double Bridges, Tenn., assignor of one third
his right to James C. Sawyer, same place-To rod is pivoted the end of a pitman, the other end of which is pivoted rod the pivoted the end of a pitman, the other end of which is pivoted
to the crank. To the pitman, at a little distance from the crank, is rigidly attached a short stud, to which is pivoted
the end of another pitman. The outer end of the second pitman is pivoted to an arm rigidly attached to a rock shaft. To the rock shaft are attached one, two, or more cranks, to the pins of which
are pivoted the ends of the piston rods of the pumps, so that the are pivoted the ends of the piston rods of the pumps, so that the

## Improved Steam Pumping Engine.

Charles H. Hudson, Chicago, Ill.-The valve is composed of three
disks of like diamcter, keyed on a stem. The steam which has acted disks of like diamcter, keyed on a stem. The steam which has acted on the piston and fllled the cylinder space is allowed to act on the valve and move it into the alternate position necessary to cut of
steam from the right hand end of the cylinder, and admit it, by the corresponding ports, to the left hand end of said cylinder, to move the piston in the reverse direction. Simultaneous with the above described action of the steam on the valve, it exhausts into the outer air. The regular exhaust from the cylinder into the valve chamber is always through the ports by which the steam entered the cylinder at the previous stroke of the piston. The openings be-
tween the passage and the valve chamber are closed alternately by tween the passage and the valve chamber are closed alternately by
the end disks forming part of the valve, the thickness of the disks the end disks forming part of the valve, the thickness of the disks
exceeding the diameter of the openings, and the projecting ends of the valve stem governing the position of the valve, so that one of est opening each time the valve is moved and comes to rest. By suitable arrangement of water valves, the supplementary chamber, requisite in pumps whose valves close by gravity, is dispensed with,

Improved Car Coupler.
W. H. Adams, Mount Gilead, Va.-This invention relates to automatic couplers where a spring catch is pushed aside by a link hook ion consists in found whose shoulders $1 t$ then closes. The may coupled and uncoupled with great facility, without complication o expensive
the track.

Improved Hydrant.
James W. R. Fisher and William H. Fisher, Martinsburg, W. Va.This invention consists of a case made in sections, a lever-hel an elastic cup, the whole so jointed together as to be readily sepa rable without removing the inlet pipe chamber.

## Improved Furnace.

Smith W. Kimble, Springfield, $\mathrm{Il}^{1}$.-This inyention consists in con necting the combustion chamber and ash pit of a furnace by on one side of the combustion chamber, pass over it, and a ttached on the other side to a pipe resting loosely in brackets.

Improved Sash Fastener.
Ira David Woolf, Oneonta, N. Y.-This consists of a spring bolt,
which works through a hole in the sash and enter the casing, which works through a hole in the sash and enters the casing, the
bolt having a peculiar stop lug, which passes with the bolt through bolt having a peculiar stop lug, which passes with the bolt throug
the slot in the plate. A spiral spring is attached to and surrounds the bolt, which spring bears against the plate and has a certain de gree of tension, which serves to force the bolt inward with a constant pressure. When the bolt is withdrawn from the casing, the
end of the stop lug may be made to rest on the outside of the plat end of the stop lug may be made to rest on the outside of the plate The boit may be attached to either of the sashes of the window, and will hold them in any desired position, and fasten them so that they cannot be moved from the outsid

## mproved Magazine Fire Arm.

Frederick M. Shinn, Leroy, Kan.-The gun has two magazines under the barrel, discharging into a revolving chambered cylinder, by
which the cartridges behind the barrel are to be shoved out of the which the cartridges behind the barrel are to be shoved out of the
chambers of the cylinder into the barrel by a breech rod. When chambers of the cylinder into the barrel by a breech rod. When
the breech rod is drawn back it pulls the shell back into the cylinder by its spring catch; and as soon as that takes place the ejector is bottom. The ejector engages the shell under the rim of the base and lifts it out of the chamber of the cylinder. As soon as the shel has been lifted out, a pawl on the ejector engages the cylinder by a notch in the rear end, and turns it sufficiently to bring a cartridge
into range with the barrel. Then the guard is pulled back and the into range with the barrel. Then the guard is pulled back and the
breech rod thereby pushed forward to push the cartridge into the barrel. The ejector is at the same time pulled back by its spring and the gun is then ready for flring again.

Improved Horse Yoke.
Rufus Stratton and George Olmsted, Hazardville, Conn.-The hames are fastened at the upper end by a screw, and have project
ing ears, which are slotted horizontally to receive the outer ends of the yoke, where they are jointed by pins or screws. The yoke is made in two parts. Horizontal bars project from the side bows and lap past each other, and work on the draft pin, which pin passes
through both bars. The ends of these bars play up and down to
ccommodate the position of the horses.
mproved Umbrella Support for Vehicles.
Alexander J. Hood, Warren, Il.-This detice is designed for supthe seat, having an adjustable grooved arm and band for holding the staff of the umbrella.

Improved Clothes Pounder.
Chauncey B. Hart, Fairport, N. Y., and George W. Hart, Medina of them by atmospheric pressure, and then allowing them to be again saturated. There is a disk of wood or metal, to the outerside
of which is attached a handle. To the under side is attached the end of a coiled spring. The last coil at the other end of the spring is attached to a metallic ring. The head and the ring are also conedges of the said head and ring. In the head are formed holes which are covered by valves opening downward. In using the deviee, it is placed upon the clothes in a tub, and the head is forced downward
by means of the handle. This compresses the air and forces it into and through the clothes, driving out the water. As the head is which onables the device to be raised and again operated upon some which enables the device to be raised and again operated upon some
other part of the clothes.

Improved Hat.
John Case, Alexandria (Frenchtown P. O.), N. J.-This hat is composed of an outer conical portion attached to a hat of the ordinary tween the two parts. The outer conical hat is supported on the rown of the inner hat, with its lower rim extending down to about a level with the brim of the inner hat. The two parts are joined or connected at the crown angle of the inner hat. The object is to teave an air space.

## mproved Horse Detacher

Amos Barker, Nebraska City, Neb.-This consists in the applica-
tion, to the single trees, of an armed vibrating rod, operated by cord tion, to the single trees, of an armed vibrating rod, operated by cord or chain, in connection with pivoted hooks for attachment of the traces. The traces are released by pulling a cord which withdraws
curved arms for the pivoted half circle hooks. The neck yoke then moves forward upon the tongue, the cord will turn the rod, withallowing the neck yoke to drop, and the horses will be entirely fre from the vehicle.
Simeon Improved Middlings Purifier.
Simeon Crittenden and James Waters, Chatfield, Minn.-In the dings and feeds them in a thin sheet to the bolt, which is hung in a slightly inclined position from the casing by pivoted arms. The bran escapes from the tail end of the bolt, and the floar passes through the bolt cloth and falls upon zigzag plates, the ends of which are inserted in grooves in the side bars of the frame, which
last is agitated by a pitman. As the flour from the bolt falls upon the plates, it slides down upon sald plates, passes through the nario lits between their lower cdges, and falls into the upper carrie rough. A number of plates are placed between the zigzag plate plate rises above the preceding plate from the head end of the ma chine toward its tail end, to prevent the flour passing in that direc tion. In the head end of the machine, between the zigzag plates and the upper carrier trough, is placed a fan blower, the wind from
which is discharged into the machine below the zigzag plates. The which is discharged into the machine below the zigzag plates. Th blast from the fan blower is directed upward by the inclined plates, and is divided by the graduated hights of caid plates, so as to be
about equally distributed from one end of the machine to the other
Improved Binding Attachment for Sewing Machines. Hamilton C. Jones, Brooklyn, N. Y.-This is an improved binding attachment to sewing machines, by which the binding is fed in a ven and regular manner with the material to the presser foot an to the goods, and the binding laid neatly in proper width on turnin ngles or abrupt circles. The invention consists of a spiral adjusta ble rear guide, and a double tapering front guide, with extension rm or tongue at the lower guide scroll for the under fold, and a ing the double folded binding and intermediate material to th presser foot and needle.

## Improved Butter Package

Henry R. Scott and Dennis W. Granger, Franklin, N. Y., assignors themselves and Andrew J. Dibble, of same place.-The body of the package is made rectangular, with slightly flaring sides and ends. ars attached to attached short upright bars, which are fush with latter bars enter mortiseson the upright bars. Spring catches ente oles in the edge of the cover, and thus lock the cover in place upon the box. In the catch holes are placed small sliding bolts, which, when pushed outward, push the catches outward, and thus

## Improved Plaster Sower.

Frank Cbarles Moder, Hortonville, Wis.-The box is provided with crooked stirrer and reciprocating distributor, the one keeping th plants.

Improved Thill Loop.
Frank S. Beriy and George F. Alexander, New Sharon, Me.-This an improved thill loop for single harness for supporting the thills, which is so constructed as not to wear the thills or their patent eather covering, when covered.

Improved Table.
Louis Postawka, Cambridgeport, Mass.-This is a fastening for table standard legs. The stand consists of a headed and end-threaded bolt, and a tubular filling, which is let into and adhesively secured

Improved Device for Forging File Blanks.
Theodore L. Grover, Brooklyn, E.D., N. Y., assignor to Bertrand Clover, N. Y. city.-The dies are made with reduced or contracted parts for drawing the bars down to form the blanks. There are also smoothing faces for smoothing and finishing the wide sides,
and a recess in the upper corner of the stationary die, in which to號
Improved Cultivator.
Amos B. Colver, Albany, Oregon.-This invention consists mainly in the mode of raising and lowering the entire plow frame and at
taching it to the wheel frame. When a main lever is lifted by the caching it to the wheel trame. When a main lever is lifted by the
driver a seat on the rear axle, the whele plow frame is acted upon by the connecting front and rear links, and lowered toward the ground for the work of the plows. By pressing the mann lever
down, the plow frame is raised to sufficient length above the ground

## Improved Churn.

Benjamin F. Price, Mount Sterling, Ill., assignor to himself and A
A. Hill, of same place.-A coupling enables the dasher shafts to A. Hill, of same place.-A coupling enables the dasher shafts to move up and down in vertical lines while the upper ends of the connecting rods move through the arcs of circles. The dasher shaft
pass down side by side through the churn cover. The dashers which are placed the one directly above the other, are attached eccentrically to the lower ends of the shafts. In the dashers are ormed a number of holes, which flare upward and downward from pass through freely, which subjects the milk to great friction, and brings the butter very quickly

## improved Lamp Burner.

James Pigot, Brooklyn, N. Y.-A prolongation of the lower portion of the air tube, in the form of a flat partition plate, separates he flat portion of the wick tube into two parts. Springs are employed in connection with the partition and ratchets, for pressing the wick into the ratchets with uniform effect for thick
ones. Improved Car for Elevated Railways.
Roy Stone, Vandalia, N. Y.-This is an improved car for that class of elevated railways which are constructed on three rails supported on a longitudinal girder stretched from column to column, the car being placed thereon in the nature of a saddle bag, with symmetri-
cal parts at both sides of the girder. The car is surrounded by plat cal parts at both sides of the girder. The car is surrounded by plat ccess to all the seats.
Combined Blotter, Papcr Cutter, and Ruler.
Frank R. A ngell, Los Angeles, Cal.-This is a paper cutter rule
haring two cross slots a toneend and a single cross slot at the other haring two cross slots a toneend and a single crnss slot at the other
to admit of receiving blotting paper.

## susiness aud wetsoual.

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battery. Send for circular. Warner Bro, Syracuse, N. Persons having new or second hand Iron Work-
ing Tools-say Planers, Lathes, Drills, Power Hammers, all medum sizes-addrees, with particulars, willam The Best Wooden Pulley made; fastens without
kess or set screws. Adjustable Dead Pulless stop loose pulieys and belts when machinery to which they belon is not in motion. Cold Rolled Shafting, Improved
Inngs and Hangers. A. B. Cook \& Con.. Erle Pa.
Goo. P. Rowell \& Co.. 41 Park Row, New York.
It is in :eed no surprise that their house tis so prosperous, and that they are the leaddng advertising agents in the
world. We would prefer, so far as we are concerned, to have a colounn or more of miscellaneous advertisements
trom this frm, than to recelve the same from this frm, than to receeve the same amount made up
of one direct from each house on their llit. mission allowed ts saved us by loses, as they pay every cent they contract for, and pay it promptly, and the keep. santer than with the thousand pereons whom they send us advertisementsfor. They do an honorable, legitlimate bu-
siness,on a business basis. If publishers, havving deallings with them, want anythng in their lline-and they supply everythng fron a spring bodkin to a cyllinder press-
types, Inks and all, they all thelr orders prompty, at man. ufacturers' prices, and we can say that we have receeved the best newspaper and book tnk ever furnished us and a
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## 

R. J. can dye cotton goods by the process
described on p. 405, vol. 29 .-A. J. B. can proportion his safety valves by the formula given on $p$ 363, vol. 29.-R. N. can make lard oil by the process given on p. 283, vol. 30.-R. S. T. will find a good
recipe for furniture polish on p. 315, vol. 30.-R.N. S. can blue steel by the method detailed on p. 123 ,
vol. 31 . - N. T. will find, on p.58, vol. 24, descriptions of various processes for molding.
(1) J. W. R. says: I have a boiler 16 feet
by 40 inches, with 2 flues of 14 inches each and a 30 foot stack. My engine is 8 by 16 inches, running at 180 revolutions, and it does good work at 50 to 80 lbs. of steam. Butit costs me all I make to pay
for wood for fuel, burning 2 cords per day. I think my work ought not to take over $3 / 4$ of a cord per day. Is there really that difference between boiler? A. We do not think that the amount of fuel burnt is excessive. Measure your feed water f possible, so as to get some idea of how much water is evaporated.
(2) F. S. S. asks: Will the flesh or grain
side of a belt give the most friction? Which will wear the longest? A. A belt should be run with the grain side next the pulleys for both reasons. (3) C. M. asks: Is there any cement that or a long time? The metal runs at about $1,200^{\circ}$ Fah., and it is necessary that the mold should get very hard, have a good polish, and not contract or expand more than iron. A. No. Iron is best. (4) G. B. P. asks: What is saleratus?
t is bicarbonate of soda.
(5) W. P. says: In your issue of April 10
1855, C. H. P. asks: What is the difference between one square mile and one mile square? You answer: None. You are wrong. There is as much difference as between a circle and a square. A mile square is a square surface having sides each
a mile in length. A square mile is a unit of area and may be of any shape ; and although it may be a mile square, it is not necessarily so. A. You are ound by subtracting one from the other. If no thing remains, what is the difference?
(6) J. H. F. asks: In building an ice house, constructed a dumb waiter which I can lower to same level as bottom of house. I am told tha Whatever is put therein, as meat, milk, butter, waiter slides. What is the best plan to overcom this? A. Try two coats of paint without turpen tine.
(7)
(7) A. F. says: I have had the walls in my house painted with oil color, and find that those parts from which the light has been excluded (by the hanging of pictures or other articles) have of removing these stains? A. Peroxide of hydro gen and ozone have been recommended in such cases, but their application is difficult.
(8) O. P. asks: How many pounds to the Is it possible to distinguish the electricity o ron, copper, brass, etc.? A. No.
(9) G. L. S. J. asks: 1. Which contains the most electricity, air or water? A. There is no
practicable means of ascertaining. 2. What num pracdicable means of ascertaining. 2. What numwind magnets for a line of $31 / 2$ miles ? A. No. 24 B. W. G. 3. What form of battery would you recommend for such a line, with ground plate for
the return circuit? A. The gravits or Callaud.
(10) F. P. asks: 1 Will winter apples keep as well if grafted upon the stock of a fall appleas they will upon the stock of a winter appie? A. Yes. 2.1 set the graft with the end of the grain of the graft meeting the side of the grain of the
stock, or with the end of the grain of the graft meeting the end of grain of the stock. Which is
(11) C. S. C.-Your boiler is too small
(12) A. P. F. asks: If two engines and trains of equal weight and resisting power, both
moving at the same speed, should approach each moving at the same speed, should approach each train prove a greater wreck than if, running a the same speed, it had impinged upon an immova ble object? A. Either train would have the same
effect upon the other as an immovable body; for the reason that, at the time of collision, the mo tion of each train would be instantaneously ar rested. At all events, we are confident that the wreck wou
the other.
(13) Inquirer.-The solid column of iron will support a greater load than the hollow co umn, both being of the same diameter.
(14) S. asks: 1. What are the dimensions of thedry dock at the Brooklyn navy yard? A. It feet long and 98 feet wide at top, with a loc chamber by which the length of the dock can be increased 52 feet. The bottom of the dock is 26
feet below mean high tide. 2. How long does it feet below mean high tide. 2. How long does it
take to empty it? A. The dock, when flled by the take to empty it? A. The dock, when flled by the
tide, contains about 600,000 cubic feet, and the 10 minutes.
(15) J. F. M. asks: How much steam ought single riveted, length 3 feet, diameter 22 inches, with a number of pipes connected to boiler fo grate bars, and a dome 1 foot in diameter and feet long, to carry? A. You can carry 130 lbs .
steam; and then you can find out how fastyour oat go
(16) R. B. C. says: I am building a pro peller boat for thing, 60 feet long, $141 / 3$ feet broad,
and 7 feet deep. I am going to put in a $16 \times 16$ inch cylinder, and want to make 150 revolutions pe wheel? A. Make a true screw, pitch $81 / 2$ to 9 feet. formance of the boat
(17) S. B. McC. asks: 1. What kind of coa is used in the foundery business? A. You can use
charcoal, anthracite, soft coal, or coke. 2. How much iron would 1 tun of good coal melt? A With hot blast, about 1 tun.
(18) C. M. B. asks : 1 . What is an oscillating engine? A. One in which the cylinder swing during the revolution, the piston rod being con
nected directly to the crank pin. 2. What is the meaning of back lash in an engine? A. The striking of one connection against another, due to a stoppage or change of motion of one of the con-
nections. 3. Why do all tugs use upright engines instead of horizontal ones? A. On account of the economy of space and the facility of arrangement,
together with considerations of cost, weight, and together with considerations of cost, weight, and
durability.
(19) L. D. L. asks: What is the water pressure per square inch at the bottom of a pipe
100 feet in perpendicular hight? A. About 100 feet in perpendicula hight? A. About (20) J. K. asks: Please give me a rule for the radius to be taken, in proportion to the diameter of saw? I want to lay it off for gumming the depend up have no further trouble. A. It will of the saw, and continue the backs of the teeth
(21) E. S. M. Says: I have a yawl 24 feee rate of 6 or 7 miles an hour. What should be thdimensions of boiler, engine, and screw? A. En-
gine 3 by 5 inches, propeller20 to 24 inches in diameer and of $23 / 4$ to 3 feet pitch. Boiler 24 to 30 inch diameter, $31 / 2$ feet high.
(22) G.E.R asks: In screwing gas or steam ofe, what number of

Taper of threads, $\frac{1}{16}$ per inch of length. These inipes of different strength, the thickness varying or the different grades, and the outside diameter emaining the same.
(23) P: R. says : 1. A friend states that the ere storm, swing from 200 feet high will, in a sedicular. II say it is simply impossible. Which is My fien woula be possible, but improbable. My friend also says that, somewhere in Europe, there are very tall towers or chimneys considera-
bly out of perpendicular. Is this so? A. You doubtless refer to the Pisg is 315 feet high, and plumb line from the top of the inclined side will meet the ground 12 feet 4 inches from the base. The tower of Bologna is 134 feet high, and a plumb ne falls 9 feet 2 inches outside the base.
(24) G. L. R. L. asks: What would be a diameter, with four 1 inch tubes, made of sheet copper $\frac{1}{32}$ inch thick? A. From 15 to 20 lbs. per uare inch.
(25) A. M. G. asks: What is meant by "a
win screw propeller?" A. Twin screw propellers twin screw propeller?" A. Twin screw propellers
are two propellers side by side. These propellers re commonly called twin screws. For informaconsult some or treatise on the screw pround as their discussion would occupy too much space for these columns.
(26) H. K. asks: 1 . Will a boiler 24 inches ong, 15 inches in diameter, with 5 two inch return
ues, produce steam enough to get the full working capacity out of a $11 / 6 \times 3$ inchesengine? A. Yes.解 with safety ? A. Do not run it above 40 lbs .
(27) R. A. P. asks : 1. I claim that the shorting at that an exhaust one hundred feet high of 4 inches diameter to an engine $12 \times 24$, making 95 revolutions per minute (side valve cutting of at $\boldsymbol{y}_{4}$ stroke), vould be beneficial. They claim that the steam passing through that length of pipe would prouce a vacuum. and the steam would rush from
beneath the valve to fill the same. Is this so? I claim that, if there be a partial vacuum, the exhaust produces it; and if we can produce a vacuum in that length of pipe, without loss of power, why not make use of all the exhausts that are puffing outside of our numerous manufactories?
A. We doubt the formation of a vacuum in such
(28) R. S. E. says: I want to make a piston to work inside a sheet copper cylinder, for holding oil, and I wish to have the piston move easily.
What is the best material? A. Make it either of wood or metal, and pack it with hemp.
If I put a coiled cast steel spring in connection where the water can touch it, shall I run a risk of drawing the temper? A. The spring will retain is temper for some time under these circum. stances, but not as long as under ordinary temper-
(29) C. B. D. asks : For an engine of 3 inches stroke and 2 inches in diameter, what sizc boiler A. Make the boiler of wrought iron, 20 inches in diameter and 3 feet high.
(30) H. G. H. says: A steam gage is found by a test gage to show a pressure of but 130, when
it should have shown 185 lbs. per square inch. Is correct to say that the gage is 55 lbs. light or 55 bs. heavy? A. The former would be the more
(31) S. M. asks: We run a $4 \frac{1}{2}$ horse power
upright engine and boiler. Last winter we inupright engine and boiler. Last winter we inserted a pipe to convey steam for beating purposes,
and from it connected another pipe to heat water in a tank. We found it impracticable to run the ter rising in the ooiler and into the cylinder. What is the cause, and what the remedy? A. Either the steam room in the boiler is too small, or the connections are
(32) A. P. asks: How can I deodorize kerosene oil? A. Digest the oil with a quantity of chloride of calcium reduced to a fine powder, at a days. It should then be drawn off from the limey sediment and treated with a little carbonate of off, and the oil washed with water.
How is dammar varnish made? A. It is formed by dissolving gum dammar in oil of turpentine.
Can the coloring matter called reginine be obtained? A.Yes, in the shops.
(33) T. M. C. asks: What is the best reme do prevent unpleasant odors from the feet
(34) R. B. N. says: We cut muriatic acid with zinc, then dilute with $2 /$ water, to soldarer tin.
Are the fumes, arising from soldering with this production by the asplication of hot coper, injurious to health? A. Yes.
In canning lobsters, we do not use the bodies. Can they beutilized by being converted into guano
or manure? A. They may be used directly as a or maner
manure.
Thave replaced the copper used in soldering tin,
with cast steel; can I tin the steel to stand heat permanently? A. Use a coppered iron.
(35) F. B. G. asks: What can I use as a
solvent for marine glue which has become hard solvent for marine glue which has become hard
with age, so as not to destroy its adhesive properties? A. The proper solvent for this is ether containing little alcohol, in which it dissolves with
the aid of heata and agitation. The operation
. should
fame.
(36) J. C. R. asks: 1. What are the analyses of oxide of zinc, red lead, litharge, and raw
and boiled linseed oill? A. Oxide of zinc iscomposed of zine 65 parts, oxygen 16 parts, litharge of
lead 207 parts,, oxgen 16 parts. Red lead consists of lead 621 parts, oxygen 64 parts. Linseed oil consists of 76 parts of carbon,11 of hydrogen, and 13 of oxy gen. The boiled is the raw oil heated with litharge.
2. Why does litharge dry so much faster than oxide of zinc, when mixed with linseed oil? A. Because drying results from the absorption of oxy-
gen from the air, and this result is more promoted by the litharge than by the oxide of $z$ inc. 3. What pigment is of a nice orange color, suitable for
striping striping ? A. Try chrome yellow. . . How can lin-
seed oil be refned and bleached?
A. By successive treatment with acid, alkali, and water. 5 What is oxychloride of zinc ? A. It is a combin2-
tion of zinc, oxygen, and chlorine, made by unio tion of zinc, oxygen, and chlorine, made by
of the oxide of zinc and the chloride of zinc.
(37) L. K. Y. asks: Is the band saw pat ented? A. No.
What does 1 oz. of pure sheet silver cost, and 1 oz. gold ? A. One oz. ot pure gold will cost about
$\$ 25$; of silver, about $\$ 1.50$. In what kind of oil or solution should I harden
my steel burnishers? A. Any fatty oil will answer.
(38) A. M. H. asks: Considering iron pyrites
Fe $\mathrm{S}_{2}$, what would be the formula for the resi as $\mathrm{Fe}_{2}$, what would be the formula for the resi-
due when as much sulphur as possible has been driven off by heat? Some of the books say $\mathrm{Fe}_{3}$
$\mathrm{~S}_{4}$, others say Fe S . Which is right? A. When iron pyrites have been subjected to roasting, it has been found that it has assumed magnetic progated the matter), its composition is $\mathrm{Fe}_{7} \mathrm{~S}_{8}$. This has been con firmed by Rammelsburg.
(39) C. L. says: For soldering and other blowpipe work, alcohol at $\$ 3$ per rallon is too ex-
pensive, and we have no pensive, and we have no gas. What can I burn in
place of alcohol that will burn freely, be clean, place of alcohol that will burn freely, be clean,
and get up heat enough to melt gold or silver on and get up heat enough to melt gold
a piece of coal? A. Rape seed oil.
(40) O.U. asks: 1. Of what cloth are artificial A. Usually of the fine isossy gill stuaf put on them? A. Usually of the fine glossy silk stuf known as tar-
feta. The taffeta is dyed of the proper green in the piece before cutting out. It is then stretched out to dry, and afterwards further prepared with gum arabic on one side, to represent the glossy upper surface of the leaves, and with starch on the other, to give the velvety appearance of the under side. The latter preparation,colored to suit the exact shade of green to be given to the leaf, must ne just of to proper con limp, whaking the leaf proper kind of under surface. Where the leaf requires a marked degree of this vel vet texture, itis given by the nap of cloth, reduced to a fine powder and properly tinted. A little gum is lightly passed over the surface, and when partly dry this powder is dusted over the surface, the superfluous
portion being shaken off. 2 .Are the veins and colportion being shaken off. 2.Are the veins and col-
oring done by hand?
A. For giving to the leaf oring done by hand? A. For giving to the leaf
the appearance of nature, by representing the the appearance of nature, by representing the
veins and indentations which they always exhibit, uffering tools are made use of
(41) J.B. H. asks: 1. Can I correct my clock by the ald of the almanac? A. Find the moment almanac calculated for that meridian will give you
how much the sun is fast or slow for that day, which will be the correction required. 2. How is it that the almanacs differ as to the time of sunrise,
etce, at any given place? A. They should not if etc, at any given place? A. They should not if
properly calculated for the meridian of the place. (42) T. G. B. asks: Can kalsomining be done on a papered wood ceiling, and how should it
be mixed and put on? A. Yes; use a large probe mixed and put
portion of glue.
How can I clean up an old gilt window cornice ponge and tepid water.
If a body in motion strikes another body of equal weight at rest, which receives the greatest shock? A. The shock will be mutual and equal.
How is dry steam made?
(43) W. T. G. asks: Please pive me a re cipe for making a gold ink. A. The ordinarygold writing ink is made by simply mixing gold pow-
der with some mucilaginous liquid, in which the very finely divided powder is held in suspension. (44) D. W. S. says: I have made a mixture of equal parts of strong lye and water, saturated
with sulphate of copper, ma obtained a green mass of the consistence of cream. What is is? $A$ A. The
addition of an alkali to a solution of sulphate of addition of an alkali to a solution of sulphate of
copper is always accompanied with a precipitate copper is always accompanied with a precipitate
of hydrated oxide of copper, which is insoluble. This body is of a green color, and has simply rendered the solution turbid.
How is verdigris made? A. Verdigris is a sub-
acetate of copper, and is formed by placing plates
of the metal in contact with the fermenting mass of the etal in contact with the fermenting m
of the grape, or with cloth dipped in vinegar.

What is glass etching, and how is it done? A. It
is the art of produciog designs, etc., on glass by the corrosion of its surface by means of hydrofluoric acid. The glass is first coated with a thin fllm
of wax, through $m$ hich, to the surface of the glass of wax, through which, to the surface of the glass,
the lines of the drawing are cut with flne steel instruments. On submitting the plate so prepared
stan only, immediately unde the surface of the glass wax, is reached and acted upon by the acid.
How can I make a small hand stamp? re several methods that accomplish this; one he best is that known as the woodbury process, which consists in first photographing the object of a platin, prepared with a solution of biction of light on which is to render the bichromate insoluble. Upon immersion in water, the parts of the plate not affected by the light dissolve out, leaving the picture standing in relief, which, on drying, becomes very hard. It is ubmitted to great pressure in a hydraulic press. The zinc die thus produced is used for printing. How can It ransfer engravings on to plate glass? A. Fix the engraving to the glass wlo ordinary ty 114. At the end of a few minutes, wash of解, the printer's ink having protect upon tit.
un
(45) A. Z. asks: What will neutralize tartaric acid in sugar or candies? A. Freshly precipbut it will be neeessary for you to experiment with small quantities of the sugar until the proper
proportion is determined. Care should be take proportion is determined. Care should be taken
that the acid should always be slighty in excess of
(46) H. S. asks: ter be heated to become stea $m$ ? If there is a cernecessarily is all of the same temperature) all go of into steam at once? A. The speciflc heat of water is found to be the highest of any known
substance, and is taken as unity. If we take an ounce of water at $170^{\circ}$ Fah., and an ounce of ice at $33^{\circ}$, and put them together, we shall have, when
the ice is melted two ounces of water at $32^{\circ}$. The the ice is melted two ounces of water at $33^{20}$. The
ounce of water has therefore parted with $142^{\circ}$ of its heat in melting, the ice, which heat is said to have become latent. Water, at the normal atmosparicum of temperature. Here again this apparent anomalous phenomenon occurs. As the
temperature of the water reaches $212^{\circ}$, it becomes stationary; any further addition of heat is absorbed in converting the water into steam, which has the exact temperature of the water that pro-
duced it. Here also heat has been rendered latent, with an accompanying change in form of the water. As from ice to water, so from water to steam; On condensation of the steam and recongelation of condensation of the steam, and recongelation by the body is given out. A certain weight of steam condensed, at $212^{\circ}$, gives out $950^{\circ}$ of latent heat. In its descent from $212^{\circ}$ to $32^{\circ}$ it tives out
$180^{\circ}$ of sensible heat, and again in its recongela-ion it restores $142^{\circ}$ of latent heat, amounting to gether to 1,272 . Pressure influences the boiling point of water, and for that reason water may be ure) so as to melt lead. Likewise as the pressure decreases, the boilling point is lowered. At the hospital of San Bernard, in the Swiss Alps, which
8,400 feet above the sea, water boils at $184^{\text {F }}$ Fah
(47) G. A. F. asks: How can I tell if a piece ored? A. By seeing whether rubbing with benzine affects the color, also whether, on careful
heating as near redness as can be done safely, the color changes or blackens.
(48) A. H. W. G. asks : I intend making mall quantities of nitrate of silver. What kind wood? A. A stove of suitable form will answer the purpose.
In making
In making a swimming belt, what weight of cork is necessary for supporting a man of 1701bs.weight, and what kind of cloth should be used for cover
ing? A. About 10 to 12 lbs. cork. Use canvas, light duck.
Have photographs ever been taken with the nat What is a good work on founding and casting etc, and on beet root sugar? A. Ure's Dictionary is an excellent authority on all the subjects you
(49) F. C. asks: How can I detect adultera-
tions in claret wine? tions in claret $\begin{aligned} & \text { mine ? A. Such tests are too com- } \\ & \text { plicated for description here, and require a consid- }\end{aligned}$ plicated for description here, and require a consid-
erable knowledge of chemistry to be at all satisfactory.
(50) S. G. asks: Can you tell me of an easy
way of separating waterinto its parts, and burning the gas? A. Water is decomposed when it is made part of a galvanic circuit of an adequate electromotive force, the oxygen being freed from the
positive pole, while the hydrogen is found at the pegative. Tue gases may without difficulty be collected separately, and burned in a compound blowpipe; but the experiment is a costly one.
(51) J. A H. asks: What is burnt lead? A When metawiead is exposed at a high tempera-
ture (above $612^{\circ}$ Fah.) to the action of the air, it is rapidily converted into theo oxide, which has theap-
pearance of small beautifully colored yellow flakes or leaves. This is readily soluble in weak acids.
(52) W. S. asks: What tests are used to detectacids in oils? A. You do not state what kinds
of oils. If free acids be present, the addition of a little concentrated solution of carbonate of soda to a sample of the oil will immediately cause an
effervescence to take place.
(53) F. H. Jr. says:I have drawn some portraits in pencil on common drawing paper, and a
few of them became soiled by handling. I want o go over them again with India ink. In what can dissolve the ink so that it will not blur when water, will not rub off when dry.
Is not the earth about as heavy now as it was at the constant falling of meteoric masses from the depths of space upon the earth's surface.
What arc the two specimens enclosed? A. Iron
(54) J. B. B. asks: What is decarbonized steel? A. It is a fancyname given to the material
(55) T. S. S. says: We wish to run a mill-
stone by a belt. There is not room enough bestone by a belt. There is not room enough be $t$ ween the timbers to use a 12 inch belt. I say that
we can use two 6 or 7 inch belts, one on top of the other, on the same pulley, and get the same power that would be given by one 12 or 14 inch. My
partner says we cannot. Which is right? A. The driving power of a belt depends upon the friction between it and the pulley; and this, in turn, depends upon the pressure or tension of the belt. Two belts being twice as strong as one, the ten-
sion can safely be doubled. Hence you may do sion can safely be doubled. Hence you may do
the work of a 12 inch belt with two 6 inch belts, one above the other. There are some practical difficulties in the way, however, and you can read-
ily put in an angular belt, which will do the work ake up less room.
(56) S. says: 1.1 am building a small engine of 4 inches stroke and $21 /$ inches diameter. How
large should I have the ports? A. Make the port
and area from $\frac{1}{20}$ to $\frac{1}{36}$ the area of the piston. 2 A. Thin rings without springs will answer for pis ton packing.
(57) W. B. M. says: In reply to the quesgines) is required to drive a 15 inch circular saw in 6 inch soft wood? You answer: "From 12 to 15 h orse." I differ with you on this point, as I know
ot a 9 horse power engine which drives a 48 inch circular saw. A. By reading our reply again, you will see that the power was given for driving the
saw up to its full capacity that is, at tre gre saw up to its full capacity, that is, at the greatest
speed and with the largest feed that could be
(58) H. L. K. says: A friend says that the pressure of steam has nothing to do with calcula-
ting the power of a steam engine, provided the ting the power of a steam engine, provided the en
gine has a governor on it; he contends that an engine working at 20 lbs. pressure will do as much work as it would working at 90 lbs. pressure. claim that the power is calculated by the pressure
of steam, length of stroke, and diameter of piston. Which is right? A. You are.
If a heary weight were let fall into the deeper parts of the ocean, would it reach a point where it would remain stationary before it comes to the It is said that ship on the icean draws less $w$. ter as it recedes from the shore, and that in fresh water a boat will gradually rise as it removes from the shore. Will the saltness of the water in the for these facts, provided they are true? A. Yes. How do you account for this apparent inconsis tency: A meat diet shortens life, yet life may be prolonged by food which supplies the waste of the
system? A. Who is responsible for the statement
thata meat diet shortens hife?
(59) J. R. E. asks: I would like to know wheel on nearly level land to a distance of 1,000 feet? A. The most economical system under or-
dinary circumstances will be by means of a wire ope.
(60) H. H. C. asks: Is there anything less lean for making steam in a small boiler fitted in boat $31 / 2$ feet long? My lamp uses about a pin of alcohol in two hours. I have tried kerosen and found it too smoky. A. There are lamps for
burning kerosene that do not smoke and are quite effective. Wedoubt, however, whether you can flind anything that gives so little trouble, and is so generally satisfactory, as alcohol
(61) M. G. asks: In a steam boiler, with the team up, is the pressure more or less below the ater level? A. The pressure is least at the top or the boiler, and increases towards the bo
by the weight of the steam and water above.
(62) J. W. M. asks: Having occasion to pen the steam chest and cylinder of my engine neither of which had been examined for more
than a year, I found the flanges under the rubber packing eaten into hollows about half way across.
When cleaning I found the metal in these place When cleaning I found the metal in these places
would cut like, and had all the appearance of would cut like, and had all the appearance or, plam bago. The joints thus affecter were all be-
low the tallow cup. The cylinder (on the upper side principally, and close to the covers) had holOows eaten into it; from one of these hollows I scraped the enclosed sample. The interior of the piston was nearly solid; ; and in cleaning away I quarter of an inch deep. Can you tell me the cause of the corrosion? Is the enclosed simply rust and grease, or has the iron undergone some
chemical change?
A. It was no doubt caused by chemical change? A. .t was no doubt caused by
impurities in the tallow. The iron is chemically changed, being converted into an oxide, which resembles plumbago. The use of tallow is becoming less common, as engineers discover its effects. but little of the tallow that is sold is pure.
(63) R. C. asks: How can I mend the of glase over of an aquarium? A. Fasten a strip or a cement white shellac dissolved in $1 / 2$ its weigh of Venice turpentine.
(64) W. E. C. asks: What is the shortest nethod for finding the amount of water in a plain
clinder boiler when partially filled? A. Find cylinder boiler when partially filled? A. Find
the area of the cross section of that part of the be area of the cross section of that part of the
boiler which is fllled with water, and multiply by boiler which is filled with water, and multitily by
the internal length of the boiler. You will find rules f
ration.
(65) A. F. H. says: In a communication about tides, it was claimed that the Hudson river was 25 feet lower at New York city than at Troy,
N. Y. Is this so? A. No. The fall from Albany . N. Is York city is only 5 feet.
If a steamboat going at 20 miles an hour bas oc-
casion to ber casion to back, how is sufficient power applied at
te dead centersto overcome the resistance of the water against the overcome the resistance oower is exerted at other parts of the stroke, and the vheel is generally counterbalanced.
Can an ordinary riffe ball
Can an ordinary rifle ball (60 to the lb.) be ropped from a hightsufficient to perforate a two
hch oak plank, upon striking the earth? A. We think not.
(66) E. N. B. asks: How fast should a $\nrightarrow i$ inch oo 175 revolutions a minute.
(67) A. S. says: I have a steam engine, of Which the lid of the steam ohest has a hole about
$1 / 4$ inch in diameter, probably the result of bad inch in diameter, probably the result of bad
casting. I have poured melted Babbitt metal into it, but it will not last. I cannot put a screw tap ont it. How can 1 plug it A. Araze a plug in.
nto My cold water pipe is of lead, and it is very
troublesome to keep the joints tight. I always troublesome to keep the joints tight. Taways of white lead, and wrapped tight with string. Can ou tell me of some other means of closing these Theplan you follow is the best urder these cirumstances, if you cannot solder the joints; butif ou can get at them to wrap the
Can I Ind the horse power of a machine when he pressure of steam in the boiler is known? A. (68) J. H. P. asks: Will a coil of steam pipe heat a kill
steam? A. No.
(69) C. W. M. asks: 1. How can I remove lime deposit or scale that has formed on the botom of the boiler, and how can I prevent its form-
tion? A. Try some of the scale preventives that have been noticed in our columns. 2. Should a boiler be reflled immediately after being blown off, oral. 3. In what manner is it best to treat a boiler that is not going to be used for a long time? A. Either dry it thoroughly and give it a coat of oil, or leave it full of fresh water. What is the best method of grinding a spindle
valve? A. There are several machines for reatting alve A.l ere are several machies rory satisfac valves and seat
tory results.
(70) W. says: 1.I want to run a 58 inch saw at
00 revolutions. It will be run from a shaft, which 01so revous several other, smaller saws. Engine is 15 inches diameter $x 3$ feet stroke, with a wheel 10 feet in diameter. Saw pulley is 2 feet in diameter. What is the best practice as to speed of engine?
A. If the engine is in good order, you can run it I 75 revolutions a minute. 2. What should be the size of the pulley on shaft? A.You can drive the This will give you an idea in regand to the size of pulleys.
Minerals, etc.-Specimens have been recived from the following correspondents,and xamined, with the results stated:
W. J. W.-It is a micacoous hematite. It is use-
ful for iron ore, and for making a sparkling paint, ful for iron ore, and for making a sparkling paint,
or dusting fancy signs.-C. A. P.-It is magnesian for dusting fancy signs.-C. A. P.-It is magnesian limestone, and does not indicate the presence of
a water-bearing stratum.-G. M. F.-They are lead, zinc, and antimony.-R. G. V.-It is a decom-
posed magnesian mica, of no value.-W. L. K.-It is plumbago, but not entirely pure.- A. M. G. - No. isnot iron; it is a magnesian limestone containng a small percentage of iron. No. 2 is a highly
bituminous coal.-J. $F$. $W$.-lt is is kot kaolin ; it is sulphate of barytes sometimes used to adulterate white lead paint.-P. F.-It is bronze mica. See
Science Record for 1875.-I.D. Pr-It is plemer but very impure. It should be experimented upon to see whether it could be used for polishing or for crucibles, etc.-E. B. K.-It is black tourmaine, a hexagonal crystal. It is a compound of boracic and silicic acids with alumina, lime, magnesia, soda, and potash.-S. D. M.-These disks are
not fossils. They are marks of structure which are sometimes developed in anthracites as well as bituminous coals. The disks are frequently $11 /$ inchesin diameter, as may be seen in some of the England. These structural markings appear to have arisen from a partial attempt at crystallization or from a tendency to develop planes at right the formation of the coal, and at a time when it was being consolidated under an increase of press ure and heat.-J. H.-It is an impure steatite or oapstone. The brown specks are coatings of ox-

## COMMUNICATIONS RECEIVED.

The Editor of the scimentific Ambrican aoknowledges, with much pleasure, the receipt of or
iginal papers and contributions upon the following ubjects:
On the Locomotive. By J. F. J.
On the Use of Mosquitoes. By S. J.
On the Use of Mosquitoes. By S.
On Gas Lighting. By J.D. P.
On the Trevelyan Rocker. By R. S
On the Trevelyan Rocker. By R. S.
On the Earth's Aerial Motion. By D. L. C.

Also enquiries and answers from the following.
E.C.-J.F.-R. J. S.-F. C. W.-N. J. K.-R.F.-
-J. C. W.-J. G. A.-G.C.-W. T. D.-H. D.-J. S

## HINTS TO CORRESPONDENTS.

Correspondents whose inquiries fall to appear may conclude that, for good reasons, the Editor de clines them. The address of the writer should alEays be given.
Enquiries relating to patents, or to the patentab.lity of inventions, aasignments, etc., will not be puly are given, are thrown into the waste basket, as it would fill half of our paper to print them all; but we generally take pleasure in answering briefly by mail, if the writer's address is given.
Hundreds of enquiries analogous to the following are sent: "Who sells gas machines? Where can pure iron for chemical experiments be obtained?
Whose is the best oil can? Where can box corner rooviny machines be found? Whose is the best pump for mine purposes?" All such personal inquries are printed.as will be observed, in the column of "Business and Personal." which is special$y$ set apart for that purpose, subject to the charge mentioned at the head of that column. Almost any desired informanon can in thls was be expe ditiously obtained.

## COFFICIAL.

INDEX OF INVENTIONS Lecters Patent of the United States were

May 11, 1875,

## and EACH BEARLNG THAT DATT

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Ladder, step, Isaacs \& Halliday
Ladder, step. H. P. Stttcher.
Lamp chinney. mica, w. E.
Lamp, cooking, G. P. Houston.
Lamp black, apparatus for making, P. Neff
Lantern, lime-llight, L. J. Marcy Latc:1, gate, J. L. Glessler.
Leather-finishing machine, Leather-punching machine, H. P. Frien
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is usually glad to seek the aid of persons experiis usually glad to seek the aid of persons experi enced in patent business, and have all the work
done over again. The best plan is to solicit proper advice at the beginning. If the parties consulted are honorable men, the inventor may safely confide his ideas to them; they will advise whether the im provement is probably patentable, and will giv
him all the directions needful to protect his right.

How Can I Best Secure My Invention? This is an inquiry which one inventor naturally taining patents. His answer generally is as follows, and correct
Construct a neat model, not over a foot in any di-mension-smaller if possible-and send by express, prepaid, addressed to MUNN \& Co., 37 Park Row, together with a description of its operation and merits. On receipt thereof, they will examine the invention carefully, and advise you as to its patent-
ability, free of charge. Or, if you have not time, ability, free of charge. Or, if you have not time, as good a pen and ink sketch of the improvement as possible and send by mail. An answer as to the prospect of a patent will be received, usually by return of mail. It is sometimes best to have a search made at the Patent Office; such a measure
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> Preliminary Examination.

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To Nake an Application for a Patent. The applicant for a patent should furnish a model of his invention if susceptible of one, or if the in-
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