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

NEW YORK, NOVEMBER 30, 1872.


Ever since the breaking out of the Cuban rebellion, the manufacture of cigars in this city; by exiles from the " ever faithful isle," has been steadily : advancing to the position of a staple industry. Numerous factories have been established which, although they employ hand làbor solely, carry on successful competition with those in which the work is performed entirely by machtnery. The tobacco used is imported directly from Cuba, and costs from three dollars to ninety directly from Cuba, and costs from threc pound. American tobacco is not used, the manufacturers not agreeing in the general opinion that it makes the best wrappers.
On being received at the factory, the tobacco is first carefully inspected, in order to ascer tain its quality, and the leaves or fillers, which leaves or filers, which are to be used for the interior of the cigars, This consists in simply removing the large stem which passes through the center of each leaf The larger and finer leaves used for wrap pers, or outside coverings, are then treated in the same manner, and passed to the foreman who, after examining who, after examining them, distributes them to the workmen who make the different rieties of cigars.
It is a noticeable peculiarity in this trade, that each man knows how to make but one kind of cigar. The workman who makes a concha cannot make a regalia, nor is he required to do so, nor can an española be rolled by an espanola be rolled by the man whose special ty-is the partaga. For the benefit of our nonsmoking readers, we should mention, en passant, that a concha is a short thick cigar, its name being derived from its shape, having a fancied resemblance to that of a shell ; the regalia is generally large in size and finely fla in size and finely fla-
vored; espanola takes
its name from red and yellow ribbons, the colors of the Spanits name from red and yellow ribbons, the colors of the Span-
ish flag, with which the bundles of the cigars of that brand ish flag, with which the bundles of the cigars of that brand
are tied; and, finally, a partaga is of large size, rather long, and is named from the owner of the manufactory in Havana at which the variety was first made. Of course, there are countless other brands, all christened with different names, according to the fancy of their makers, but those above mentioned may be considered the principal ones and the most generally recognized throughout the trade.
Our artist has represented the workmen in the act of rolling the cigars. The process, although very simple and apparently remarkably easy to perform, nevertheless requires the greatest skill and long practice. The men are seated in rows, each one having before him, on his table, a thick slab of hard wood, and on either hand a heap of dampened leaves, consisting respectively of wrappers and fillers. A wrapper is selected, smoothed on the slab until it is free from creases and wrinkles, and then cut with a peculiarly shaped knife, somewhat resembling that used by shoemakers in trimming soles, into a nearly semicircular form. The workman then takes as many of the short leaves, to be use as fillers, as he thinks will make the cigar, in his left hand, and squeezing them into a loose bundle, places them on the wrapper before him. By a dexterous twist, the edges of the latter are brought up, a quick roll is given to the whole, and the bundle is tightly enveloped. The end for the mouth is now carefully manipulated into the required conical shape, and the point ly manipulated into the required conical shape, and the point
secured by a drop of paste; the other extremity is cut off secured by a drop of paste; the other extremity is cut off
smooth. The cigar is then placed on the slab, rolled a few smooth. The cigar is then placed on the slab, rolled a few
times under the flat of the knife blade, and it is ready for times under the flat of the knife blade, and it is ready for
smoking. This process, of course, requires a much greater

## [CIGAR MAKING.

expenditure of time than if the cigars were merely pressed into molds, but it has been found that those made in the latbesides inferior in many other respects.
Messrs. Mora \& Co., one of the largestmanufacturing firms in this city, inform us that the workmen are paid according to the number and quality of the cigars they roll. Makers of regalias receive $\$ 20$ per thousand, of conchas $\$ 20$, and of es poñolas $\$ 18$. An ordinary quick worker will finish two hundred cigars per day, and as many as four hundred are made by the oldest and most experienced hands. The men are all Cubans, and some of their customs would doubtless seem odd
in by a screw press; the cover is then nailed down, the Gov ernment stamp affixed, and the box is ready for the market In case, however, it is desired to press the cigars into those ir regular triangular or quadrangular forms in which they are sold, they are first dampened, then packed in bundles, and finally enveloped in strong wet paper. The latter, in drying, forces the cigars together, causing them to assume the required shape.
The stems and refuse of the tobacco are not uised. The odd ends or cuttings of the manufactory are sold in bulk for filling for cheap cigars, the wrappers of which are generally Connecticut leaf.


## CIGAR making.

to an American workman. They club together, contributing twenty-five cents a week each, with which they hire a fellow exile to read aloud to them during their work. The position is no sinecure, for the reader is expected to keep up an incessant flow of words from 7 A. м. to 6 p. м., with the exception of one hour's rest for refreshments. The workmen thus become posted in the news of the day, and in addition occasionally listen to the perusal of Spanish history, or some work of fiction. There is another tax which they impose upon themselves, to the payment of which they religiously adhere, which is to lay aside a certaln sum every week from their wages, to be sent to their struggling compatriots in Cuba, for arms and supplies.

The sorting of the different kinds of cigars, as regards strength, is carried on by another set of workmen, who seem to be possessed of the most unerringly delicate judgment. Standing before a heap of cigars, thrown indiscriminately on a table, they pick them out one at a time, hold them so that the light will fall on them from a certain point, instantly tell their exact grade of strength, and toss them to their proper heaps in almost a single motion and with incredible celerity. If the cigars are to remain cylindrical in shape, they are then tied in bundles, another proceeding requiring considerable manual skill. The ribbons to be used in fastening the bundle manual skill. The ribbons to be used in fastening the bundle together are first stretched out on the table, and the cigars
heaped upon them in quantities of twenty-five or more. The workman then takes the ends of the ribbons, brings them together, gives them another of those indescribable twists, ties the knots, and drops the bundle into the box in less time than
it has taken to pen this sentence. The bundle, however, is a little too large for its case, and consequently has to be forced

Steam Street Car. The Remington steam street car, from Ilion, N. Y. (Baxter's patent) heretofore described in the Scientific Amer ICAN, was AMER rcan, was recently brought to this city fully tried on the track fully tried on the track of the Bleecker street
railway. This road railway. This road runs through the most crowded and difficult parts of the city, its curves are sharp, and its grades unusually heavy ; it is safe to say that any steam carthat can pass over its track is able to meet the requirements of all city railway traffic. Some of the curves of the Bleecker street line are less than 50 feet radius, while there are grades as steep as 1 in 13. There are also innumerable crossings of other tracks to be passed, so that the difpassed, so thalties presented to the steam car, on this the steam car, on
line, are unusual.
We are hàppy to say that the Remingtoncar has proved a decided success. On the recent trial it easily turned the sharpest corner, and on the top of the steep grade in Elm street it was stopped eversed, and backed down the declivity, returning without the slightest hindrance. It is of the size of an ordinary street car, and has nearly the same appearance: the machinery, em bracing a compound engine of five horse power, occupying the front platform, which is also provided with a box con taining coal enough for half a day. A conductor and engineer only are required to run the car, which can be stopped very quickly by suddenly reversing the engine. With a lightload and on a straight track, it is said to have run at the rate of twenty-five miles an hour.

## Krupp's Steel Works.

The establishment of F. Krupp, at Essen, Prussia, manu factured last year $150,000,000$ pounds of cast steel, against $130,000,000$ in $1870 ; 8,810$ workmen, and engines amounting to 9,595 horse power, are employed. Five hundred and twenty-eight furnaces for smelting, heating and converting; 169 forges, 260 welding and puddling furnaces, 245 coke furnaces, 130 various other furnaces, 342 turning lathes, 130 planing machines, 73 cutting machines, 172 boring machines, 94 grinding benches, 209 various other machines, 174 steam boilers, 265 steam engines (from 1,000 horsepower downward), and 58 steam hammers (from 30 tuns downwards) are in use. The various articles manufactured consist xles, wheels tires for railroads, rails, spring for railroa nd tramua to plates, rollers, tool steel, cannon, gun carriages, etc.

Coats, the celebrated English thread maker, has moved his establishment to this country, and at Pawtucket, R. I. now has a large thread factory where he employs three hun-
dred persons.

## the institution of civil engineers.

The following list of subjects for papers for the Session 1872-73, has been issued by the Council of the Institution of Civil Engineers, Londo who invite communcations dealing in a complete and comprehensive manner with any of the subjects comprised therein, as well as upon others, such as:a. Account of the Progress of any Work in Civil Engineering, as far as absolutely executed (Smeaton's Narrative of the Building of Eddystone Lighthouse may be taken as an example.)
b. Descriptions of distinct classes of Engines and Machines
of various kinds. of various kinds.
c. Practical Essays on Subjects allied to Engineering, as, Sor instance, Metallurgy ; and
d. Particulars of Experiments and Observations connected with Engineering Science and Practice.
${ }^{\text {List. }}$

1. On the Application of Graphic Methods in the Solution of Engineering Problems, and in the Reduction of Experimental Observations.
2. On the Elasticity, or Resistance to Deflection, of Masonry, Brickwork, and Concrete, with observations on the Deflection of the tops of Bridge Piers, by unequalloading of the Arches abutting on them.
3. On the Methods of Constructing the Foundations of some of the Principal Bridges in Holland and in the United States.
4. On bridges of large span, considered with reference to examples, now in progress or recently completed, in the United States ; including an account of the testing, and of the effects produced by variations of temperature.
5. On the Theory and Practical Design of Retaining Walls for sustaining earth or water, and on experimental tests of the accuracy of the varions theories.
6. On the Different Systems of Road Traction Engines, with details of the results in each case
7. On the Use of Concrete, or Bêton in large masses, for Harbor Works and for Monolithic Structures.
8. On Dredging Machinery, and on the cost of raising and depositing the material.
9. On the Appliances and Methods for Rock-boring and Blasting, in this country and abroad, and on the results obtained.
10. On the Gage of Railways.
11. On the Systems of Fixed Signals on Railways, and on the connection between the signals and the points.
12. On Modern Locomotive Engines, designed with a view to economy, durability, and facility of repair, including particulars of the duty performed, of the cost of repairs, etc.
13. On the different Systems for Surmounting Inclines on Mountain Railways.
14. On the various Modes of Dealing with Sewage, either for its disposal or utilization.
15. On the Separate System of Sewering Towns, with a detailed description of the works in a town to which this system has been wholly or partially applied, and particulars as to the results.
16. On the Ventilation of Sewers, with a résum ' of the Experiments as to the motion, pressure, etc., of Gas in theSew-ers.-
17. On the Constant Service of Water Supply, with special reference to its. introduction into the metropolis, in substitution for the Intermittent system.
18. On Street Railways and Tramways through Cities and Towns, and on the best mode of working them.
19. On the Application of Steam as Motive Power for pumping Water or Sewage, with a comparison of the advantages of different classes of Engines, and details of the cost of working for long periods.
20. On the yarious descriptions of Pumps employed for Raising Wateror Sewage, and their relative efficiency; and on the employment of Water as a Motive Power for pumping, by means of Water Wheels, Turbines, Water Pressure Engines, or other Machines.
21. On the Employment of Steam Power in Agriculture.
22. On the laws governing the Flow of Steam and other Gases through Orifices, Pipes, etc., and on Experiments to determine these Laws.
23. On the Methods of Transmitting Force to distant points. 24. On the best practical Use of Steam in Steam Engines, and on the effects of the various modes of producing Condensation.
24. On the modern practice of Marine Engineering, having reference to Economy of Working Expenses, by Superheating,
Surface Condensing, great Expansion, High Pressure, etc.
25. On the Present State of Science in regard to the Manufacture of Gas for the purposes of Illumination.
26. On the Construction of Sluices, for the expeditious fill ing and emptying of Locks of large size on navigable Canals. 28. On the Harbor and Dock Works at Spezzia.
27. On the Maintenance, by Sluicing, of the Harbors on the Coasts of France, Belgium, etc.
28. On the Practice and Results of Irrigation in Northern India.
29. On the Sea Works at the mouth of the Adour, and the effect produced by them on the bar of that River.
30. On the Sea Works at the mouth of the River Maas, and the effects produced thereby.
31. On the Manufacture of Iron and Steel as now pursued, the effect on strength and tenacity of the admixture of substances with the Ore, and any test, other than fracture, by which the quality may be ascertained.
32. On the various Methods of Draining distant isolated sections of Mines.
33. On Compressed Air as a Motive Power for Machinery
in Mines, with some account of its application on the Conin Mines, with some account of its application on the Contiment.
34. On the Use of the Diving Apparatus in Mines, especially in Westphalia and in Germany.
35. On the Systems and Apparatus at present used in Telgraphy.
For approved original communications, the Council will be prepared to award the Premiums arising out of special funds devoted for the purpose. They will not, however, consider themselves bound to make any award, should there not be any communication of adequate merit; but on the other hand, more than one premium will be given, if there are several deserving memoirs on the same subject. It is to be understood that, in this matter, no distinction will be made between essays received from a Member or an Associate of the Institution, or from any other person, whether a native or a foreigner.
The communication should be written in the impersonal pronoun, and be legibly transcribed on foolscap paper, on the one side only, leaving a sufficient margin on the left side, in order that the sheets may be bound. A concise abstract must accompany every paper.
The drawings should be on mounted paper, and with as many details as may be necessary to illustrate the subject. Enlarged diagrams, to such a scale that they may be clearly visible when suspended in the Theater of the Institution, should be sent for the illustration of particular portions.
Papers which have been read at the meetings of other societies, or have been published in any form, cannot be read at a meeting of the Institution, nor be admitted to competition for the premiums.
The communications must be forwarded, on or before the 25, Great any further information may be obtained.

A NEW APPLICATION OF TUBE HYDROMETERS.
By Winson H. PiLe, M. D.

A plain cylindrical tube of thin glass, closed at its lower end, is to be immersed in pure water, at a temperature of $60^{\circ}$ F., and then loaded by pouring in shot or mercury until it sinks about two thirds of its length in the water, the point to which the surface of the water rises being then marked on the tube. If now that part of the tube which was immersed in the water be divided into 145 parts, and these parts numbered from the top downwards, the tube will represent a Baume's hydrometer for liquids heavier than
water ; and by floating it in any liquid of greater density than water, its degree will be seen on the tube at the surface of the liquid.
These degrees can be marked on paper, and the paper inserted in the tube and pushed down to the bottom, the upper mark or zero being exactly opposite the mark which had been previously made on the tube.
We will now proceed to show a new application of these tube hydrometers in determining densities.
Having immersed a tube, closed at the lower end as before,
in water, we pour water into the tube until it sinks about in water, we po
z of its length.
It should float upright. We are now to mark the surface of the water in which the tube floats, and also the surface of the water within the tubs. The tube below this latter mark
must then be divided into 145 parts, either by etching on the must then be divided into 145 parts, either by etching on the
glass or, what is more practical, by drawing a scale on paper numbering the degrees from the top ( $0^{\circ}$ ) downwards. In ascertaining the density of any liquid heavier than water, the tube must be emptied and dried by rinsing with alcohol and drawing air through it by means of a long tube, then immersed in water of $60^{\circ} \mathrm{F}$., and the liquid to be tried poured in until the tube sinks to the upper mark. It can then be taken out, and the degree of density shown on the tube, if it
be etched, or else by holding it on the paper scale in its probe etched, or
per position.
Our illustrations have been thus far for liquids heavier than water; for those lighter than water, the tubes or scales
require a different division. Unfortunately, Baume's method of dividing his hydrometers rendered the degrees of those for light liquids larger than those for heavy liquids, and by comparison we find that they are in the ratio of 145 to 140. In order, therefore, to make a scale for light liquids, we divide the space below the surface of the water within the tube into 140 parts instead of 145 parts, as at first; the degrees are then continued upwards 70 or more parts. These divisions are numbered at the water point $10^{\circ}$ (another peculiarity of Baume's scale), and running upwards so high as desired. The scale below the water point need not be
marked, as it can be only used for liquids lighter than water. The tube is used for all liquids in the same manner, namely, by pouring into it the liquid to be tried until it sinks in water down to the mark made at first on the tube; then by holding it against the paper scale marked as just described. The sury
An advantage which the tube possesses, when used in this manner, is the small quantity of liquid necessary, as the tube can be made quite small in diameter, and by increasing its length the degrees are rendered larger, and thus greater accuracy is obtained. It may also be employed in ascertain-
ing the density of extremely heavy liquids, where no hydrometer could be found of service.
Before you ask a favor of any man consider three things. First, can you not avoid it? Second, can the one you apply to grant it? Third, would you, if your places were reversed, do for your friend what you ask him to do for yourself? It is well to think of this, as it may change the whole question.

The Great Fire of Boston.
In a discourse on the Sunday evening after the fire, Mr. Henry Ward Beecher, of Brooklyn, N. .,N made the following observations, which are full of interest and common sense: Last year it was Chicago that was destroyed: now it is Boston. The West and the East are at last united by a common calamity. Boston is thoroughly identified with the whole history of this country, for from it sprang all thatis greatand good of American ideas. The earliest heroes of liberty were from there; the war of independence began there; it was from there; tha war of independence began there; it was from
there that Jefferson sought the Adams who aided him in making the laws for the newly-formed Republic. Boston has always been the true head of the nation, and never flinched at the call of liberty. American history began in Boston, which city has never ceased to be the brain of the country for knowledge, liberty, and religion. Boston never went back from its duty when other cities swerved from theirs. Hated she may have been by some, but there is not a city in the United States that is not indebted to her for schools, literature and scholars, from the earliest day of the Republic to the present time. No other city of the Union ever gave such a common school education to all as Boston has done; from the highest to the lowest grade, education has she willingly given to her poorest son or emigrant resident. God could not have laid the heavy hand of fire on a city more noble than this. It is a national calamity. Some may say the disaster was sent to humble their pride or theiravarice. If such were the case, no city would escape. Under such Providence, where would New York and Brooklyn be? With such a law no spot on the earth ought to be saved. Such an assertion is presumptuous, it is audacious. A sparrow cafnot fall without God's knowledge; yet sparrows do fall. Such remarks are in defiance of God's wisdom and equity. Instead of making them, we should take lessons from the disaster, for it teaches a great deal. It teaches us that, in the construction of streets, individual rights should not set at nought the genof streets, individual rights should not set at nought the gen-
eral interests. Why were the streets so narrow? This fire eral interests. Why were the streets so narrow? a accident, for it will be found that it followed a general was no accident, for it will be found that it followed a general
law throughout. The plague, fever, and fire were the best law throughout. The plague, fever, and fire were the best
architects of the London of to-day, and also of many other cities. The fire teaches Boston that it is not needful or wise to have narrow streets to convey the flames from one side to the other, or to act as horizontal funnels to carry the fire from one block to another. But the answer will be that the streets have been so for a hundred years, and there has been no fire. Is it necessary to have such a fire even once in a century? This fire will show that it is not needful to build houses four or five stories high of fireproof granite, and then surmount them with an inflammable box, out of the reach of firemen, for the fire devils to sport in and scatter their sparks all over for the fire devils to sport in and scatter their sparks all over
the city. Architects could not see this result, and bitterly the city. Architects could not see this result, and bitterly
the city is now paying for the experience. Other cities not far from here may also have to pay as dearly for their parsimony in erecting buildings. Why not make every business house a separate fire department? We can carry lighl and
water in the hollows of walls to any part of a building we choose.- Why not have the means of extinguishing incipient fres also built in the hollows of walls, and each man in the place a fireman?

In the arts, nickel is rapidly growing into favor as a sub stitute for silver in plating steel, iron and other metals. Its commercial demand is rapidly increasing, and as it is much cheaper than silver, it will undoubtedly be adopted in the manufacture of many articles as a substitute for that more precious metal. One mine, the Mine La Motte tract, Missouri, was worked from 1850 to 1855 . The ore was the sulphuret, associated with lead and copper. About $\$ 100,000$ was realized from the croppings of the vein. Croppings of nickel ore are found also in Madison, Iron and Wayne counties, Missouri. The refined metal is worth $\$ 3$ per pound. For small coins, it is very useful. The principal supply is at
present derived from a single mine in Lancaster county, Pa. present derived from a single mine in Lancaster county, Pa. It has been worked for seventeen years, and developed to a depth of 200 feet. The length of this lode is between two to six hundred tuns per month, employing in the working of the mine a force of 175 men .

A CRIPPLED rogue in Philadelphia has found a new use for an artificial leg. He worked in a pipe factory and was in the habit of filling his porcelain limb each day with a choice assortment of meerschaums, which he disposed of on his own account. When discovered, he had made about $\$ 800$ by this illogitimate traffic. In this-way ho was walling off with a goodly share of the profits of the establishment.
California does everything on the biggest sort of a scale. A bee hive in the rocks in Los Angeles county is reported, and is said to be 160 feet deep, entrance 30 feet wide and 17 feet deep; it contains several tuns of honey. In fact the sweet liquid runs, on warm days, in a small stream from the hive, from which the settlers supply themselves.
A Maine sea captain suggests that telegraph wires be extended to all the lightbouses on the coast, and that a system of signals be arranged to be exhibited from the light. houses to give notice to passing vessels of approaching storms or changes of wind. The idea is a good one.
Celery, as an article of dish, is highly recommended for nervousness. A correspondent says he has known persons cured of nervousness, whose hands shook like aspen leaves. He recommended the daily use of it at meal times.

Sefien patents have been granted for peliceman's clubs.

## REMARKABLE STRUCTURES OF THE ANCIENT AMERICANS.

In a review of the work on " Ancient America," by John D. Baldwin, the London Athenceum says: Not many perhaps, of those who habitually speak of the "Old and New Worlds" as a geographical expression fully realize the idea of a dual world of civilization and progress; yet it is certain that, side by side with that of Egypt and Assyria, there grew up in America another culture, equal, at one time, in art, power, and extent, and although, in so far as our existing evidence enables us to judge, unconnected, yet greatly resembling in system that on which our own civilization has been established; and were it not that these two cultures unfortunately came in contact during the climax of Spanish ecclesiastical
bigotry and intolerance, the so called new world might have boasted of an ancient history corresponding to our own. So completely, however, has the law of the survival of the strongest asserted itself under the influence of the monkish exponents of Christianity-so effectually did they succeed in snuffing out all trace of art and culture amongst the people
whom they had conquered-that writers may now be found whom they had conquered-that writers may now be found
who, in the face of the evidence afforded by ruined cities, who, in the face of the evidence afforded by ruined cities,
palaces, aqueducts, and paved roeds, deny the claim of the American continent to any ancient civilization higher than what might have been derived from the wild Indians, such as the Iroquois and the Algonquins, whom the Pilgrim Fathers encountered in the seventeenth century. Such views
as these receive no support from Mr. Baldwin. The relics of ancient American civilization are to be found in these repa rate but nearly contiguous areas situated near the point of junction of the two continents.

Commencing with the northernmost of these divisions, commonly known as the region of the mound builders, we find in the neighborhood of the lakes, at the northern apex of the triangular region above mentioned, in Michigan, Iowa,
Missouri, and particularly in Wisconsin, a tract of country Missouri, and particularly in Wisconsin, a tract of country
characterized by the presence of large mounds designed in the form of animals, birds, serpents, or men, in huge relievos. Next to this we have a district of which the State of Ohio may be regarded as the nucleus, but which occupied the whole valley of the Ohio and its tributaries, extending into Western Virginia, Indiana, Michigan, Illinois, and Missouri. The special characteristics of this area consist of pyramidal mounds, usually from six to thirty feet high, but rising in some cases to sixty and ninety feet; they were generally square or rectangular, and were ascended by winding staircases on the outside. This district is also remarkable for
lines of entrenchment, from five to thirty feet high, inclosing lines of entrenchment, from five to thirty feet high, inclosing
usually from one to thirty acres, but extending at times to 100,200 , and even 400 acres. They frequently consist of combinations of square and circular figures, the accuracy and perfection of which prove, as Messrs. Squier and Davis have remarked, that the builders possessed some standard of measurement, and had the means of determining angles. inclosures in Ohio alone. Lower down in the valley of the Mississippi, and along the fertile plains bordering the Gulf of Mexico, and to westward over the Rio Grande, the inclosures are smaller and less numerous, and the mounds, though of the same character and more plentiful, are lower, and consist of truncated pyramids and pyramidal platforms. Broad
terraces, elevated passages, aguadas or artificial ponds, and terraces, elevated passages, aguadas or artificial ponds, and
the use of sun-dried bricks, are peculiar to this region, the remains of which approach more closely in character to those of Central America than the ruins to the northward. Taken as a whole, the mound builders appear to have been inferior in culture to their Central American and Peruvian neighbors. They were an agricultural people: yet they made use of spun cloth, their pottery was in some cases almost equal to that of Peru, and there are grounds for supposing that they had a knowledge of astronomy. Their tools and other relics were composed of copper, silver, porphyry, greenstone, and obsidian. Metallurgy, in the proper sense of the term, does not appear to have been introduced amongst them, for their copper tools were beaten into form, and contained in some
calver just as it is found in the matrix in the pure state on the shore of Lake Superior, where they worked it in open cuttings from the surface.
Turning to Mexico and Central America, we find here also the antiquities of this central region distributed in three distinct areas. In Chiapa, Tabasco, Oxaca, Yucatan, Honduras, Tehuantepec, and Guatamala, the ruins consist of stone-built cities of great extent, palaces richly ornamented, and standing upon raised platforms similar to those found in the lower portion of the Mississippi valley, in all probability, severed the same purpose. Most of these ruined cities are thickly overgrown with trees; and it is known that other cities lie buried in the forest districts, which have been as yet but lit tle explored. More is known respecting the Mexican area from its having been the center of Aztec civilization at the time of the conquest; and though some doubt has been thrown upon the accounts of the city of Mexico given by the Spaniards, it is certain that a comparatively high state of civilization, although inferior to that of Central America, existed in the valley of Mexico at that time. Their city had considerable architectural pretensions, and their temple was a rectangular terraced pyramid, ascending by a flight of steps on the outside, like the pyramids of the mound builders; but they did not possess the phonetic alphabet of the Central Americans, and their records consisted of picture writings.
The third sub-division of this central area is found in New Mexico and Arizona amongst the Pueblo Indians, the chief characteristic of whose culture consists in their residence in tire town or village of small rooms ranged in three or four tire town or village of small rooms ranged in three or four
stotios above each other, forming a huge rectangular structure
not altogether unlike some of the great edifices in the ruin of Central America, such as the palace of Palenque or the Casa del Gobernado at Uxmal, but yet differing from them both in character and purpose. These buildings were in use at the time of the conquest, and are still inhabited in some places. The Pueblos are vastly superior in culture to the wild tribes of Indians on the north, with whom they are con ntly at war.
The Peruvian ruins consist of cities, palaces, fortresses aqueducts, one of which is 450 miles long, and great paved roads, admirably constructed throughout the whole length of the empire, which latter were originated during the earlier civilization, and restored by the Incas. Their work was admirably done; but it is everywhere seen that their masonry, although sometimes ornamented, was generally plain and massive in style. They had no inscriptions, though it is art of writing in hieroglyphics. Their temples were not high truncated pyramids, and their great edifices were not rected upon terraces, as in Central America; but the door in the older buildings around Lake Titicaca had the peculiar ity of being narrower at the top, like some of the prehistoric structures of Europe. Their tools were of bronze; but it has been conjectured that, although iron was unknown in
the times of the Incas, it may have been employed in the the times of the Incas, it may have been employed in the
earlier times, as that ore is abundant in Peru, and some of the existing languages, if not all, have names for the metal In their knowledge of astronomy, they appear to have been inferior to the Central Americans.
The antiquity of the mound builders is established by the growth of forest surmounting their remains. In the débris covering the ancient copper mines of Lake Superior, trees showing 395 rings of annual growth have been found grow ing; and Sir Charles Lyell counted 800 rings in the trunk of also, in both on one of the mounds at Marietta. It is eviden also, in both cases, that several generations of trees have
preceded those now standing in the soil. In the valley of preceded those now standing in the soil. In the valley of
the Mississippi, four terraces are usually seen, marking four distinct eras of subsidence since the river began to flow. The ancient works, mounds and enclosures are found on all these terraces, except the fourth or lowest; showing that this last terrace, which probably marks the longest period of any was formed since the works were erected. Some of the mounds have also been destroyed by streams that have since receded more than half a mile, and which, at present, could not reach them under any circumstances. The antiquity of the latest relics of the mound builders is further confirmed by the state of decay in which all the skeletons of these peo ple are found. Although the soil is not unfavorable to their preservation, only one or two skulls have been found in a condition to be restored. In Central America, similar evi dence of great antiquity is afforded by the growth of timber, and by the fact that everythiug perishable has disappeared, except the lintels of some of the doors of the more modern structures of Yucatan.
In Peru, Mr. James Wilson found, at various points on the coast near Quito, ancient pottery and other manufacture articles finely wrought, and some of them of gold, beneath a marine deposit of six feet, having trees growing on the surface which were older than the Spanish invasion; which proves that this land must have been submerged beneath the ocean and again elevated to its former position since these relics were deposited.

## Decisions of the Commissioner of Patents. . GARRATT vs. N. SIEBERT.-Interference.

The one first to invent a new and useful device is entitled to the protection of a patent, even if its production was accidental a
Garratt.

Woven Wire Mattresses.
G. C. PEREINs
G. C. Perkins.-Appeal.

Application of

## Mattresses. <br> Applicant claims-

1. A wire mattress or cushion having a web of coiled 2. A wire mattress or cushion having a web of coil. 2. A wire mattress or cushion having a web of coiled
springs linked together in sets of three or more, substantially springs linked
2. A fabric of spiral wire springs interlocked two and two or three and three, substantially in the manner herein deThe references show, in the case of Rouillion, a mattress made by placing one coiled cushion, composed of single wire coils, over another similar one and interlocking the two ;
and in the case of Leemann, a mattress composed on the and in the case of Leemann, a mattress composed on the
margin of doulle coiled wires and in the middle of single margin of double coiled wires and in the midde of single
coiled wires. This plan it was supposed would give sufficient strength and save the extra material and cost of making the whole mattress of double wire coils. If it did not, as a matter of course the double coils would be further employed, either to wholly or in part compose the center of the cushion. manner shown, to give additional strength, how many or how few to use, becomes simply a matter of judgment. The same have been used, and a third can be employed in the same by simply adding it to the strand, there is no more invention involved in so adding it and forming a stronger cushion than
there is in driving an additional nail when there are no diffithere is in driving an additional nail when there are no diffi-
culties in the way and two are not sufficient to hold. Appliplicant has invented nothing. He has done nothing more than to make a stronger mattress than Leemann did by emthere being no difficulty to overcome in so doing.
Application rejected.
Tubular Legs for Portable Furnaces.
Appli
ORGE.
LegaEtr, Commissioner
The claim on which the appeal was taken is as follows-
The combination of the hearth plate of a portable furn
with wrought iron tubular legs connected together, all sub
tantially as set forth. the improve forth.
The improvement which applicant has made in portable
furnaces-and I have no doubt he has made one-consists in furnaces-and I have no doubt he has made one-consists in
supporting them upon hollow wrought iron legs, whereby supporting them upon hollow wrought iron legs, whereby
sufficient strength is obtained in the legs and at the same time they are rendered lighter than those heretofore made of solid cast aren. But the difficulty is, as the Examiner says that the improvement "does not indicate in any degree inven-
tion." It is simply the result of the exercise of that judgtion." It is simply the result of the exercise of that judg.
ment and the application of that knowledge-in view of the ment and the application of that knowledge-in view of the gous situations where strength, lightness, and economy of mechanic. In a less developed state of the art of making and applying tubular legs and supports it is possible a patent, such as applicant seeks, might be legally granted, but not now.
The references cited by the Examiner are in point as showing the various applications of tubular supports analogo
applicant's, and exhibiting his as barren of invention.

## Decisions of the Courts.

United States Circuit Court, District of Mi
This was a suit in equity upon letters patent granted April 10, 1866, upon the joint invention of Frederick S. Sanford and Dwight Wheeler, relative to improvements in sewing ma chines, and designed to adapt the ordinary sewing machine to the work of sewing sweat linings into hats. Glover Sanford
and others complainants, and Matthew Messer and others defendants.
The ma
The main points of the defense were: First, that the patent the bill was defective for want of parties, it appearing that the complainants had parted with the exclusive right to use and vend the patented improvement in and for the State of Massachusetts, which made it necessary, it was urged, that
the guarantees of this right should be joined as complainants. She guarantees of
This is a suit in equity founded on letters patent granted by ene United States "for a new and useful improvement in by which it may be adapted to sew sweat linings into hat by which it may be adapted to sew sweat linings into hats
without any alteration in the organizations of such ma whines."
An objection is made that the bill is defective for want of
parties. Defendants claim that since the date parties. Defendants claim that since the date of the patent ine plaintiffs have transferred such an interest, in the patent in and for the State of Massachusetts, that they have not th maintain the bill of complaint. It appears that the patentees conveyed to Stanwood and Bailey all their interest in the invention as secured to them by the letters patent for, to, and
in the State of Massachusetts, except the right to build said in the State of Massachusetts, except the right to build said
machines. Any assignment which does not convey to the as machines. Any assignment which does not convey to the as entee holds in the territory specified, or an undivided in terest in the entired to the patentees is for an entire thing. It is the
exclusive right of making, using, and vending to others to excusive right of making, using, and vending to others to be used, the improvement described in the patent, and for
which the patent is granted. The instrument introduced in evidence by the respondents purports to convey to Stan wood and Bailey the exclusive right in certain specified ter
ritory to use, and vend to others to be used, the patented in ritory to use, and vend to others to be used, the patented in-
vention, but-it does rot convey, but expressly reserves to the grantors, the right to make the machines.
As well stated by Chief Justice Taney in Gaylor et. al. vs.
Wilder, 10 Howard, 494, it was obviously not the intention of Widder, 10 Howard, 494, it was obviously not the intention of the legislature to permit several monopolies to be made out of one and divided among different persons in the same limits. patent right may be good as between the parties as a license and enforced as such in the courts of justice, but the lega can maintain an action against a third party who commit an infringement upon it. The bill of complaint in this cas charges that defendants have made and do make the patented invention in violation of complainants rights under the pat ent. The bill can unquestionably be maintained for that in even if it were necessary to join other parties as complain ants in a bill alleging infringement only by vending and using The next inquiry is whether Sanford \& Wheeler were the original and first inventors of the improvement described in
the specification and letters patent. As to this, Judge Shepley the specification and letters patent. As to this, Judge Shepley

## decides that they are and sustains the patent. $J . B$. Robb and C. O. Morse, for complainan <br> J. B. Robb and C. O. Morse, for complainants

United States Circuit Court, District of New Jersey SAMUEL WETHERILL et al. vs. THE PASSAIC ZINC CO. et al. Construction of Licenses and Grants-Rights of Grantees under a Patent after it is Extended. Held as follows:
A conveyance of buildings, machinery, etc.," with rights to use" certain patented processes, for working which they
might be adapted, is a license to use the processes in those might be adapted, is a license to use the
buildings only and not a general license.
Words restricting a grant of certaine.
Words restricting a grant of certain patented processes to such as the grantor "holds in his own right" are to be under
stood as meaning such as he holds for the benefit of others and not those of which he owns only a part interest, and they pass under the grant.
A grant of all the patents which the grantor "now has, or
has in contemplation to obtain"" has in contemplation to obtain
tended terms of those patents.
A license to use an invention "for the whole term of the patent which may be granted," given before the issuing of the patent, does not authorize the use of it under an extension of the patent.
The right to use a patented process during the original term of the patent does not, under the 18th section of the act of
1836 (re-enacted in 1870,) authorize the use of it after the 1836 (re-enacted in
The grant of the right to use a patented process, and of
apparatus which, though capable of being adapted to cess, was constructed to accomplish the same object by differ ent means, does not, after the patent is extended, authorize the use of the process in the apparatus.
Geo. Harding, for complainants.
Geo. Harding, for complainants.
E. W. Stoughton and Geo. Gifford, for defendants.
THE great joiner-the lawyer; he can replace a tenant, impanel a jury; box a witness, bore the court, chisel his clent, augur the gains, floor a witness, nail a case, hammer
the desk, file his bill, and gouge the whole community.


THE AGRICULTURAL DEPARTMENT AT WASHINGTON.
It is a matter of surprise and regret that it is but recently that the claims of agriculture have received national recognition, and that the Government should not have appreciated at an earlier date the necessity of applying a portion of the
above mentioned patriotic gentleman had been distributing seeds and plants gratuitously, and for nine years, during his entire term of office, did he continue his good work. His successors in the Patent Office kept up the practice, butit was not until 1862 that the De partment of Agriculture was formally organ ized.

The appearance of the building and its ad jacent gardens is well depicted in our en graving. The grounds and conservatories are filled with specimens of almost every plan and tree indigenous to our country-from the luxuriant tropical vegetation of the Southern States, to the dwarfed and hardy foliage of our northern borders. A division is devoted to horticulture and the propagation and ac climatization of new and foreign species Studies in ornamentation, in the best means of hybridizing, budding, pruning and grafting in treating diseases of plants and trees, are horoughly pursued in the experimental garins. Seeds of new varieties and of superior aality, as soon as they are obtained, are free Iy distributed throughout the country on ap plication to the Commissioner of Agriculture.

The Department maintains at least one cor respondent in every county of the United States, through whom statistics of quality and quantity of crops and other facts are forwarded to Washington, to be there distributed by means of the monthly and yearly reports. Specialists are also employed to prepare for these reports instructive articles on suitable
. topics. Questions from agriculturists are free
ly answered and the fullest possible informa - tion afforded. The purchaser of a farm situaO ted in a region with which he is unacquainted has only to inquire, and the department will tell him the crops likely to prove remunerative in the special locality, advise him regarding ultivation, and warn him of obstacles to be surmounted and the best means of overcoming them. A chemist will analyze the soil, report as to its properties and the value of fertilizers to be used thereon; a botanist will give every particular regarding the natures and diseases of plants, and will point out in what families to seek needed products and bhat effect a change of soil will have upon them. An entomologist will give advice regarding the insects which destroy vegetation, and as to the best mode for their extermina Af tion.

As corcpared with the other national bu reaux, the expense of this department is remarkably small. The cost of the library and museum was $\$ 140,000$, and the conservatories were built at an expense of but $\$ 52,000$ more The library contains a valuable collection of agricultural literature in several languages Volumes of rare pictures are arranged on long tables -one work a present from Francis Joseph I, Emperor of Austria, entitled "Na ture Printing," containing representations of ferns so exquisitely printed that it is difficult to believe them unreal. In the museum are specimens of fibrous products, cereals of this and other countries, stuffed birds and plaste casts of fruits from all the differentsections of the United States, arranged so as to show at a glance the products of each region and the specific changes caused by transportation. On the walls of the fruit cabinet are hung dia grams, showing the character and habits of the different insects that prey upon fruit and fruit trees, and in glass cases are preserved the native birds that feed upon destructive insects and should be protected by the kind treatment of the agriculturist. The whole arrangements are neat and handsome, and well repay a visit to this department of sci ence and agricultural art, which is filled with rare specimens of artistic excellence and skill.

Ammonia in Snow Water.-Dr. Vogel re fers to Dr . von Liebig's researches, made in 1826 and 1827 , on the quantity of ammonia as nitrate in rain water, and then records at length his own researches on the presence and quantity of ammonia contained in snow and snow water. By the method employed by him the following results were obtained, liter of snow water being the unit:-Freshly fallen snow, collected in a porcelain basin, a $0^{\circ}$ gave 0.003 gramme; at - $3^{\circ}$ gave 0.002 ; at from $-9^{\circ}$ to $-15^{\circ}$ gave 0 . Snow water, from national wealth to such development of the resources of the jnow which had lain for twenty-four hours, on a piece of ga country. Some thirty years ago, the first appropriation, the den ground manured during the previous autumn, contained merely nominal sum of $\$ 1,000$, was, at the instance of the 0.012 gramme. Snow water from snow which had been twen Commissioner of Patents, Hon H I Ellsworth devoted by Congress for this purpose. For two years previously the
four contained 0.009. Snow which hda been twenty-four hours on a zinc roof contained 0.004 .

## TBANSMISSION OF MOTION

Lecture dellvered by Coleman Sellers, at the Stevens Institute of Technology, Hoboken, N. J., February 19th, 1872.

## NUMBER III.

What I have said in description of the modern hanger holds good in the various forms of bearing, suited to various uses where hangers are not admissible. Thus, when the shaft is to be carried by stone piers, not likely to lose their horizontal adjustment, or in cases of vertical shafts, pillow blocks are used in place of hangers. I have an example here

(Fig. 10). The box is furnished with spherical surfaces to fit in sockets in the casting or frame; it is self-adjusting as to line, but cannot be raised or lowered as in the case of the hanger. It takes the place of what is known as the clamp box, and of any rigid bearing not adjustable. It was a clamp box that I found among the many ingenious illustrations of mechanical devices in the cabinet in the room of your Pro fessor of Mechanical Engineering. I have it here (Fig. 11).

## Fig. 11.

 t is very simple in construction. It is made of
two pieces only; don't look two pieces only; don't look as if it would be expensive to make, and just the thing for the " anything-is-good-enough-so-that-it-is-cheappeople." But does first cost constitute cheapness? Let us see. Once upon a time I thought a circular saw, operated by foot power, would be a very good thing to have in the house. I had a suitable band fly wheel and treadle; all I wanted was a saw mandrel and circular saw. These were furnished by a saw maker of renown, at a very moderate cost, say seven dollars and fifty cents. For bearings it had clamp boxes, lined with Babbitt's metal. A neat wooden framework was soon made to receive the boxes, and the work of fitting them to place begun. This did not take verylong, it it true; but when I came to screw up the holding down bolts, the spindle would not revolve, so a little more cutting and carving was needful; and at last, after much patient labor, it seemed all right, and the saw was turned very batisfactorily. In a few days, however, it was fast again, and I found the frame had sprung from warping and had to be refitted. All this careful work would not have been requisite had the saw been driven from a steam engine; but foot power is of limited capacity, and any serious loss from friction is soon felt. Now had this spindle been provided with ball and socket bearings, all the work needed would have been to bolt them to an approximately true surface, and they would have made their own alignment, and would never have bound or cramped the spindle. Why, those clamp box-

es would have been dear at half the money, when the cost of fitting, etc., is taken into consideration. I have seen a saw mandrel, with an $18^{\prime \prime}$ saw, running in cast iron ball and socket bearings, working well after 16 years' hard usage, and during that time never having been adjusted, and that spindle is to-day as good as when it was made.

Pillow blocks are sometimes used in connection with cast iron wall plates upon which they rest, and are secured by bolts. I have an example' of such a construction (Fig. 12).

Fig. 13.


This same combination inverted, with an oil dish on the cap of the pillow block, is now used extensively to carry the head shaft of long lines, as it admits of the very heavy head
shaft, with large pulleys, being hoisted into place, and then secured by the cap and bolts. A head shaft, or the first shaf of any line, usually rests in two bearings. Fig. 13 shows such an inverted pillow block. Sometimes it is requisite to build bearings in a wall, in which case what is called an arched wall box (Fig. 14) is used in connection with the pil Fig. 14.

low block. Very often it is advisable to support the lin shaft from the face of a wall, in which case pillow blocks, secured to knees, are very convenient (Fig. 15).
Mr. Bancroft thought all boxes should be made five diame

## Fig. 15.

 namely, shaft long namely, a box for a 2 inch shaft should be ten inches long; but it has since been demonstrated that four diameters is suf ficient, and that has been the practice for many years. I have here also an example of a hange $r$ to be fitted to a post; it is called in that form a post hanger (Fig. 16). It is in all essential particulars
like the ordinary hanger, so far a adjustment and swiveling principles are concerned.
Before leaving the subject of bearings, I would mention that there are examples of cast iron boxes, in use in woole factories where high speed shafts are running, which show no appreciable ase. In 1867, I read
$\qquad$
 paper on journal bear ings before the Frank lin Institute in Phila delphia, and while preparing that paper I took occasion to examine a bearing in which had been running, for 16 years, a $4 \frac{1}{2}$ inch shaft, with a pulley 72 inches
face, close to the bearing, taking all the power from an engine of 16 inch cylinder, 3 feet stroke, making 50 strokes per minute-say transmitting forty-two horse power. This bear ing showed a bright sur face over the extent o one third of the circum ference of the shaft on the bottom half, box. The box had been originally made to fit the journal loose ly, and it had not worn enough to make it fit over one third of the circumference of the shaft. - In the use of cas iron bearings, lubrication must be attended to, else the bear ing will soon be cut and rendered useless; but lubrication is o easy and so little oil is needed for the purpose that the can be no reasonable excuse for neglect You will ther the sample of the hanger-now itfore you, two large cavities the sampte' of the hanger-now ablore you, two large cavities
in each end of the top 'box; 'these cavities are called tallow in each end of the the should be filled with tallow and oil, mixed so as
cups to be of such a consistency as not to be fluid in warm weather. Should the journal heat from any cause, this same solid lubricant will melt, and, running into the bearing, will protect it for the time being. The box should be oiled in the center and oil holes are provided for that purpose in the recess around the spherical partion of the top box. There is also a hole in the very center of the ball on top, and the top plungers, which rest on the ball, being hollow, a self-feeding oil cup can be placed on top, and thus deliver oil regularly to the bearing. As to the quantity of the oil needed, I would remark that shafts running in self-adjusting hangers, with bearings four diameters long, at a speed of 120 revolu tions per minute, require, on an average, $2 \frac{2}{10}$ fluid ounces of oil per bearing for six months' oiling, and self feeding oilers, placed on top, should not deliver any more than this quan tity.
From time to time a great deal is said about self-oiling boxes; by this term is meant boxes that are made to contain oil in some reservoir usually under the shaft and from which reservoir oil is fed to the shaft, and then allowed to run back into the reservoir and thus be used over and over again. It is said that bearings in self-oiling boxes have been made to known a self-oiling box to be made to work well with so lit tle oil as $4_{1}^{4}$ f fluid ounces in it. Some of them hold a pin. each, and only the other day I was called upon by a manufac turer who required some shafts, couplings, and pulley, but who did not want hangers, as he would make his own self
oiling hangers. I asked him how much oil he put into each box. "Oh, about one pint," he said; "I do not think them safe with less." One pint is 16 fluid ounces, quite enough oil to last four years, if properlyapplied, and yet it would never do to trust that quantity of oil for that time, as it would be come deteriorated by age. Self-oiling boxes are rather more costly, and take more oil to run them, than properly made bearings oiled by hand. Self-oiling boxes are good things to sell-better than to use; they are good things to talk about to those who do not know what true economy in oiling is. Glass oil cups above the bearing, feeding oil at such a rate as to consume 24 fluid ounces in six months to, say, hangers for $2 \frac{1}{2}$ shafts, are the best, and oil fed at this rate will not run $\frac{1}{2}$ shafts, are the best, and oil fed at this rate will not run
out of the box ends, but will just supply the waste from consumption
All shafts, long or short, must be provided with some means of preventing end motion. Line shafts should have one pair of collars fitted to one of the bearings only. The collars placed usually on the first or head shaft should control the position of the entire line; more collars are apt to cause needless friction. When shafts are collared, the collars should be fast to the shaft; loose collars held in place by set screws are sometimes used, but are more expensive and cumbersome than the fixed or fast collars. Some engineers refer necking in the head shaft to some smaller size in the ournals. Suppose the first or head shaft require to be made f iron $6 \frac{1^{\prime \prime}}{}$ diameter, to sustain the driving belt. This shaft might be necked in, and be carried by bearings, say $5 \frac{1}{\frac{1}{2}^{\prime \prime}}$ diameter, and the ends still further reduced to the size of the shaft to be coupled to it. This practice of necking in the bearings of the head shaft, common in modern cotton mill practice, has the advantage of diminishing the veocity of the surface motion and of the shaft in the box; for by diminishing the diameter we diminish the speed of the rubbing parts, and the tendency to heat is much increased with increase of velocity
To determine the size of shafts for the transmission of a given power, a safe formula is $D=$ the cube root of $[(P \div R)$ $\times 125] \mathrm{D}$ being diameter of shaft, $P$ the horse power, and $R$ the number of revolutions per minute. This gives a shaft strong enough to resist flexure, if the bearings are not too far apart, The distance apart that the bearings should be placed is an im. portant consideration. Modern millwrights differ slightly in opinion in this respect ; some construct their mills with beams $9^{\prime} 6^{\prime \prime}$ apart, and put one hanger under each of the beams; others say 8 feet apart gives a better result. I am clearly of opinion that with 8 feet distance, and shafting lighter in pro portion the best result is obtained. Thetendency now is to porre the the tine shafts, nod par is to ood pros a 120 revolutions, for wood-working machinery at 250 revoluions, and for cotton and woolen mills at from 300 to 400 revolu tions per minute. Hollow or pipe shafting has been made to run at 600 revolutions per minute, very satisfactorily. This kind or shatting is too costly to be generally introduced, Mr. Jam es B. Francis, of Lowell, writes me that since the decrease of the water power in that town, or rather the rapid increase of the factories, they have been obliged to economize heir power, and they are doing so by using smaller shafts thicher velocities, and have even made extended lines only 1 inch in diameter. They so arrange the mill as to 4 . ure a a cose o ach lan ll will be to the use of not less than 1潤" diameter for the smallest line the use of not less tha
shafts in cotton mills.
Thafts in cotton mills.
Thow running in some factories lines of shafting 1,000 feet long each. The power is generally applied to the shaft in the center of the mill, and the line extended each way from this. The head shaft being, say $5^{\prime \prime}$ diameter, the shafts extending each way are made smaller, and small in proportion to the rate of distribution, so that from $5^{\prime \prime}$ they often taper down to $1 \frac{8}{4}$. In coupling shafts of different izes, it is customary to reduce the end of the larger one to the size of the smaller shaft, and then to use a coupling uited to the smaller size. Fig. 17 shows an example of this method of reducing the larger shaft to the size of the smaller one. The rapidity with which the reduction of the size of the sections is made must depend, in all cases, on the distribution of the power. For instance, if a line of any ength whatever receives its power at one end, and transmits

Fig. 17.
the same amount of power at its other end,such shaft must, be of uniform diam. eter; but if it distributes its power
 butes its power at regular intervals along its length, the shaft may be made in sections of a size proportioned to the power given off.
It would be impossible in one lecture to detail all the contingencies that influence this reduction, as questions of expediency will often have a decided influence. While speaking of the relative velocity of shafts, I would like to call your attention to one consideration touching on the economy of fast running shafts. To run a shaft of a given size and weight, say 200 revolutions per minute, must take more power than to cause the same shaft to revolve 100 revolutions, but with increased velocity the diameter of the shaft may be diminished, and with it the diameter of the driving pulleys may also be lessened; and hence the weight on the bear ings will be reduced and the velocity of the surface of jour nals not much increased. With the formula I have already given you for computing the proper size of the shaft for the transmission of a given power, at a given velocity, you can readily work out comparative examples, and thus demon. strate the advantage of high speeds over low ones.

## Crartespondemce.

The Eaitors
spondents.

## The Vienna Exposition

To the Editor of the Scientific American:
The epidemic of personal abuse which has pervaded the country for the past few months seems, at last, to have reached the office of your journal.
From an article under the above heading, in your issue of November 16, I extract the following: "Then there is General Van Buren, the United States Commissioner for this show, who will also come in for emolument. At present his office is purely honorary; he draws no pay and knew this when he accepted its functions. But of late, he has been very arduously engaged in his exhibition duties, stumping eloquently around the country to urge the election of General Grant, and the administration will of course be expected to provide for his trip to Europe." But once before has any personal assault been made upon me in connection with my official duties, and that was in a communication to one of our daily papers, from a person to whom I had refused the appointment of assistant commissioner. I am not aware of having similarly disappointed any gentleman connected with the Scientific American, and am therefore at some loss to know to what to attribute the paragraph I have quoted.
While glancing at your article, my eye was caught by certain prominent figures at the head of your editorial columns, which advise the public that your journal is furnished to subscribers at three dollars per year. And, upon turning the page, I find, as the frontispiece, a very excellent representation of a weaving loom attended by an attractive young woman. I might perhaps; be considered personal if I should suggest that your paper was a "show paper," notwithstanding its high sounding title, and that you published it for "pay" and not in the interests of science. And if further I should say that, in your opposition to the International Exhibition at Vienna, you had been moved by a desire to commend your paper to American inventors as the especial champion of their interests, with a view to increasing your circulation and drawing to your net applicants for patents, and thus add to your incoming wealth, I should doubtless find many who would credit the assertion, whatever might be said of my taste in making it. If, in addition, I should announce that you had labored zealously to secure the election of Mr. Greeley to the Presidency, your judgment would probably, in many quarters, be criticized, but your right as a citizen to do even this would not be questioned.
Now, with these comments, let me at once admit the truth of your statement that my office is without pay, and that I knew this fact when I "accepted its functions;" but permit me to add that I did not seek the position, and I only assumed its duties when made to believe that I could thus render some service to the country. And, further, let me say that I have no intention of going to Vienna and giving a year more of my time and exertion at my own expense, and, in addition, pay out of my own pocket the expenses of the Government. If you have any disinterested individual connected with your editorial department who is anxious to nected with your editorial department who is anxious to
do all this, send him along, and he can take the position at do all this, send him along, and he can take the position at
once. Neither can I well see why I should thus devote myonce. Neither can I well see why I should thus devote my-
self to public interests by taking charge of, what you are self to public interests by taking charge of, what you are
pleased to term, "a show" at Vienna, where American inventions are exhibited and their superiority established before the whole world, while you demand hard cash for publishing what $I$ may please to call a show paper to a limited number of subscribers. Your assertion also that I have been "stumping eloquently" for the election of General Grant I will not deny, but when you say that I have in that way "been arduously engaged in my exhibition duties," thus insinuating that I have neglected my official duties and taken to the stump with a view of having a claim for compensation as commissioner, you invent a foul calumny which I respectively insist even newspaper editors have no patent right to do.
Ever since the formation of the Republican party, I have taken an active part in its contests, and, while I believe in its principles, I shall continue to do so. While doing this I have never neglected more important duties, nor have I ever been the hired advocate of any committee or clique, for I have uniformly refused compensation and paid my own expenses. As commissioner to the International Exhibition at Vienna, I have labored zealously for the past four months to make the American Department a success. I have done this to the entire exclusion of my own personal business, and without reference to my own interests, or as to whether I should continue in the commission and go to Vienna or not. While thus engaged, I have earnestly striven to secure a convention and treaty in the interests of our inventors. The Govern ments of Austria and the United States have ratified a treaty upon trade marks which goes far to secure the rights of our citizens, but I have desired farther to procure an abrogation of certain obnoxious requirements of the Austrian patent laws, and I have caused to be prepared and sent to W ashington a draft of a treaty to that end; such a treaty the SciENtific American has professed to be strongly in favor of. If its assistance is to be of the character of the articles thus far published in its columns upon the subject, I may be pardoned for saying it will not prove valuable.

I take pride, in this connection, in stating that all my applicants for space thus far have expressed their determination to send their goods to the exhibition if they have to do it at their own expense; and that in no instance have they asked that their board bills be paid by Uncle Sam.
It may be witty to call the International Exhibition "a show," and to insist that exhibitors are only so many adver-
tisers who ought to pay for their advertisements. "This had for years the best opportunity to become acquainted with world is all a fleeting show;" and yet there are many people English and Scotch engineering, through personal visits to who are foolish enough to be exceedingly interested in its the engineering establishments in those countries; but to give affairs; and I fully believe that our country will see something more in the grand collection of the industries of all nations at the Austrian capital than a great advertising agency.

I regret that one of our leading scientific journals should take so narrow a view of it, and would fain believe that the take so narrow a view of it, and would fain believe that the
editorial in question was the offspring of a bad dyspepsia, or an election bet lost on the late "tidal wave."
I will not do you the injustice to express a doubt of your giving this communication a place in your columns.

Thomas B. Van Buren.

## 1873.

## The Bursting Strain on Cylindrical Boilers.

To the Editor of the Scientific American:
The Scientific American holds the position of the lead ing scientific and mechanical paper of the most influential nation on the face of the globe. By constantly reading it, more practical and useful knowledge can be obtained with less effort than from all other periodicals and books combined. As such, I have time and again recommended it to young men generally, and to mechanics particularly. As one holding these views, I wish to offer a suggestion.
Every paragraph appearing in your paper, although it be a correspondence for which the paper is " not responsible," bears a quasi endorsement as having been found worthy to enter your columns, being selected from among a number,the majority of which are rejected.
In your issue of October 19, 1872, page 244, is an article on "Cylindrical Boilers," which I supposed to have been inCylindrical Boilers," which I supposed to have been in is made plausible, and stands endorsed therein by Fairbairn, "so extensively known in scientific engineering." A mere expression of difference of opinion was likely to go unheeded as against such endorsement. Therefore, in my communi cation to you on the subject, I used ridicule to show more strikingly the absurdity of the position taken. This went into the "basket," and the error asserted by Bakewell still stands in your columns unrefuted, teaching to my young friends, whom I have advised to examine the Scientific American for knowledge, that which is totally erroneous.
Imagine my surprise when to-day, in your answers to cor respondents, I perceived that my communication, intended to ridicule Bakewell's proposition by showing its absurdity, could have been understood as expressing my own belief you putting down your "constant reader" for so many year The pressure in any vessel cannot be greater in one direc tion than in the opposite direction. Hence, I chose, a strikingly illustrating the error, the semi-circular shape on one side, and a diameter or flat side on the other. On the latter, Mr. Bakewell will hardly contend, unless he irretriev ably belongs to the perpetual motion school, that the pressure is greater than at the diameter. How, therefore, can he claim that on the semi-circular portion it can be any greater? His mode of reasoning by " resolution of the radial forces into horizontal and vertical," and again, "of vertical forces so obtained into horizontal," etc., at once points out the error in his mode of reasoning.
Believing that with your great experience and knowledge you always admit an oversight, and set your columns right continue your appreciating and constant reader,

Robert Creuzbaur.
[We printed Mr. Creuzbaur's answer on page 298, and called his attention to Mr. Bakewell's letter, which did not state that there was a greater pressure on the convex part of ing strains of boilers vary as the semi-circumferences, and not as the diameters. We shall publish next week a letter, which is to the point in Mr. Bakewell's theory.-Eds.]

## Transmission of Motion.

## To the Editor of the Scientific American:

I have read the criticisms by Mr. James Garland on a lec ture delivered by Mr. Coleman Sellers on the above subject and I am surprised to find even a comparative advocate of the plate coupling.
When, two years ago, I first became acquainted with American mechanical engineering, there appeared to me nothing in this country more strikingly superior to English mechanical engineering than the American or specially Sel ers' way, here generally adopted, of constructing shafting, coupling, hangers and
transmission of motion.
Mr.Garland is perfectly correctin saying that,in England and elsewhere, the way to keep shafts in the plate coupling in line is to let one shaft enter the opposite part of the coupling short distance, but I have also known engineers in England who advocate and practice the mode described by Mr. Sellers of true-fitting bolts in preference to fitting the end of a shaf in the coupling of a shaft of different diameter.
There is no doubt that a worse contrivance than a truefitting plate coupling, or the one Mr. Garland saw fifteen years ago, may be invented; but the advantages of the dou me to allow of no dispute. If Mr. Garland is correct that it is not considered good practice in England to enlarge the shafts for the reception of couplings, then there is certainly a great amount of bad practice in England. I have seen not
only the ends of the shafts for the reception of the couplings, but also the seats for the pulleys, enlarged, and this I would
call good practice, if it were not for its costliness. I have

Mr. Garland other authority, I refer him to any ish publications on engineering practice.
Philadelphia, Pa.
L. Schutte.

## Shifting Belts on Pulleys.

## The Editor of the Scientific American:

S. W., in the article on the transmission of motion, pag 292 of the present volume, suggests an idea that may be a valuable one. The same idea occurred to me long ago, but without trying it, I had not thought it practicable to shift a belt from a pulley not in motion. Will J. W. please inform us if he has seen an actual trial of it?
A plan that I have tried somewhat, and which works well, is to make the loose pulley smaller than the tight one, so as to relieve the strain of the belt and the pressure on the bearing when the belt is on the loose pulley. Where the tight pulley is of wood, so that the edge can be beveled, a difference of an inch in the diameters is no hindrance to the shift ing of the belt
Good authorities say that the adhesion of a belt is as the square of the amount of circumference enveloped by it Then it seems to me that it is a good policy to cross belts where it is possible, for the gain in adhesion must, in most cases, be more than the extra wear by crossing.
Buchanan, Mich.
W. G. Blish.

## An Invention wanted for Dressing Ramie.

To the Editor of the Scientific American:
A machine is now wanted by the agricultural industry which will largely pay the trouble of inventing it. That fine plant called ramie or China grass (Urtica tenacissima) is being cultivated in Louisiana, Texas, California, Mexico and Cuba, but the planters find that the way to a large production is obstructed by the want of an efficient and substan tial machine for extracting the valuable fiber, and what is most desirable, for extracting it in large quantities.
I wonder that this machine has not been invented in the true land of useful inventions, although Mr. Lefranc, of Louisiana, has tried and succeeded to a certain extent, in extracting the fiber, but only at the rate of 250 to 300 pounds a day. I am sure that the man who shouid make such a gift to the pioneers of the ramie culture in those States would be amply remunerated by the selling of hundreds, if not of thousands, of such machines.
Havana.
A Planter of Ramie.

## The Stow Pavemen

To the Editor of the Scientific American:
In the Scientific American of October 19, in an article on wood pavements, you state that the Stow pavement on Sixth or Seventh avenue is wearing out. I will inform you that there never has been a single foot of the Stow founda tion pavement laid down on either of those avenues in the city of New York. Will you please correct your statement in the next issue of your valuable paper?
Buffalo, N. Y.
[The pavement alluded to should, we believe, have been mentioned as Stafford's.-EDs.]
The August Shower of Meteors as seen in Texas.
To the Editor of the Scientific American: To the Editor of the Scientific American:
In regard to the shower of meteors of August 10, I would state to you that on the morning of the 11th, between 12 and 1 o'clock A. M., I beheld the finest display of meteors that I ever saw in my life. They were in the west, at about an angle of $45^{\circ}$ from where I stood, and were of many sizes, from the smallest speck up to the largest sized star, and very thick.
Bryan, Texas.
P.

## ABSURD COSMIICAL THEORIES

by w. t. robinson, A. M.
Dr. Carpenter is not in advance of the Scientific Ameri AN in ascribinggreat importance to common sense as a test for scientific theories. This rule, when applied to certain cosmical hypotheses, shows them to be too thin for any prac tical purposes.
For instance, Dr. Hickok, in his late work on "Creation," claims that matter results from three forces: antagonistic, diremptive and revolving." Antagonistic forces collide, neutralize and form lumps of matter. But what is this force that he freezes into matter? Heat, light, electricity and sound are examples of it. What is sound? It is nothing more than a jarring or vibration of the air or other substance. The "force" or vibration jars the auditory nerve, and pro uces the sensation of hearing. In like manner, the wave of light impinge on the optic nerve and produce vision Heat acts in a similar way. But heat is not an entity in itself it is merely an abstract name for molecular motion. A bal lying still represents no force; start it down hill and it has force proportioned to its velocity; when it strikes at the bottom, its mass motion is converted into molecular motion, or heat; hence, heat and motion are convertible terms. But this motion is not anything in itself; it is simply an abstract name for the process of a substance changing position ; and, as all the forces of Nature are merely varieties of motion, it follows that without matter there can be no force, because motion is nothing more than the action of matter. Force is therefore really nothing in itself. Now, common sense ebels at the idea of the learned Doctorbringing two nothings into collision and begetting something, for every effect must into collision and begetting something, for
have an adequate cause, every bairn a dad!

La Place's nebular theory, as now understood by various
cisentists, supposes that matter in the beginning was difcisentists, supposes that matter in the beginning was dif-
fused throughout space, and that, through the action of the fused throughout space, and that, through the action of the a process of evolution. But these evolutionists do not admit that matter was created; if not, then it had no beginning, hence no starting point. Go back as far as mathematics or hence no starting point. Go back as far as mathematics or The theory is, therefore, not accordant with common sense, because it assumes a condition which could not possibly have existed.
Because our little world, and probably all other matter in the Universe, is revolutionizing, it does not follow that this change is evolution. Plants, animals, races revolve and die; meteors and comets are thrown into chaos, probably suns and systems are "knocked into everlasting smash;" but as the Universe can have no limits, there is no possible chance for a grain of matter or a vibration of force to drift off into the regions of nowhere. So that new suns and systems may arise from the fragments of the old ones, just as new plants grow up from the humus of defunct vegetation. Thus we have all things succeeding in endless rounds, vast, eternal, incomprehensible.
Council Bluffs, Iowa

## FIRE.

Professor C. F. Chandler, of Columbia College, recently delivered an interesting lecture at the Stevens Institute of Technology upon the very timely subject of "Fire." Beginning with general definitions, the lecturer explained the phenomena of combustion,and illustrated the reciprocal nature of combustibles and supporters of combustion by burning oxygen in ammoniacal gas, at the same time causing the latter to ignite in the air. Oxygen was also shown to burn in hydrogen and in an atmosphere of ordinary street gas. After
explaining oxidation and the gradual combustion of bodies explaining osidation and the gradual combustion of bod avoiding fire,
and executed several experiments with carbonic and sulphurous acid gases. He then explained the principle of fire extinguishers, showing how they contained carbonate of soda in solution, to which, by turning a handle of the apparatus, sulphuric acid is added, thus generating carbonic acid gas, besides forcing out the stream of water. The construction of a well known invention of this kind was detailed, and its mode of operation shown. The lecturer then gave an excellent plan for
rendering light fabrics fireproof,
and astonished the audience by calmly setting fire to one of a pair of thin window curtains. He then applied a blaze to the other, which refused to be kindled. A similar experi-
ment was made with two children's dresses of thin material: ment was made with two chilaren's dresses of thin material:
the first burst into flame the instant the lamp was applied, the second, though made of precisely the same fabric, could not be ignited. This effect was caused by mixing with the starch with which the articles were prepared the tungstate of soda, a crystalline and not very costly salt. Dr. Chandler suggested that a fireproof starch, properly prepared with this or some other ssitable chemical, would be a very valuable invention.
The greater part of the discourse was devoted to the means of preventing fire
statistics of fires,
recently compiled, show that $76,000,000$ dollars was lost through isolated conflagrations in the United States, Chicago and Boston not being considered, within a space of two years. Investigations into the causes show that although the largest number of fires was due to incendiarism, no less than 12 per cent owed their origin to accidents with kerosene. Examinations, made by the Fire Marshal of New York city, also proved that 18 per cent of the fires occurring within the limits of one year were due to a similar cause. The lecturer then proceeded to explain the manufacture of kerosene, its nature and how it is adulterated. He stated that nearly all the
kerosene
sold in the city is unsafe, and instanced how he purchased 700 samples, out of which only 28 were not dangerous, and 37 were extremely bad. A very lucid description was given of the method of testing the oil, and the varieties of apparatus used were exhibited. The flash point and not the burning point should be considered, as, of course, the vapor of the oil must ignite before the liquid can kindle. One hundred degrees Fahr. was stated to be the commercial standard for the flash point, but Dr. Chandler considered that this should the flash point, but Dr. Chandler considered that this should
be raised to at least $130^{\circ}$, so as to preclude all possibility of be raised to at least 130, so as to preclude all possibility of
the oil arriving at the flashing temperaturewhile in the lamp. A strong denunciation was delivered against the manufacturers who sell unsafe kerosene and thus imperil human life. It is a common trick to delude customers by setting a little of the oil on fire in their presence to prove that it is non-explosive. If kerosene ignites at ordinary temperatures, it is a sure sign that it is extremely dangerous. The oil never in any case explodes, but its vapor when mixed with air does so. Kerosene which is almost pure gasolene is now sold in New York. One variety is known as "Safety Gas," so called to evade the law. It is sold by one Smith, at No. 40 East Broadway; (we give the individual the benefit of the gratuitous advertisement). To prove the inflammability of this compound, the lecturer poured a little on an old coat hung on a frame. On touching a light to the garment, it instantly burst into a fierce blaze, which continued a sufficient time to burn the wearer, if any there had been, to death. This oil was stated to be as dangerous as gunpowder, and should pever be used. The properties of a really safe oil were then
explained, and samples of various kinds shown. Among others were the products of several well known firms, the best being mineral sperm oil, which Dr. Chandler stated flashed only at $250^{\circ}$ Fah., and was practically as safe as whale oil. Taking a specimen of this liquid, he heated it to a temperature of $212^{\circ}$, lit some cotton waste saturated with it, and actually extinguished the flames in the boiling oil. The same material, when poured on a garment, could not be ignited. Good oil is necessarily more expensive than the inferior qualities, but the very best only costs one half cent per hour while the worst cannot be sold at a lower rate than on quarter of a cent, for the same period.

## laws regarding the use of ofl

should, said Dr. Chandler, be rigidly enforced; and he called attention to the late English enactment on the subject. The various state laws hitherto passed are virtually inoperative their principal defect being that their execution is left to in spectors, who can be approached and so caused to neglect their duty. Selling or making dangerous kerosene should be legally made a crime, punishable by heavy fine for every offence. In case human life is sacrificed, the manufacturer should be indicted for manslaughter. Inspectors should be abolished and the evidence of every citizen taken as competent to prove the manufacture or sale of bad material.
carbonic actidas a preventive.
Dr. Chandler alluded to a company which at one time was started in this city for the purpose of introducing carbonic acid gas through pipes into all the houses, so as to have a
means of extinguishing fire ready at hand. This, he said, would be extremely dangerous, because in event of a leak in the pipes, the same could not be discovered, and the escaping gas would suffocate the inmates of the dwelling. It was proposed at one time to compress this gas into a liquid and furger of fire, the gas might be set free

## street gas

was also discussed. A common cause of fires is the habit of running over a gas pipe with a light in order to detect a leak. This is highly dangerous and often causes explosions. their gas when the fault is in the burner. A very large amount of money is yearly wasted simply because gas is improperly consumed. Iron burners are bad because they become rusty; brass are better, and those of soapstone or lava,
as they are known in the trade, are the best. The most as they are known in the trade, are the best. The most had ever seen was known as "Sugg's London Burner," made in England. This is an argand burner constructed of soapstone.

## fireproof buildings

were next taken up. Mansard roofs were strongly condemned and also the practice of using inflammable materials in buildings. Pine wood is so cheap in this country that it is employed for house carpentry almast to the Dr. Chandler then proceeded to explain the French mode of building, which he said was almost absolutely fireproof Floors consist first of a number of thin iron beams, much thinner than are used in this country, placed some two feet apart. Across these are laid a number of rods of hoop iron, and across these again more of the same material, until a network with interstices of about a foot in size is formed. A flat platform is then brought up underneath, and liquid plaster is poured over. As soon as this sets, the platform is
removed and the floor remains, a solid mass of plaster and removed and the floor remains, a solid mass of plaster and
iron. Walls are constructed after a similar fashion; iron. Walls are constructed after a similar fashion; a few
light scantlings are put in position to give shape and, boards being temporarily placed on either side, liquid plaster is poured in and allowed to harden. All walls and floors therefore are perfectly solid, and consequently fireproof. Dr. Chandler then gave a very entertaining account of a fire in the Palais Royal, in Paris. He said that the inmates of other nor move a single article. Of the Paris Fire Department, he gave an amusing description, saying that it was but a single garden engine and a line of men passing buckets. This, hough seeming ridiculous at first, really showed the sense of the people, who, instead of paying immense sums for an elaborate organization, spend their money in rendering their
houses incombustible. A fire in one room in a French house houses incombustible. A fire in one room in a French house
spreads no further. It is only necessary to close the doors spreads no further. It is only necessary to close the doors
and let the articles contained in the apartment burn up. No other damage can be done.
In great cities every house should be, by law, fireproof Our so-called fireproof warehouses are manifestly easily consumed, a fact shown by the immense number of windows which are always constructed in them and which offer no resistance to the fierce blasts of hot air from an adjacent burning edifice. All windows should be provided with iron shutters, not swinging, as these are easily curled up by heat but enclosed and sliding in the wall. Shutters should, how ever, be double, so as to leave an air space between them.
Dr. Chandler spoke at considerable length on fireproo construction, strongly advocating wide streets and isolation of buildings, and concluded his discourse, which was loudly applauded throughout by quite a large audience, by an appro priate quotation from Schiller's "Song of the Bell."

IT is said that a copper mine has been discovered in Jack son county, Ill., of extraordinary richness, at a depth of only ten feet. Experts, they say, pronounce the ore to contain ninety-five per cent pure metal, and in consequence all the inhabitants of the county have dropped their ordinary occu-
pations and gone to sinking wells in hopes to strike a "lead."
 Formation of Corrosive Sublimate

The author has instituted a series of experiments to ascer tain the eorrectness of the assertion that calomel when mixed with other powders becomes converted into corrosive sublimate; the results of these researches may be summarized as follows: No corrosive sublimate is formed within twenty, four hours when calomel is mixed with saccharum album accharum lactis, magnesia usta, magnesia hydrico-carbonica and natrium bicarbonicum. After three months no corrosive sublimate is formed in mixtures of calomel with mag nesia usta, magnesia hydrico-carbonica, and any kind of re fined sugar or milk sugar, but faint traces are formed in mix tures containing calomel, natrium bicarbonicum, and refined lamp sugar. By treatment with water, corrosive sublimate s only formed in such mixtures of calomel as contain mag. nesia usta and bicarbonate of soda. Rather large quantities of sublimate are formed in powders composed of calomel, sugar, and bicarbonate of soda, if the mixture becomes damp and is kept for a long time. No sublimate is formed when a powder consisting of calomel and bicarbonate of soda is digested with water acidulated with hydrochloric acid. Pepsin does not favor the formation of corrosive sublimate. $-G$. Vul pius.

## Pure Hydrochloric Acid.

The crude hydrochloric acid of commerce is first diluted, by the addition of water, to a specific gravity of from $1 \cdot 14$ to $1 \cdot 13$, and it is next treated with sulphurretted hydrogen gas until it smells strongly of the gas. The liquid is next filtered and then poured into a tabulated retort and heated until the sulphuretted hydrogen is eliminated. The test of solution of corrosive sublimate having been applied, the bulk of the acid is distilled over at a gentle heat, a few fluid ounces only being left in the retort, so that any chloride of iron left in the acid may be retained.-Th. Diez.

## Starch in Potatoes.

A tabulated form contains the record of experiments with sixty-one different varieties of potaloes, in which the author had estimated the total percentage of dry substance and the total quantity of starch. It appears from this re search that the percentages alluded to vary, for dry matter, from 15.64 to $34 \cdot 25$, and the percentage of starch from 8.79 to $26 \cdot 09$.—Dr. Raab.

Mejillones Guano.
This material occurs native and in large quantity near the Bay of Mejillones (Bolivia). In 100 parts, this substance consists of-lime, $30 \cdot 6636$; magnesia, $7 \cdot 9193$; peroxide of iron $0 \cdot 1466$; alumina, 0.0047 ; potassa, 0.5051 ; soda, 1.4532 ; phos phoric acid, $35 \cdot 86803$; chlorine, $2 \cdot 2250$; sulphuric acid $1 \cdot 6036$; silica, $0 \cdot 0459$; carbonic acid, $1 \cdot 5956$; water driven of at $100^{\circ}, 7 \cdot 6858$; non-nitrogenous organic matter, 6.5189 ; nitrogen, 0.7675 ; granules of granite, insoluble in HCl, $2 \cdot 2830$; loss, 0.7249 . The authoretat thisguneeurs in pulverulent sandy state, and that it is readily acted upon by carbonic acid and water, and thus rendered available for plants, while, in consequence of its high percentage of phosphoric acid, it may be used with advantage for the prepara phoric acid, it may be used with advantage for the prepara-
tion of phosphate of ammonia and other phosphatic preparation of phosphate
tions.-H. Vohl.

Economical Preparation of Hydrogen.
By first reducing to the metallic state a peculiar kind of ron ore found at Chateauroux (France) by means of oxide of carbon, finely divided iron is obtained, which is used to prepare hydrogen, which thus costs only $\frac{1}{2} d$. per cubic meter ( $35 \cdot 31$ English cubic feet) and may be used for various heat ing, illuminating, and air balloon filling purposes.- $M$ Giffard.

Applications of Sulphurous Acid Gas.
The author proposes to apply sulphurous acid gas-obtained in the usual way from pyrites or burning sulphurfor the purposes of saturating urine, the contents of fosse d'aisance, ammoniacal gas water, the waste soap water from woolen and other industries, partly for disinfection, but more particularly for obtaining valuable products by evaporation; the sulphurous acid gas is forced into the liquids by means of blowing fans or force pumps. $-M$. Chaudet.

## Why the Fire Spread so Rapidly.

All the accounts agree in attributing the fearful spread of the conflagration in Boston, to the presence of the "Mansard " roofs, which proved to be simply huge wooden boxes, mounted upon the summit of granite walls, far above the reach of the firemen. Mr. H. S. Oakley, President of the National Board of Fire Underwriters, New York, cautioned the Boston Board of Underwriters in relation to this very mattor more than four years ago, and asked them to use their influence toward suppressing the erection of these im mense frame structures above the cornices of their busines houses and dwellings. The building in which the fire origi nated he was well acquainted with, as he had given it his per sonal examination, and he feared that it and similar struc tures would at some time or other entail a great loss on the community. It was 60 by 100 feet, and the Mansard was from 20 to 30 feet high, without a break-a great wooden structure surmounting the masonry. The second building ignited stood on the opposite side of the street, and the gnited stood on the opposite side of the street, and stated
street was sixty feet wide. It should, however, be stated street was sixty feet wide. It should, however, be stated
that if iron framing and iron covering plates are used in the that if iron framing and iron covering plates are used in the
construction of these roofs they are then made perfectly safe. It was a Mansard-roofed building that arrested the spread of the fire in Boston on its recurrence from gas explosions. Doubtless the authorities of Boston will hereafter require the use of iron.

HAY AND STRAW STACKING APPARATUS.
The labor of stacking wheat, rye, oat, or barley straw and hay with an ordinary pitchfork is by no means slight, and indeed it is almost impossible to build stacks by hand high enough to prevent their becoming lat by settling, and their consequent rotting by the soaking in of the rain.
The invention herewith illustrated is designed to enable one man to place straw or chaff on a stack or pen eighteen feet high, as fast as the material can be furnished by the thrashing machine. It consists of an upright resting on a pivot and held erect by two braces, the upper ends of which are fastened in such a manner as to allow the upright to pivot readily in any direction. The lower extremities of the braces are firmly staked in the ground, as shown in the engraving. To the upright is attached a windlass, A, furnished with a ratchet and pawl, and carrying an elevating rope which passes upover a pulley, $B$, then down around another pulley on a carriage, C, and thence back to a staple on the upright, to which it is made fast. The carriage, C, is provided with The carriage, C , is provided with
friction rollers so as to slide freefriction rollers so as to slide free-
ly and down the upright, and ly up and down the upright, and
connects with the lower end of connects with the lower end of ty of which is pivoted to the vibrating beam, E. The latter is hinged to the top of the upright as shown, and supports at its further end the tonge or grapple. The construction of this appliance is after the fashion of lazy tongs, and is readily understood tongs, and is readily understood
from the engraving. To the from the engraving. To the pling arms is attached a cord, which passes through a loop on the swinging beam, and thence is led along down to a point beside the windlass.
To operate the device, the rope attached to the windlass is slacked until the beam, E , is inclined downward sufficiently to allow the tongs to grasp a quan tity of straw. By pulling on the cord attached to the grapple, the jaws are opened to engage the material, and by slacking the line the tongs close of their own weight and firmly hold. The windlass is then the beam elevated to the proper distance, then revolved and paratus is turned on its pivot until in position to drop its load on the stack. The cord attached to the tongs is then pulled, causing the jaws to open and the straw to fall out. The machine is represented at this stage in our illustrationthe figure at the foot of the upright being in the act of draw ing the cord.

The principal advantages of this invention are the econo my of labor and time which it must cause, and also the simplicity of its parts. It can readily be made by any farmer, with the assistance of an ordinary smith in the construction of the metal portions. It is not heavy or unwieldy to manage, and can be easily carried upon the shoulders of two men.
Patented through the Scientific American Patent Agency, September 24, 1872. For further information address the inventor, Mr. D. W. Baird, Lebanon, Tenn.

## SEWING MACHINE TREADLE AND:OASTERS.

Our engravings represent an improved form of treadle a also an ingenious mechanical combina tion of levers, whereby the sewing ma chine may be lifted on or off its casters at pleasure. From Figs. 1 and 2 the arrangement of the treadles is readily understood. There is necessarily an al ternate motion, the cranks being on a quarter turn similar to those of a loco motive. The dead center is thus avoided, and the machine can be entirely controlled by the feet, which, acting separately, have a much more natural and rately, have a much more natu
Figs. 3, 4, and 5 represent the various portions of the device for actuating the casters, which, in Figs, 1 and 2, are shown respectively out of and in action. The lever (Fig. 3) is attached to the rear right hand leg of the machịne, its forward end terminating in a foot plate. Fig. 4 is affixed to the corresponding forward leg, the arm of the lever being inwards, connecting with and moved by the foot lever, Fig. 3. Fig. 5 extends cross the machine under the treadles. Onits right hand end are an arm and pin, which pin enters the slot shown in the foot lever. A caster is attached to its left hand extremity by means of a shor arm.


SEWING MACHINE TREADLE AND CASTERS benefits of an enterprise in whichall are so deeply interested.
forward leg, which retains it until it is released by the hand. The rear caster fastened to this lever is therefore thrown into action, while the arms of the levers, Figs. 4 and 5, are forced down, causing the other two casters thereto attached to press on the floor and to act as fulcrums, so that the machine is raised fully half an inch, and may be easily moved from place to place. It will be noticed that the bar, Fig. 5, carrying the caster on the left, is made concave, so, that any oil, that may fall from the feeder or bearings, is caught and prevented from reaching the carpet. The treadles and the invention just described may be easily applied to all forms of sewing machines new or old.
These devices were patented through the Scientific Ameri
can Patent Agency, the treadles under dates March 7, 1871,
national glory. "Confidently relying on the zeal and patriotsm ever displayed by our people in every national undertaking, we pledge and prophesy that the centennial celebration will worthily show how greatness, wealth, and intelligence can be fostered by such institutions as those which have for 100 years blessed the people of the United States.

## Huge Snow Plow.

We see it stated that the Union Pacific Railroad is having built, at the shops in Omaha, a snow plow which, when finished, will be the largest and most powerful in the world. It is rapidly approaching completion, and in a few days will be ready for business. The trucks on which it is built are very
heavy and strong, and were cast especially for this plow. The platform on the trucks is 22 feet long and 10 feet 6 inches wide, and is composed of solid oak timbers, 8 by 16 inches. These timbers are held together by 10 iron bolts $1 \frac{1}{4}$ inches in diameter, which run crosswise This solid bed is fastened to the transom beams by 40 bolts, 20 over each truck. The inclined slide, placed on the platform, is 22 feet long, and slopes at an angle of 30 degrees, and is held firmly to the bed by 40 bolts of an inch in diameter, and is supported from behind by inclined posts 5 feet long, 8 inches wide, and 16 inches thick. The entire length, from the rear of the platform end of the slide, is 32 feet. The slide is to be ironed, and an immense plow of the ordinary shape, 18 feet long, 11 feet wide, and 5 feet high, and covered with iron 3-16 of an inch thick, is to be securely placed upon it. On the point of this plow there is to be an iron plate, steel pointed, 11 feet long and 4 feet wide. This plate, of course, runs across the track, and only 1 inch above it. The rear of the platform will be boxed in, making a room twelve feet high, 11 feet wide and 10 feet long, for the purpose of keep. ing the snow out. It will be

## BAIRD'S HAY AND STRAW STACKING APPARATUS

 $t$, if necessary, it can be loaded May 9, 1871, and Sept. 12, 1871, and the casters Oct. 17, 1871, $\mid$ furnishe by Mr. G: K. Proctor. They are now manufactured by the Sa- with iron lem Shade Roller Manufacturing Company, of Salem, Mass., John C. Osgood, agent, to whom further inquiries may be addressed.
## The National Jubilee.

The onehundredth anniversary of American Independence is to be celebrated at Philadelphia, Pa., July 4th, 1876, in a becoming manner. One grand feature of the occasion will be the general exhibition of the products of American Industry. The Centennial Commission has issued an address to the people of the United States, signed by President Joseph R. Hawley, for subscriptions to the fund of ten millions of dollars required to make the Centennial such a success as the patriotism and pride of every American demand. The Commission looks to the unfailing patriotism of the people of every section to see that each contributes its share of the

The monster will weigh fifty tuns, and will be operated by three of the heaviest engines on the road. The cost will be over $\$ 5,000$. The design was gotten up.by Mr. G. E. Stevens, superintendent of the car and building department, and Mr. J. H. Congden, general master mechanic of the road, who must have made it a study since last winter. There will be but very few snow drifts that this plow won't clean out but if it ever jumps the track, it will be a pretty hard job to get it on again.

## New Submarine Telegraph Cable.

Telegraph cable works have been erected on the Pacific coast, at San Francisco, and the Electrical Construction Com pany have completed the first section of their first job, to wit, a cable for the British Columbian Government. It is in ended to be submerged under Rosario straits, to connect Van couver's Island, at Victoria, with the continent.
The cable is 35,000 . pounds. The conductor is composed of seven No. 20 copper wires. of 97 per cent fineness. The dielelectric consists of two coats of pure gutta percha $\frac{9}{32}$ of an inch in diameter, with intermediate coatings of Chatterton's compound. The gutta percha coil is served with two coats of machine banding, well tarred, and covered with a protecting armor of No. 9 galvanized iron wires, laid on spirally. Electrically tested, the resistance of the conductor is eight ohms, or B A units, per knot, and the resistance of the dielectric or insulating medium, $443,000,000 \mathrm{ohms}$ perknot. The company has an order on hand to manufacture another cable 30,000 feet long, for the Puget Sound Telegraph Company, to establish a connection Telegraph Company, to establish a co
between Seattle and Port Townsend.

A patent called the "Electro Magnetic Motor" has, it is said, lately been tried on board the yacht Miranda, in the Birkenhead Great Float, and for the moment the result is of that nature which enables the inventors to state that at full power the motor made 1,400 to 1,500 revolutions per minute, while not connected with the screw. The yacht was worked for about five minutes, but before she could be brought up she had torn all the fastenings away from the great vibrator. The fact is, remarks the London Daily Neurs, that raised, 1 , the device being out of action, the foot lever is and Territory of Centennial organizations which shall in time the motor was twice too powerful for the yacht, and there the machine rests firmly on its legs. In Fig. 2 the foot lever has been pushed down and is caught under the catch on the
nations are gathered together in 1876, each Commonwealth invention into general use.
can view with pride the contributions she has made to the We have not a doubt as to the latter.

## grientific ghmexiam.

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VOL. XXVII., No. 22. [NEW SERIEs.] Twenty-ighth Year NEW YORK, SATURDAY, NOVEMBER 30,1872 .


## THE VIENNA EXPOSITION.

We have had occasion of late to present to our readers a variety of evidence, showing that if the American inventor were to go to the trouble of exhibiting new improvements at the coming Exhibition, as desired by the Austrian officials, he would be simply a carrier of novel patterns to Vienna for Austrians to copy, for which they would make no acknowledgment and give him no compensation.
We have shown how fully the laws of the United States protect and encourage Austrian inventors when they come here for patents, and we have urged upon the Austrian government the propriety of simple reciprocity.
We have shown that American inventors could not be expected to take an active interest in the Exposition until the obnoxious Austrian laws are modified; and, until the change has been accomplished, we have urged that Congress ought to refuse to grant appropriations in furtherance of the Exposition undertaking. We have further indicated that there is no necessity for the office of United States Commissioner, can exhibitors, if they believe they can profit by forwarding they believe they can profit by for ment employees to induce them to look after their own interests, nor should they require national assistance in pursuing their ends of private gain; and finally, that any setting aside of the public funds, to pay office-holders for services of no greater value or utility than pleasure trips to Europe, would be both unadvisable and impolitic. Such is about the substance of our hitherto expressed opinions, in answer to which the United States Commissioner, General T.
Van Buren, sends the letter printed in another column. Van Buren, sends the letter printed in another column.
Our correspondent does us an injustice in supposing that with the private character of a gentleman, whose ability and patriotism we would not impugn, and to whose eloquent and forcible addresses we have listened with great pleasure and approval during the late campaign.
There are certain assertions in his letter, however, which seem to require comment at our hands. We are there stigmatized as a "show" paper, and as an illustration, reference is made to a large and handsome engraving of an im. proved loom, displayed on the first page of a recent issue of the Scientific American, of which ninety thousand copies have been printed. We admit that we are a "show" paper, and as such we take pride in presenting such fine illustrations as the one referred to. We know of no better means of laying before the public the best products of the national inventive genius, and we but perform a duty when we publish the same in the most attractive and complete manner. But the Commissioner is somewhat unfortunate in the selection of this particular device as evidence of our being a "show" paper. It happens that the loom is of remarkable and exceptional excellence and ingenuity, and has accordingly been patented in the United States and in some parts of Europe, but not in Austria. Americans avoid that country, because they can get no proper protection for their inventions. If the Austrian laws only offered suitable protection, doubtless the inventor of the large and splendid loom, to which the Commissioner alludes, would have made haste to apply for space at the Exposition; and we are free to say that the presence of that remarkable machine in the Vienna "show" would form a more novel and attractive feature, in the display of textile machinery, than anything of the kind that is likely to be there presented.
As the " especial champion" of inventors, a title in which we confers a pride, and which it is our aim to deserve, we consider that we advocate the cause of the entire country, and believe it to be to General Van Buren's directpersonal inrights of our inventors be fostered, sustained and defended.

Special stress is laid upon a trade mark treaty, with which the Commissioner had nothing to do, and which is of little importance compared with the interests of American inventors, still open to infringement and piracy by the Austrians. In a widely distributed circular, issued from General Van Buren's office, we find the following remarkable statement:

The Austrian government is exceedingly desirous that the United States shall be well represented, and makes extra ordinary concessions to American manufacturers. The Aus trian patent law is practically abrogated for the six months of the exhibition and two months following, and inventors are protected, by a special ordinance, against piracy of their inventions." Is there not a slight discrepancy between the intimation now made to us that a treaty may at some future
time be concluded, and the direct assertion to the public in the above circular, that the objects of such treaty are now absolutely accomplished?
Would it not be well for the Commission to send out a new circular to manufacturers, showing that the previous circular of the Commissioner is incorrect; that the Austrians have not granted any "extraordinary concessions;" that the Austrian law has not been "practically abrogated," and that all that has been done in the premises, as the result of the zealous labors of the Commissioner on that point, consists, as he now states, in the sending of a draft of a proposed treaty from 51 Chambers street, New York, to the city of Washington ?
The question of personal remuneration, General Van Buren places in a rather singular light. He states that he entered upon his duties, very well knowing there was no salary at tached thereto, and actuated by a laudable motive to render service to his country. In the very next sentence he forgets his patriotic desires, and says he cannot, and insinuates will not, continue his functions at his own expense. Why did he undertake them? Moreover, he says that he has no claim for past services, and wants compensation for the fu-
ture. But he has already boasted that a large number of ture. But he has already boasted that a large number of
articles for exhibition have been entered. Now, surely, it articles for exhibition have been entered. Now, surely, it
will not require a very extensive assortment of machines to fill thirteen thousand feet of floor space, and consequently the Commissioner's labors must be nearly completed. Therefore, having given a fair amount of time and trouble to his duties, why doès he not, as he says he is willing to do, resign? We presume there are other gentlemen of leisure and means, and possibly of equal ability, who will accept the position. Why, we further ask, does our correspondent now appoint sixty-five asssistants to perform work which he was able to prosecute zealously, even when otherwise occupied in laborious political duties? Why seek to induce Congress to appropriate a large sum to pay a number of men for doing The word "show," and theasure trips to Europe
The word "show," and the insinuation that the Exposition is a grand advertisement, seems to wound our corre spondent's sensibilities. "Show" is a plain Saxon term,and i synonymous with the high sounding "Exposition," while, as to the advertising guestion, we hag to rofor the Commi adertising is admi ted to be an what possible expedient can be conceived better adapted to create expeditiously a demand, for any article having in it merit enough to recommend itself, thanthat of placing it be fore the world in a great international exposition?"

Since the above was written, we observe, by the daily papers, that Mr. Van Buren has made his appearance i Washington to advocate the appropriation of half a million of dollars for the expenses of himself and others to go to the Vienna show. In his remarks before some of the teachers of the District, he said that the Austrian Director of the Exposition, Baron Schwartz, had written several letters to him urgently asking that models of American school building and apparatus might be sent to Vienna. But Mr. Van Buren intimated that, out of the proposed five hundred thousand dollars, only a small portion could be allotted for such pur poses. We have no doubt of the latter fact. The most of the money will be required to pay for the European pleasure
travels and hotel bills of the Commissioner and his super travels and hotel bills of the C
abundant retinue of assistants.

## THE NOSE STRAIGHTENE $R$.

Among the recent triumphs of mind over matter is the invention of a device for straightening crooked noses. We the more elongated form, impart the stylish Grecian bend to vulgar noses, or transform the common-place idiotic nose into a thing of beauty, which is a joy forever. But we presume it will, for the patentee says so. Here is his advertisement which we find in a London paper:
N OSE MACHINE. This is a successful contrivance which,


## REMARKABLE STUPIDITY.

Through the courtesy of the Board of Management of the ecent Fair of the American Institute, we have been forward d a copy of a very singular circular lately submitted to that trite fact of the value of the compound marine engine, then goes on to state that the opinion of English engineers re garding the same is not conclusive, ingenuously remarks that if our merchant navy had the best engines it could compete with established rivals, and concludes with the remarkable equest that tests be initiated in the machinery department of the Fair to determine the advantages of the compound system. The document bears the signatures of such firms as

Williams \& Guion, Pacific Mail Steamship Company, Spofford Brothers, Wm. K. Garrison, Murray, Ferris \& Co., C. H Mallory \& Co., Atlantic Mail Steamship Co., H. B. Cromwell \& Co., and others
The only words which seem applicable to this astonishing composition are ignorance and effrontery. That men high in the mercantile world should not be posted in the fact that for several years back, every new steamer that has been added to the foreign lines plying between this city and Euro pean ports has been provided with compound engines, has proved the same advantageous above all others, and has made equal speed with half the former consumption of fuel, is simply amazing. The logs of these vessels are open to their inspection, and if to this excellent evidence we add the long since expressed opinions of not only the best European, but the first American, engineers, that the compound engine is by far the best machine extant for marine purposes, we should like to be informed what better proof these modern Rip Van Winkles require.
Were it not for the gratuitous slur upon the whole engineering profession, the concluding request would be actually funny. Here is a body of well known citizens, and among them the publishers of a scientific periodical, who at least ought to know better, deliberately asking the American In stitute to require its judges to undertake experiments which are to be " of the highest value." Can anything, we ask, be more absurd? Do we understand that these gentlemen be lieve that the Institute, of all societies, through the medium of three civilian judges, presumably not the best talent the country can afford, backed by a mixed board of managers the majority of whom know little or nothing on the subject can give an opinion worthy of a moment's serious considera tion, and above all of being placed superior to that of the best English and American scientific and mechanical authorities ? Were it not for the fact that this petition has been pub lished and made the subject of comment by the daily press, we should pass it by in silence as an inconsidered emanation signed by men who were ignorant of the views it expressed but as it has been given to the public, it is as well that its re markable contents and purport be understood.

## THE HORSE DISEASE.

The epizoötic still prevails in many places throughout the country, occasioning greatinconvenience in the transaction of business, and throwing many laboring persons out of employ ment. In this city the distemper has abated; but a new form of disease has set in, having the character of dropsy It has been attended with fatal results in many cases.
In respect to the epizoötic, the experience here was that the more quiet the animals could be kept, until their health and strength were fully restored, the better. In many instances, where horses were used contrary to medical advice, bad re sults followed. Commodore Vanderbilt has lost a twenty thousand dollar horse-Mountain Boy. The animal was so well that the Commodore drove him out. Butimmediately on returning, the horso sickened and died of pneumonia. Dr. J. J. Woodward, of the United States Army, Washing on, has made a careful microscopic examination of the organic forms derived from the air of stables, in that city, in which numbers of epizoötic horses are kept. He was unable o detect the presence of any germs other than those ordina rily encountered. Examination of the mucous discharge rom the nostrils of the sick horses gave the same result. The popular belief that the sickness is due to the presence of certain spores of fungi, floating in the air, is not regarded as correct by Dr. Woodward and other microscopists.

## OXYHYDRIC ILLUMINATION.

We have before alluded to the introduction of the oxyhy rogen light in this city, and the endeavors which are being made to supplant by it the ordinary gas now in use. In this connection the French Bulletin du Musée publishes a report of Mr. Felix Le Blanc, of Paris, based upon experiments made in that city and in Brussels, upon the gas of the Sociète Tessié du Motay, which is the same as that made by the New York Oxygen Gas Company. A flame of common il uminating gas is fed with a certain quantity of oxygen, by means of special burners delivering the common gas at the circumference, while the oxygen passes through the axis The two gases, passing through distinct tubes, mix at the extremity of the burner.
The following is a brief resumé of the conclusions of Mr . Le Blanc, based on experiments made along one side of the Boulevards des Italiens and des Capucines, in Paris. He ays: First: This illumination would not be possible ove any extended surface with the gas used. Neither is the method economical, asit is notably mare expensive than a quantity f ordinary gas giving equal light. The system should not e recommended for the lighting of public streets. Second The assertions made by the society are not substantiated. It is inexact to say that, in the oxyhydric system, the com bustion by the oxygen would be complete. It would require much more oxygen than could be consumed with effect, while the light would be greatly weakened. Third: If the ordinary gas be enriched by volatile hydrocarburetted vapors, previous o mixing it with oxygen, it will be necessary to surmount many difficulties in carburetting systems already well studied. The report goes on to give other reasons of the ame tenor against the use of the gas, and finally considers s hygienic effect. M. Le Blanc says that without doubt such a means of illumination does not impoverish the air
within circumscribed limits so rapidly of its oxygen as does ordinary gas. But to ensure complete combustion, the flame equires much more oxygen than is supplied, and consequently the light is much enfeebled; so that for this reason, he considers the healthfulness of the system to be by no
gas with a good system of ventilation is preferred, on account of the unfavorable influences which might be exerted
by a more than normal proportion of oxygen in the air. For by a more than normal proportion of oxygen in the air. For
metallurgical operations, this gas remains yet to be proved metallurgical o
In spite of Mr. Le Blanc's unfavorable opinions, so far a we can judge from the results obtained by the use of oxyhydrogen gas in New York, the system seems excellently suited for a variety of purposes. In one of our largest squares (Madison), a number of burners have been placed, which illuminate brilliantly a remarkably extended area completely paling all other lights. The expense of the sys tem is its greatest drawback for street lighting, though it is excellently adopted therefor. For the illumination of large buildings, however, we consider it unsurpassed. In the immense hall of the American Institute, in this city, this method has been employed during the recent fair; the quantity of light given far exceeded that of the twelve hundred burners of common gas ordinarily used, while the air in the building was noticeably purer and less oppressive The cheerful effect of the illumination in rendering objects clearer to the vision, and also in causing colors to appear in greater brilliancy, closely resembled sunlight. The whiteness of the light greatly added to the beauty of the scene pre sented by the profusion of tastefully arranged articles in the exhibition, and formed a marked contrast to the murky yellow glare diffused by common gas. Double pipes were laid throughout the whole edifice, one serving the street gas and the other containing the oxygen, both having their outlet at single burners. The American Institute deserves the highest commendation for the admirable way in which it has thus proved the value and utility of this new system, though opposed in its introduction by serious obstacles. The oxygen had to be transported a long distance across the city from the works of the company manufacturing it, compressed in cyl pipes, and yet a constant and efficient supply was uniformly pipes, and yet a constant and efficient supply was uniformly
maintained. There is little doubt that for interior illuminamaintained. There is little doubt that for interior illumina-
tion this gas will be extremely beneficial, both as affording an increased supply of oxygen and not impoverishing or vitiating the air, but actually rendering it purer, while the clear white light is far less hurtful to the eyes than the yellow and heated rays emitted by the ordinary street gas flame

## OUR CONCRETE DOCKS.

The work of constructing the new docks in New York is proceeding. The foundations, up to the surface of the water, are to be of concrete, made in blocks of from 50 to 75 tuns weight each. The composition consists of seven parts broken stone, three parts sand and one part of Portland cement. The concrete is cast in wooden boxes of the desired form and size, a central aperture being made in the block. After setting for a few days the boards are removed, leaving a block hav ing a hard and comparatively smooth surface. The block is cast with central grooves for the introduction of the lifting chains, and aftcr the blocks are placed one upon the other,
the grooves are filled with cement, which adds to the strength of the entire structure. From the surface of the water up granite blocks are to be used.

## AIR GAS LIGHT IN ENGLAND.

The "Air Gas Light Co., Limited" is the title of a new bubble in the speculative share line, now extensively puffed in the London papers and said to be having success. Several prominent names are connected with the scheme. The air gas is made by passing air through a suitable hydrocarbon liquid, such as naphtha. This method, as our readers know, has for years been in common use in this country. But in England the plan is, practically, almost unknown, and the "Air Gas Light Co., Limited," are astonishing the natives with the light, and are also unloading their stock shares as fast as they can find purchasers simple enough to buy. The air gas "epizootic" had a good run in this country; but speculation therein ceased a long time ago. A reasonable, steady and extensive branch of industry is now carried on, in this line, all over the country. For country dwellings, stores and churches, the air gas furnishes excellent illuminastores and churches,
tion at a small cost.

## THE GROWTH OR EVOLUTION OF STRUCTURE IN

 SEEDLINGS.Professor John C. Draper has recently published a pam phlet under the above title, showing from experiments made that in plants, as in animals, growth as applied to evolution of structure or organization of material provided is inseparably connected with oxidation. Regarding the lower organisms as fungi, the uniform testimony is that these plants at all times expire carbonic acid, while it is chiefly in the higher plants and especially those that contain chlorophyllor green coloring matter, that carbonic acid is absorbed and oxygen exhaled Regarding these plants, it is stated that they exhale oxygen in the light and carbonic acid in the dark. This change, Dr. Draper considers, arises from the fact that two essentially different operations, have been confounded, namely : the actual growth or evolution of structures in the plant and the decomposition of carbonic acid by the leaves under the influence of light, to provide the germ or other materials that are to be organized; and he proposes to show that, by adopting this proposition of two distinct operations in the higher plants, all the apparent discrepancies regarding the growth of these plants are explained,
Two series of experiments were arranged, in which growth in the dark might be studied and compared with similar growth in the light. Peas were selected as the objects of
trial, and each seedling was planted in a glass cylinder one trial, and each seedling was planted in a glass cylinder one
inch in diameter by six inches long, loosely closed by a cork
and filled to within half an inch of the top with fine earth or vegetable mold. The cylinders were then placed erect in covered tin box in such a manner that the lower ends dipped into water contained in the box, while the whole of the cyl inder, except the top, was kept in the dark. Warmth was was supplied by the external temperature, varying from $70^{\circ}$ to $80^{\circ} \mathrm{F}$., and the supply of moisture was retained uniform One box containing five cylinders was kept in a dark closet and another, exactly similar, placed in a window where the direct rays of the sun fell upon it five or six hours per day Similar means were provided for determining the growth of the plants during night and day. One seed in each set failed o germinate. From the results obtained by the experiments, Dr. Draper arranges tables which give the following conclusions: In the seedlings grown in the dark, the time with which the structures were evolved in each plant is uni orm-about the 17 th day. Six periods of evolution are in dicated, uniform in each plant, notwithstanding the difference in the weight of the seeds. In the first period, the growth consists of the formation, close to the stem, of two partially developed pale yellow leaves; in the second, the leaves are larger; in the third, a lateral stem projects, bearing two more leaves, between which is a tendril; in the fourth, the twig and tendril elongate; in the fifth, the tendril bifurcates; and in the sixth, it trifurcates. Stems, leaves, twigs, and ten drils are therefore evolved by the force pre-existing in the germ without the assistance of light. In the case of th seedlings grown in the light, the leaves and tendrils wer many times larger and of a brighter green color, but the light developed no new structure. The average weight of dry plant and the proportion of root to total weight of plan was nearly identical. It was also found that, in the pot in which the peas were grown in the dark as well as those in the light, the soil was so poisoned by the roots that second crop failed to sprout, thus affordiug another
processes in the plants must have been similar
From careful observation, the author concludes that the act growth or evolution of structure is independent of light hat at night. He says that the whole history of the plant, rom the time the seed is planted to its death, is a continuou story of oxidation, except when sunlight is falling on the leaves. The seed is put in the ground and, during germina tion oxygen is absorbed and carbonic acid exhaled. If kep in the dark, only carbonic acid is exhaled, oxygen never; and the plant not only grows, but all visible structures, excep flowers, are formed in a rudimentary condition. In the light, the growth during the night time is attended by the evolu tion of carbonic acid, while during the day time the bark of the stem and branches is throwing off carbonic acid. When flowers and seeds form, the evolution of carbonic acid attend ing this highest act of which the plant is capable is often greater than that produced at any time by animals. The inal conclusion is that all living things, whether plants or ani mals, absorb oxygen and evolve carbonic acid or some other
oxidized substances, as an essential condition of the evolu oxidized substances, as
tion of their structure.

## PROGRESSI OF AMERICAN IRON INDUSTRY.

The iron business in the United States has never been in so flourishing a condition as at the present day. In Pennsylvania more iron is now being produced than by all the combined furnaces of England and the Continent of Europe, and yet the demand is far greater than the supply. A correspondent of the New York Times states that in the valleys of Eastern Pennsylvania there averages a furnace for every five miles and still millions of dollars are being invested in further ex tension and development of the iron industry. All the iron masters are reaping golden harvests. Pig iron can be produced at an average first cost of from $\$ 13$ to $\$ 17$ per tun, ac cording to location and conveniences at hand. A clear profit of from $\$ 35$ to $\$ 45$ per tun is made, and when the produce ranges from one to two hundred tuns per day, the aggregat very of a dor part to the fact of the country being thrown upon its own resources, England having discontinued shipping pig metal hither altogether, because under the present state of the market in Europe she cannot afford to do so. In the cheap times of the Kingdom, ore was plentiful and labor was to be
had at very little cost. Now the mines are old and well had at very little cost. Now the mines are old and wel
worn; native ore is rare and labor at advanced rates, so that Spanish ore is imported, which, by the time it reaches Eng lish furnaces and is smelted by English labor, is advanced fully 100 per cent over the first cost of produce. One of the most prominent operators in Pennsylvania publishes the in formation that for the first time in the history of this coun try, America has shipped iron to England with advantage. Our supply of ore is unlimited. In nearly every Stat new veins are being developed, and in almost every case an accompanying discovery of coal is announced. The track of furnaces will eventually find its way to Western Virginia, thence to Texas, and in time we may look to the Territories of the great West for our valuable pig metal. This year's produce of iron, there is every reason to believe, will exceed that of last year by fully a million tuns, and if the produc ing capacities continue in like proportion with the present three millions more

In Georgia, the picking of the cotton crop is rapidly going forward, and if the weather continues as fine as it now is, the whole of it will be gathered by the 15th or 20th of Novem ber. Two thirds have already been gathered, ginned, baled, and are either on the road to market or already there. So
seems that the caterpillars have not taken all of the crop.

Shoeing Oxen for Pavements.
In regard to the matter of shoeing oxen so that they can ork on pavements, Mr. P. P. Sibley writes to the Boston Journal às follows:

As I have worked twenty-four years at blacksmithing, and claim to be master of my trade, I will give my opinion in regard to shoeing. In the first place, turn the shoe as usual, only a little thicker at the toe, then weld together at the toe, and put a calk on the toe about an inch long and one quarter inch high; heel calk the same. In setting, care should be taken to keep each claw in its natural position, that is, spreading them as the ox would usually stand, and also fit the shoe well. Put six nails in each half of the shoe. I the shoe well. Put six nails in each halways used the Vulcan No. 6 nail. I have shod cattle in this way that were driven through a river twenty times a in this way that were driven through a river twenty times a
day, and did not lose a shoe for weeks, when if shod the day, and did not lose a shoe for weeks, wh
common way they would soon become lame."

## A New Steamer.

The Victoria is the name of a new and splendid steamer, ately arrived at New York on her first voyage from Liverool. Her burthen is 3,600 tuns. She was built on the Clyde by Messrs. Alexander Stevens and Sons, her length being 380 feet, readth of beam 42 feet, depth of hold 30 feet, and having engines, two in number, of the compound vertical direct acting principle. The cylinders of these are 108 inches low pressure and 60 inches high pressure, with a stroke of four feet. Steam is supplied from six tubular boilers, with superheaters for each. The propeller is 18 feet in diameter and 20 feet pitch. Then there are smaller engines for pumping and deck purposes, weighing anchors, loading and unloading cargoes. Fire engines are all over the ship, and the forward part of the deck is so constructed that the seamen, in the worst of weather, may not suffer from exposure in their duty.

## PATENT DECISION.

The Supreme Court of the United States in the suit of Wells vs. Gill, Hat Body Machine, has sustained the Wells patent. One of the allegations was that the Commissioner of Patents had, in the reissue of the Wells patent, granted claims for subject matter not contained in the original patent. The Court refused to go behind the Commissioner's action.

## PROFESSOR JAMES HADLEY.

This learned and distinguished linguist died at New Haven, Conn., November 14, 1872, in the 52nd year of his age. He Conn., November 14, 1872, in the 52nd year of his age. He
occupied the professorship of Greek at Yale College, was President of the Oriental Society, and enjoyed a worldwide reputation as a master of languages.

The Epizootic among Deer.
We learn from our Western exchanges that the dreadful horse disease, the "epizoötic," has now taken effect upon the wild deer, and is likely to diminish our supplies of venison and skins. Many deer are found dead in the woods. No deer is shot now, and when one is found dead the skin is removed to be made into leather. The horses used in the woods are all sick, and the men treat them to hemlock fumigations and sweats, with good results.
New Steam Launch.-A trial of a steam launch, built or the government of Costa Rica by Messrs. Yarrow and Hedey, of Poplar, England, recently took place on the Thames. This little steamer is 43 feet in length, and the chief feature of its construction is that it is built in three entire sections, so as to enable it to be thoroughly tested under steam in Engand, and can be afterwards divided into three separate pieces for shipment, each section being of such a size as to enable t to be lowered down a vessel's hatchway. At the joints there are double bulkheads, rendering each section buoyant in itself. This method of construction avoids the necessity of obtaining skilled labor to put the launch together and set o work on arrival at its destination, thereby rendering the ntroduction of these useful little steamers possible in many foreign parts otherwise impracticable. The launch in ques tion maintained easily a speed of ten miles an hour on a con sumption of half a hundredweight of coal.

## Fire--Newspaper a Offices Burned out.

The following is the list of the newspapers, magazines, etc. which were located in the burned district:-American Homes monthly, 51. Water; American Painter, weekly, 58 Congress American Railway Times, weekly, 66 Federal ; American Un ion, weekly, 63 Congress ; Ballou's Monthly Magazine, 63 Congress; Banner of Light, weekly, 158 Washington street; Bos ton Almanac and Business Directory, and the Boston Directory, 47 Congress ; Cabinet Maker, weekly, 50 Congress; Chrisian Monthly, 19 Lindall; Freemason's Monthly Magazine, panion, 42 Summer; Harness and Carriage Journal, weekly, 40 Pearl ; Boston Journal of Chemistry, monthly, 150 Congress 40 Pearl;Boston Journal of Chemistry, monthly, 150 Congress ;
Little Christian Monthly, 19 Lindall; Monthly Novellette, 63 Congress ; New England Postal Record, 40 Liberty square; Saturday Evening Gazette, weekly, 37 Congress ; Pilot, weekly 19 Franklin; Shoe and Leather Record, weekly, 40 Pearl Shoe and Leather Reporter, weekly, 40 Pearl; Shoe and Leather Trades Journal, weekly, 3 High; Sierra Maga zine, monthly, 100 Pearl; Temperance press, weekly, 46 Congress ; Transcript, daily, 150 Washington; Yankee Blade, 40 Liberty square; Waverly Magazine, 50 Lindall; Journal of Applied Chemistry, monthly, 40 Pearl.
B. F. Chandler, C. E., of United States Navy Yard, Ports mouth, N. H., writes us that the large cotton mill in that place is lighted with gas made from paraffin, which proves to be far preferable and 50 per cent cheaper than coal.
A science teaches us to know; an art to do. In art, tenth
s a means; in science ${ }_{4}$ it is the end

## SCIENTIFIC AND PRACTICAL INFORMATION.

inoculation with dead blood.
It is well known that surgeons are often seriously injured by accidentally cutting themselves with instruments that have been recently used for dissecting purposes. The wounded part swells, and mortification often ensues, necessitating amputation and sometimes causing death. In order to determine the poisonous properties of this putrid blood, M. Davaine communicates to Les Mondes the result of several experiments made upon rabbits. The liquid used was the blood of an ox that had been ten days slaughtered. This, by subcutaneous injection, he administered to his subjects in varying quantities, obtaining by successive dilutions with water the most infinitesimal attenuations. Killing one animal, he would take its infected blood and force the same into the veins of another, and so on until he reached what he terms the twenty-fifth generation. On this last experiment he says: "Four rabbits received respectively one trillionth, one ten-trillionth, one hundred-trillionth, and one quadrillionth of a drop of blood from a rabbit belonging to the preceding generation that had died from the effects of a one trillionth dose. Of the four, but one animal died-that which received the one ten-trillionth. It appears, then, that the limit of the transmissibility of the poison in the rabbit reaches the one trillionth part of a drop of decayed (septique) blood."

## INDEPENDENT CAR WHEELS.

In the Polytechnic Exhibition of Moscow is now exhibited a new method of arranging the axletrees of railroad cars or other vehicles, in order to facilitate the passage around curves of very short radius. The axle is cut in the middle and the two portions are reunited by means of a long metallic sleeve. The extremities of the axle consist of a pivot and socket, so that their only point of contact is directly in the center of their junction. Shoulders or flanges are arranged which retain the halves within the sleeve. The two portions of the axle are thus allowed to work at different portions of the axle are thus allowed to work at different
velocities, by which it is believed that the successive shocks velocities, by which it is believed that the successive shocks
occasioned by the sliding of the wheels on the rails in rounding short curves will be avoided. This system is being applied to a tramway between Petrofsky Park and the gardens of the exposition, on which there are curves of from 30 to 50 meters radius.
The invention is very old and has long been known in this country. One of the most approved examples is the " DotyMiltimore Compound Car-axle," which is now used on several of our railroads. It is stated that 104 patents have already been granted in this country upon car axles and wheels having the above idea in view, to wit, making car wheels to having the above id

## COLORING THE EYE.

Dr. R. J. Levis, of the Pennsylvania Hospital, has devised a means of coloring opacities in the cornea of the eye. He says: "The disfigurement of the glaring white opaque spaces says: "The disfigurement of the glaring white opaque spaces
of the cornea can be cured by indelibly tinting, so that if central, they shall show the blackness of the natural pupil, central, they shall show the blackness of the natural pupir,
or if peripheral in location, the color of the underlying iris or if peripheral in location, the color of the underlying iris
may be most deceptively imitated. Should even the entire may be most deceptively imitated. Should even the entire cornea be opaque, a very natural imitation of the appearance
of the whole circle of the iris and the pupil can be accomplished." The instrument used is a bundle of from three to six very fine sewing needles inserted into a handle. For coloring matter, ordinary water pigments are used, rubbed to a pasty consistence and mixed with a little glycerin. For the black of the pupil, Indian ink is employed. The surface of the opaque spot being wiped clear from moisture, the paint is applied thickly over it with a small pencil. The needle points are made to penetrate repeatedly and rapidly in varying directions, until much of the opaque surface is gone over with the pigment. Two or more repetitions of gone over with the pigment. Two or more repetitions of
the process are required. Theoperation is said to be painless, the process are required. The operation is said to be painless,
and as the coloring matter is regularly tattooed into the and as the coloring matter is regularly
tissues, it cannot be washed out by tears.

THE OSCILLATIONS OF SHIPS MADE USEFUL.
M. Guzman, of France, has lately published in the Annales $d u$ Geinie Civil an elaborate essay, proposing to utilize the inertia of a suitably suspended and freely oscillating body; such, for instance, as a heavy pendulum so placed on a vessel as to be swayed by the action of pitching and rolling, and, by suitable mechanism connected with the pendulum, to apply the power to working pumps, etc. This is a very old idea, and is, we believe, an American invention. At any rate it is the basis of several different patents in which the idea is embodied. One would almost suppose that Mr. Guzman must have had before him, in preparing his essay, a copy United States patent No 18,192, of September 15, $185 \%$.
This invention consists simply in a heavy weight attached to a swinging shaft. As the former sways to and fro, by the movement of the vessel, it actuates gearing which communicates motion to a shaft which operates a pump and keeps the ship dry. In the back numbers of the Scientific American will be found several other forms of the same idea illustrated and explained.
The essay of Mr. Guzman is only one of hundreds of examples in which Europeans, having hit upon some old American invention, have put it out in a new dress and passed it around through the press as a novelty.

## NEW BOOKS AND PUBLICATIONS.

How to Paint: A complete Compendium of the Art. Designed for the Use of the Tradesman, Mechanic, Merchant and Farmer. By F. B. Gardner, Author of "The Carriage
Painter's Manual." Price $\$ 1: 00$. New York : Samuel R. Painter's Manual." Price
Wells, No. 389 Broadway.
A neatly printed, conventent little book, thoroughly practical in all its

Facts for the Ladies.-Mrs. O. Plerce, Boston, Mass., has used her
Wheeler \& Wilson Lock-Stitch Machine since 1859, withoutrepairs, earning from $\$ 12$ to $\$ 15$ a week, making men's clothing. See the new Improvements and Woods' Lock-Stitch Ripper.

## Wusiutss and servomal.

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turers, John Cooper and Co., Mount Vernon, Ohio.
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the Southern States for sale. Address W.H.H.Heydrick,Chestnut Hill,Philla. The Berryman Steam Trap excels all others. The best is always the cheapest. Address I. B. Davis \& Co., Hartford, Conn.
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For Solid Wrought-iron Beams, etc., see advertisement. Address Union Iron Mills, Pittsburgh, Pa., for 11thograph, etc.
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Colt's Armory, Hartford, Conn.
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George P. Clea For hand fire engines,address Rumsey \& Co., Seneca Falls, N.Y. A New Machine for boring Pulleys, Gears, Spiders, etc. etc.

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## Noder

[ We herevotth present a sertes of inquiries embracing a variety of topics of
oreater or less general interest. The questions are simple, it is true, but we prefer to elicit practical answers from our readers. 1
1.-How can I best stop small leaks in a rubber gas bag ?B. S. P.
2.-Will some one please inform me whether black ink writing, faded by age, can be restored so as to be read; and if it can be what is the process?-H.E.C
3.-How can Ibest prepare lime cylinders for use in producIng the oxyhydrogen or calctum light? Can air-slaked lime be utilized fo the purpose?-B.s.P.
4.-Canany one of the readers of the Scientific American give me a recipe for making a cheap and permanent sllver plating for brass
ware? I have tried several patent preparations, but the coating docs not ware? I have tried
last long.-J. W.C.
5.-What is the best and cheapest way to removeold paint or varnish from carriages, preparatory to repainting and varnishing?-M M. H .
6.-How can I galvanize cast iron? I wish to have your way of dotng it, as all the recipes from your paper I have tried came neare the mark than an
7.-I am experimenting. in photozincography and collotypy; can any of your nomerous readers inform me what kind of a press I
should use, whether platen or roller, and whether an ordinary copper plate should use, whether platen or roller, and whether an ordinary copper plate
could be successfully printed with from the same press? What is the comcould be successfully printed with from the
position of the ink to be used?-A. $G$., Jr.
8.-Can any one give me information concerning the manu facture of flour starch? Would it pay a farmer to make it on a small scale?
How many pounds of starch can be extracted from a bushel of ground
lin How many po
wheat?-J. s.
9.-I am using a copper and tin composition for a sliding box, and find it wears out rapidly. I have thought of using lignum vita, o some other hard wood, instead of metal. Will some one inform me whethe
any kind of wood would wear longer than the above named metal for such any place? I wave noticed that some manufacturers of steam fire engines use
a rignum vita, but do not know the reason why they use it. Can any one in form me? $-\mathrm{J} . \mathrm{M}$.

## The sint xuve

SPECLAL NOTE. -This column is designed for the general interest and in struction of our readers, not for gratuitous replies to questions of
purely business or personal nature. We will publish such inquir hovoever, when pata for as advertisements at $\$ 1.50$ a line, under the hea of "Business and Personal."
P. H. A. enquired in our paper of November 16 whether there was any danger of bursting the barrel of a rifle in case the ball is no
rammed down to the powder. The answer was that the fact that the bal rammed down to the powder. The answer was that the fact that the ba
was not rammed down does not increase the liability of bursting the ber rel. It should have read "does increase" the liability of bursting. The theory of gun men is that, when there is any considerable space between the powder and ball, the gas engendered by the charge strikes the ball a more sudden blow than when the ball is rammed home to the powder. Ac
cidents from bursting, due to insuffcient ramming or placing two charge cidents from bursting, due to insuffclent ramming, or placing two charges
or balls in the gun, with air space between, or placing wads or other plugs in the barrel, not in proximity to the powder, are of frequent occurrence Shot guns, which have light, thin barrels, especially near the muzzle, have been known to burst on aring if the mazzle was simply plugged with snow C. M. B. says: I am about to have a particular kind of muzzle upon before giving the order. The following are the points: How thick upon before giving the order. The following are the points : How thick
ought a steel rifie barrel be to carry a two ounce concave-conical bulle with perfect safety, allowing as much powder as would burn in the chamber? What would be the proper charge of powder to use for such a bullet in order to shoot it with all the force that the barrel would stand ? What would the welght of such a barrel be, allowing it to be as light as
possible and perfectly safe, that is, as safe as the ordinary rifle? I have possible and perfectly safe, that is, as safe as the ordinary rifie? I have
tried hard to find this matter out here, but with poor succeess. I have con sulted some gunsmiths, but they could give me no deflnite answer, an guess work won't do in this case. You may be sure I shall anxiously look through your column of answers to correspondents for the time to come. Answer: In thickness the barrel should be twice the diameter of the bore at the breech, and one and three fourths the dlameter of the bore at the
muzzle, and the barrel should not be less than thirty inches long in order mazae, and the barrel should not be less than thirty inches long in order
to burn all the powder. The barrel should be made of decarbonized steel of good quality. The weight of the barrel will depend upon its length Which is not stated by you. But you can easily settle the weight. The quantity of the powder should be equal in weight to about one sixth the
weight of the bullet.
G. L. H.-What will be the best practical method to decompose water into oxygen and hydrogen, flling separate vessels respectively?
Answer: The most conventent method of decomposing water is by means Af the galvantc battery. Place the ende of the two Frres in water, near each other, and overeach wrie a collecting jar or twbe
will then rise, hydrogen in one, oxygen in the other.
R. H. D. says : You might add to your article on paper hangIng: Cover your table with newspapers and renew when solled, Instead of
cleaning the table so often, and use sizling of vinegar and water before cleaning the tathes
pasting the walls.
A Subscriber asks if tea made of burdock root will purify the blood without thinnnngit too much? Answer: This root 1s consldered excel-
lent for disorders of the blood, but we advise you to consult aphysiclan in respect to tts use.
W. C. Van N. says: I am troubled with rheumatism in my feet. Will some one state a remedy? I have heard that lemons are good.
How manymust I eat a day, and at what hours? Answer: Fifteen lemons
 other troubles, in a short time. But if you wish to 11 ve
let the lemons alone and consult a frstrate physiclan.
W. D., of N. C., sends us a mineral specimen, asks what it is, and says he has leased for ten years the land where it is found. Answer:
The mineral is quartz rock, colored red by oxlde of iron. The silvery particles in it are mica, and of no value.
F. D. H. asks: Can iron be plated with copper by the means employed to plate metala with silver, using a solution of sulphate of cop-
per instead of the silver solution?
Fer instead of the silver solution? Answer: Yes.
F. H. asks: How can I remove mercury from the surface Of brass, which has become coated by accident, with out Injury to the aseme?
Answer: By heating the article. Looks out that you do not tinhale the mercarrial fumes.
E. H. asks in what way galvanized iron can be treated to re-
sist the action of salt. Answer: You can protect the fron by means of sist the action of salt. Answer: You can protect the fron by means of
varnish. You do not state, however, the circumstances under which the Varnish. You
fron is used.
F. H. N. requests us to inform him whether the report of one gun can be heard as far as the report of two, fred simultaneously, the
guns to be of the same size, charged the same, etc. The question arose guns to be of the same size, charged the same, etc. The question arose
thus A. A.laimed that the solos sung at the Boston Jubblee could be heard
jose
 Certainly the report of two guns will make alouder noise, then
quently cound transint the sound farther. Answer: Your conclusion is
correct. The reporto of two guns will be louder than one, and will consecorrect. The report of two guns will be louder than one, and will conse-
quently be heard further. A.Is wrong about the Jubilee singers.
quene
volce could not be heard at so great a distance as several volces of the volee could not
same power.
Professor Ott writes as follows: In your issue of November 9, 1 find it stated among the answers to correspondents that the process of Mallet for manufacturng oxygen has not as yet come fnto practical
ose. Permit me to tnform you that the same has been in use in Frankfort nee. Permit me to nform
on-Mand for about two years, the oxygen beling employed for Phillpps
 States. The experiments made with the irst apparatus of Maliet yildieed
a gas consisting of 97.3 volumes of oxygen and $2 \cdot$ of nitrogen, an amount In answer to A. F. S., asking how to clean stove pipes of soot, I would recommend the following: Place a plece of newspaper with a
spoonful of gunpowder enclosed, beneath the entrance to the stove pipe, removing the tops on the back near the pipe. Let the paper have a long end ; light it and then retire after replacing the tops. The explosion of
the powder will bring the soot down.-H. B.
W. K. L., query 2, page 281, will find that silicate of soda is
 glass. The makers of this usefularticle deccine
can it be procured in small quantitles?-T. . L.
In a recent issue you suggest to artists and draftsmen the use of "ordinary collodion, sold by all dealers in photographtc matertals"
as a protection to pencll and crayon drawings. Would it not be best to as a protection to pencil and crayon drawings. Would it nit be best to
use platio or unsensitized collodion, as the free iodine in ordinary collodion,


 $\begin{aligned} & \text { soluble gun } \\ & \text { R., of N.Y. }\end{aligned} . .$.
To A. T. M., query 6, page 314. Dissolve about 60 grains of carbonate of ammonta in the water used formixing with 1 poond of flour. Knead well, and bake immedatately; all the ammonia will volatilize. Or mix
dry, with each pound of flour, about 36 grains tartarice acla and 42 grains carrbonate of soda, add water, ete. Knead quickly, place in tliss and bake. Bread also used to be made by using carbonate of soda and murratic acia;
but the introduction of the large quantity of common salt so formed was but the introduction of the large quantity of common salt
was considered injurious to the health. - E. H. H. of Mass.
To O. S., query 11, page 314. Ozone papers are made by dipping unsized paper Into a solution of 1 part lodide of potasslum, 10 parts
wheat starch and 100 parts distilled water.
Dry rapidily, cut into silps, and keep tn a well stoppered bottle in the dark. To use: mosten a alipp and
hangin a cage of wire gauze, when the effect of any ozone will be indhangin a cage of wire gauze, when the effect of any ozone
cated by the depth of color produced. - E. H. $H$, of Mass.
To D. R. W., query 12, page 314. There is nothing dangerous about the processes named for silvering glass.-E. $\mathrm{H} . \mathrm{H}$, of Mass.
To 0 . S., query 21 , page 314. Saturate the outside of your rats-espectally the bottoms-with a solution of corrosive subllmate, and,
when Fats-especant well with panint. You need not fear any ill effect from the
when dry, con the
sublimate on the ontents. It will be also well for you to see that there is subllmate on the contents. It will be also well for you to see that there is
some ventllation underneath. The corrosive sublimate is about the best some ventllation underneath. The corrosive sublimate . 18 abo
preservative of wood against decay known. - E. $\mathbf{H} . \mathrm{H}$.,of Mass.
To T. J. S., query 26, page 314. Steep, for a while, in a dilute solution of permanganate of potash; the broom corn will become brown.
Place then in a hot dilute mixture of muriatic aclid, and it will be quite white.-E. H. H. of Mass.
To O. S., query 11, page 314. Boil common starch into a weak solution of fodide of potassium, to make a solution of any convenient con-
sistency. Brush this evenly over any good paper; drugstists' white wrap-
 Free ozone will, if present, decompose the fodide of potass
the starch a deep blue, forming lodide of starch.. -S ., of $\mathrm{N} . \mathrm{Y}$
To E. E., of R., India, query 5, page 314. Such a machine as an ordinary hay cutter answers very well for cutting leaves. Have four or
more blades, Instead of two and so cut the leaves to the width you want. more blades, Inste
E. H. H ., of Mass.
To E. E., of R., India, query 9, page 314. The senna leaves after drying on sleves by currents of alr or in a stove, are prepared for the
market by plckling out the leaflets, stalks, poos, snd the leaves of weeds or
 W. B. N., query 5, page 298, will want 40 horse power to drive sixteen 30 Inch 12 gage clrcular saws through 6 tnch to 10 tnch stocks,
and he will require two rubber belts, 12 inches wide, 5 ply thick. - . H . and de will
M., of P. Q.

To J. H. L., page 314. A very good way to imitate ground glass 18 to take a ball of fresh putty, as large as a small apple, and press 1 to
the inside of the glass, repeating the operation until the whole 18 sumfl clently coated. It will require a practical eye to distinguish the result from ground glass.-A. B., of U. s.
To A. P. C., query 23, page 314. All parts of the circumference of a locomotive wheel travel around the ayle at the same rate. But
one potnt rests unon the rail not moving formard for the time belig. All
the other the other points are morlng forward with varyling rates, the top potnt
moving most rapldy moving most raplily. Thus every polnt of the wheel deseribes a cyclold
but, being in different parts of the cyclotid at the same time, advance accor dit, betng in difierent parts
dingly.-Le R. F. G , of Mass.
To E. E., of R., India, query 28, page 314. There is no plan so rellable as the tasting of an Infusion made of defnite strength, by welgh
ing the quantity of tea and measuring the quantity of water. An extract Ing the quantity of tea and measuring the quantity of water. An extract
of tea can be made, but the result would be useless, as the fine aroma Fould be dissipated during the necessary evaporation. Tea contains the principle called thetne, similiar to caffiline in coffiee, and possessed of the
same therapeatic properties. Heat, if too great, will volatilize it as is done
 dally In the roastlng of coffee. Tea can be analyzed and its constituents
separated.-E. H. H., of Mass.
J. F. S., query 29, page 314, can prepare litmus paper by taking drugglst's white wrapping paper and brushing over one side with
solution of 1 part litmus to parts water. Thls will make blue paper, to solution of 1 part litmus to 4 parts water. This will make blue paper, to
detect aclds. For red paper, redden the above solution, carefully, with an detect actus. For red paper, redden the above solution, carefully, with an
acti and use as above. I prefer to take blue litmus paper and hold it over the fumes of natitre or acetic acids, and thus redien 1 t. This avolds all
the the fumes of nitric or acetic aclas, and thus redden it. This arolds all
excess of acid, and the paper 18 more dellcate. Any vegetable blue will
answer in place of litmus, If you can get a color deep enough.- S To J. F. S., query 29, page 314. Make an infusion of litmus a fat dish or saucer, and draw slips of the paper through 1 t . If common a nat dish or saucer, and draw silps of the paper through it. Ir common
bloting paper it used. it probably will be an adanatage o oad a few drops

of ammonia to the ittmus solution. Thhis will make the blue papers. For | of ammonia to the ilemus solution. This will make the bue papers. For |
| :--- |
| red. $\begin{array}{l}\text { proceed an before, but add } a \text { drop or two of acetlc, or diliute sulphuric } \\ \text { acid.-E. H. H., of Mass. }\end{array}$ |

## communications received.

The Editor of the Scientrfic American acknowledges with much pleasure, the receipt of original papers and conributions upon the following subjects:
On the Dangers of Car Couplings.-By J.E.S.
On the Force of Steam and the Theory of Heat.-By J. C.
On the August Meteors.-By W. L. D.
On Methods of Ascertaining the Dew Point.-By R. H. A.
Experiments and Suggestions Concerning Automatic Fire Alarm Devices.-By H. M. s.
On the Prognostication of the Weather by Animals.-By . P. H.
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On the Properties of the Concentrated Solar Rays.-By G. R,
On Milk Sickness.-By A. G. P.
On Canal Boat Propulsion.-By L. M. H.
On Car Couplings.-By T. E. B.
On Cylindrical Steam Boilers.-By L. C. S.
On Thunder and Lightning.-By A. E.D.
On Scientific and Mechanical Possibilities,-By J. E. E.

## 

## Under this heading we shall pubush nent home and foreign patents.

Rotary Stean Enging.-Andrew Philp, New York city.-In thisinvention the cyllider has two long clrcular recesses in the Inner periphery, at oppo-
site sides of the axis, with finclined abutments, sald recesses being as wide as the length of the cyyndider, and asdeep as it it designed that the piston plates,
that the steam acts upon, shall project from the disk, which fts ti the cylin der as close as it can and revolve freely, and carries the sald piston plates in radial slots. The sald plates are fitted therentin so as to sillde oot and In and
yet not allow steam to e escape by passing around them in the slots. The sald disk 18 provided with steam way grooves on one side, and on the other in the behind the plates for propelling the disks. The steam 1s admilted to these
steam ways by the ports on one side and on the other, from the annular steam ways by the ports on one side and on the other, from the annular
steam chests in the disks, attached to the plates whlch inclose the cylinder

 walls of recesses. The arrang "nent of the ports, relative to the receesses, 18
reversed for the different sldes of the englne, the object being to run the reversed for the different sldes of the engine, the object betng to run the
engine in opposite directions thereby. There is an exhaust port at each end of the recesses, with a cock for opening and closing them, as required. All for forcing the plates out into recesses for taking steam theretn, exhausts through the small ports, which are arranged equidistant between the ends of recesses, so that they exhaust the sald notches, whether the engine runs
one way or the other. The inner ends of the plates have ilttle grooves to admitt the steam, although the sald ends rest on the bottom of the notches. The ports are arranged ene the ports, which are always open and will be
recesses when they come to crut off when they pass beyond asid ports. The steam ways are so arrange
relatively to sald receesses, that team is admitted benind the plates a s soo as the sald rear corners have arrived at the bottoms of sald Inclines; and the steam ways will be made any length short of the exhausts, accoraing to the extent it may be desired to work the steam expanslvely. The exhausts will
be alternately opened and closed, according to the direction in which the be alternately opened and
Carprattre's Work Bener.-Edward Andre and William h. Andre, of joiners, house finishers, and others, whtch can be much more easily moved jorners, hiouse finshers, and others, which can be much more easily moved
and transported from place to place than work benches of ordinary con-
Fire Kinduña Conpotnd.-John s. Carroll, of Covington, Ga, as signor to himself and J. W. Rogers, of same place.-T This invention relates to a new composition which is to be applied to wood, coan, or other devices
to be igntted, and which can also be used for illuminating purposes on
 and Spanish brown or other coloring matter.
CHTRN. -Roger WIlliams, of Yonkers, N. Y.-The invention consists in operating two open frame dashers tin the same direction in an oval churn.
The two dashers stand with their faces at right angles and always remain so The two dashers stand with thelr faces at right angles and always remain so
during operation, as they revolve in the same direction with equal veloctty during operation, as they revove in the same drection with equal velocity.

They thereby prevent a continuous current of the cream along the walls of | the churn. $\begin{array}{l}\text { A. } \\ \text { of the churn. }\end{array}$ |
| :--- |

 and dorsal wings, which are connected with the extremttes for operation The chief object of the present invention is to support the filing apparatus entirely on the body of the operator, and remove all weit hht from the arms
and legs, so that they will be free to give their entire strength to the opera. and legs, so that they will be free to give their entire strength to the opera.
tion. The tinention consists in a new arrangement of belt and rigid braces for supporting the apparatus on the boay; in a new system of stay cords in
fen he severa w mgg; novel method of uniting the wings in front and making
them adjustable, and in a new arrangement of cords for connecting the WIngs with the extremithes or exposing them to the action of the same. By
grasping certain cords rasping certann cords with the hands, and pushing forward and upward, the
WIngs are raised, not fully at once , but gradually, TIngs are raised, not fully at once, but gradually, the forward part frrst, and hence back ward, the same as can be observed In the movement of winged
animals. By means of the feet, the operator can draw the wingsexactly in a reverse to the effect on the same by the hands. The system of upper and lower cords on each side wing is divided into two parts, whence branched
cords extend to the untting rings, thus forming two points of attachent Cords extend to the uniting rings, thus forming two points of attachment Whereby the canting or roling of the wings wirbe prevented and a steady notion Insured. Yhe rods ana branches are prliclpaliy stralned In the direc ratus is easy to put on, and can, when not in use, be folded together into comparatively small compass. The welght of the whole machine need not exceed ffteen pounds. The points are the same as those of the at's wing, except that in the bat the three rods projecting back ward are not branched. The rods are then secured in position and the stay cords and
covering attached to them. The walstring may be compos covering attached to them. The waistring may be composed of fellites, 11ke
a light wheel, or of thin metal curved so as to combline strength with lightLess. The main rods may be composed of bamboo, branches of reeds, or Wood, not exceeding an inch and a half in the thlckest part, and tapering to
a half inch. The small rods are in proportion. The covering (which may be composed of ofled silk or gummed cloth) 1 s secured to the cord which ex tends all around and connects the potints of the rods and stay cords. . It is
intended to start from the ground. In order to make a beginning, one foot Is disengaged from the stitrup, when, by ratising the other foot and pushtng the hands upward and for ward, as in swimming, the wings are raised. Then, by suddenly depressing the wings, by means of the elevated leg, the former
are intended to elevate the body by thelr action on the alr. This alternate elevation and depression of the wings is continued as long as ilight is de tred. bling those of swimming in water.
Cownive
WARDROBE
$A N D$
 delpha, Pa.-This invention has for its object to Improve the construc.
tion of the combined wardrobe and bedstead patented June 4, 1872. Sultable appliances hold the side boards from rocking or turning when
extended, and at the same time, allow the sald side boards to be turned up Into a vertical position. To the outer side of the inner end of each of the side boards is pivoted a grooved pulley, which rolls up and down in a groove formed for that purpose upon the tinner surface of the:sidese of the case, the
sald groove het sald groove betng made dovetailed to keep the sald pulley in place while
moving up and down. To the Inner end of each side board 18 attached the moving up and down. To the Inner end of each side board is attached the
end of a rope or cord which passes up and 1 sattached to a drum, attached to end of a rope or cord which passes up and 1s attached toa drum, attached to
a shaft, which is pivoted to the upper part of the case. One of the drums Is made double, and to tts other part is attached a cord, which is weighted, and passes over a gulde pulley or pullegs, to bring it into such a postition
that it may be convenlently reached and operated to ralse the side boards that tit may be conventently reached and operated to ralise the side boards
To the inner ends of the side boards are attached the ends of another pair of ropes, whith pass over gulde pulless to bring them Into such a position
as to be easily reached and operated to draw the side boards downward, and thus extend the beastead. When it 1s desired to close the bedstead the spring slats are pushed along Into grooves, and when the bedstead is
opened the sald spring slats are drawn out of one set of grooves and Into opened
others.
Ine
Iox Corter.-Louis Townsena, of Terre Haute, Ind.-This invention has for its object to furnish an improved machine for cutting ice for packing
and for opening a passage for vessels. The frame work which carries the

 not the tede to cut hrough te ice. Totends of the shat revolvein bear-
ings in bars and may be raised out of contact with the tice, or lowered to cut the ice to any required depth, by moving the rear ends of the bars up or
lown upon screws. The saws for cutting the cea are held forward against the tee by welghts connected with the upper parts of the saw by cords. To the tee by welights connected with the upper parts of the saw by coras. To
the under side of the bars of the frame, that run in the direction in which
the the eutter moves, are attached runners, some of which may be groved
longtudinally to enable them to take a frm hold upon the ice and prevent longitudidnally to enable them to take a frm hold upon the fee and prevent
lateral slip. The cutter frame may be connected with elther end of the rame to enable the return cuts to be made without turning the power. To the under side of the longitudinal bars of the frame are attached runners
pon which the power moves. Cross runners are pivoted eccentrically to upon which the power moves. Cross runners are pivoted eccentrically to
the side bars of the frame so that, when turned in one direction, the said unners may be held free from the ciee, and when turned in another direc thon their faces may project below the runners to support the frame and
enable it to be moved laterally to adjustit to make a return trip. The nable it to be moved laterally to adjust it to make a return trip. The
construction enables the power to be placed at a constderable distance from
 that there may be no danger of breaking through.
MAchine For Crozing AND Dressing the insides of Pails, etc.-
Richard W. How and Clarence E. Patterson, Brooklyn, N. Y. -This invention as for its. object to furnish an improved turning out slide of pall and keg lathe, which shall be easily adjusted for different sized palls and kegs. By
turnnng a shaft in one direction, the crozlng heads will both be moved forarning a shaft in one direction, the crozing heads will both be moved for-
ward Into a working position; and by turning the sald shaft in the other direction, the sald crozing heads will both be drawn back to allow the sllde to be withdrawn from the pall or keg. A stop arm projects into such a positlon
that the ends of the staves of the pail or keg, when thesilde 18 moved forward that the ends of the staves of the pall or keg, when thesllde is moved forward
nto the sald pall or keg, will strike against it and stop the sald silde in the proper position for the crozing knives to operate upon the staves, the adjustle crozing heads having been previously adjusted tn proper position.
Tus Washer Frane.-Butler R. Pratt, Plainwell, Mich.-The Invention llow of which the tub ts grooved to admit the cranks shaft. Pins in the bot tom of the frame, four inches, more or less, in length, are so arranged that they bear against the outside of the tub to hold it in place. The side and end preces of the frame are turnea, to oallow the water to drain off from the rame, and give the same a finished and workmanilize appearance. By means of the
pins arranged to inclose the tub, the machine is kept steady and in its proper ${ }^{2}$
Pneumatic Fire Engine and lawn Sprinkler.-Henry C. Neer, Park netal, adapted to within It , and adapted for compressing air, also for injecting water in some cases ; the pumps belng worked by a foot treadle connection, which is also
adapted for the application of a hand crank. The tank is also provided with a funnel with a stop cock for being filled by pouring water in when the air pressure is off, In case it is not convenient to introduce the water by the
pumps. The object is to provide a machine which may be kept charged with water and compressed air for use in shops, factories, etc., ready for instan ity of water will suffice if quickly applied. It is also designed to quan tity of water will suffice if quickly applied. It is also designed to afford a for sprinkiling lawns than those in which the water is expelled by a pump. Chair, Rocker, and Loungar, Combined.-Henry Haldt, New York city.a stand or frame so as to rock, or be made fast for either a rocker or eas chair, and the back turns down and unfolds by a jolnt at the top to form the easy chair, rocker, and lounge.
CofFIN HANDLE
its object to in appearance, that can be manufactured at small expense ; and it consists in the joint formed by the combination of the tube and tips with the ear and end of the arm that supports the hand piece.

Pocket for Traveling Bag.-Daniel Read, of New York city.-This invention has for its object to furnish traveling bags provided with an im
proved outside pocket, designed especialy for small traveling or belt bag for ladies' use, but which may be applied with advantage to other styles o bags, and which will add greatly to the beauty of the bag; and it consists in the outside pocket provided with an elastic mouth applied to the outer surface of the bag.
Drip Pipe Trap for Refrigerators.-Charles Durant, of Jersey City,
N. J.-This invention has for its object to furnish an improved trap for the drip or drain pipe of a refrigerator, which shall be so constructed that it mas be tilted to clear it of any sediment or other matter that may collect in it, Ing trap with the drain pipe; nation, with the drain pipe, of a $U$-shaped supporting and stop bar; in the combination with the trap of a cross bar or plate; in the combination of a trip rod with the tilting trap; and in the combination of hook hinges with
the trap and its supporting bar.

Steam Heater.-James J. Smith and Samuel R. Wood, of Cleveland, O.This invention has for its object to improve the construction of steam heat-
ers. It consists in rectangular cast iron boxes, into which the steam is introduced, and by contect with which the the opposite sides of the bozes, near one end, are formed holes, in which are inserted short pipes having a screw thread cut in their inner surfaces. Any desired number of the boxes are placed side by side and at a short distance apart, and are connected together by short pipes, which are screwed into the small first mentioned pipes of two adjacent boxes. The space between each
t wo boxes is inclosed with a case, which has an opening in its bottom near the pipes for the entrance of the air, and an opening in its top, directly over the other orifice, for the escape of the air. A horizontal partition extends longitudinally through the middle part of the space between each two boxes, from the end of the case at or near which the openings are formed nearly to the other end of said box, thus forming a fiue and compelling the air to pass twice along the sides of the steam boxes before it escapes. The sides and ends, but leaving spaces or compartments at the bottom and top. The steam is introduced into the pipe at one side of the boxes, and it and the water of condensation escape through the pipe at the other side.
Bace Lash Sprivg for Machinery.-Hiram W. Bachman, of McLean, Ill.
-This invention consists in the employment of two back lash springs for connecting the spindle and pinion of mill gearing or other gearing. The sald springs are connected to the collar on the spindle and to the pinion on opspindle. They thus prevent the wearing of the parts in the localities where the bearings come when one spring is used, which very soon makes such looseness as to cause the pinion and collar to wobble, thus creating back
lash even with a spring connection, and making it necessary to frequently lash even with a spring connection
refit the spindle pinion and collar
Mode of Lubricating Machinert.-Alexander P. Gross, of Vallejo, Cal -This Invention relates to the application of the principle of the hydro tion. A suction and force pump of ordinary or suitable construction, is connected with the bearings, and its piston rod is curved inward
at its outer end so as to enter and work in a cam groove in a circular collar, which is secured on the shaft. The lubricant is contained in a chamber, from which a pipe leads to the pump. To operate the apparatus, the chamber is which causes oll or other preferred lubricant and the shaft set in motion tne grooved collar and the piston rod. By this means the oll is received into the pump cylinder and forced out, whence it spreads laterally beneath the shaft into grooves and returns to the reservoir or passes directly into the ntal or vertical
Metmod of Forming Sheet Metal Measures.-Jacob Coover, of Cham ersburg, Pa.-This invention relates to a "new way" of constructing dies cubical quantity, but also to aliquot parts thereof, and it consistsin a conical male die, having a lower section of a cone, the solid contents of which equal one gill; then a horizontal projecting shoulder formed by another sectional one resting thereon, whose solid contents also equal one gill, but together qual in precedig are equal to one half pint; the next section of a cone is qual in solid contents to fit nicely therein. A conical tube is then formed of suitable size, placed the female die, and staved up. The bottom is then applied thereto and the top finished in the usual manner.
Waste Pipe Trap.-Thomas Smith, New York city.-This invention is an mprovement on the waste pipe trap for which a patent was granted to the with a hinged valve or gate in it, introduced between two sections of the pipe, so that the waste passes under the free end of the valve to the escape ipe, the sald valve being to stop the wind gusts which sometimes blow up rom the sewers and blow the water out of the water traps above, so that he gases from the sewers escape into the houses. The sald trap is designed oo be used as auxiliary to the water trap. The inventor now proposes by having the waste pipe leading into the trap enter at the bottom Instead of
the top, as heretofore, so that tts mouth will always be submerged, which as not so before, to make this a water trap, also to effectually shut off the ases from the sewers, as well as a gate or valve trap ,to stop the aforesaid wind blasts, which gases leak or escape through the joints of the valve above the water in the trap.
Wrovart Iron Pier for Bridars.-Theodore B. Mills, Iola, Kansas.-This
invention consists in the construction of piers, columns, or abutments of on for bridge supports construction of piers, columns, or abutments of ts or foot rests on the foundation, at suitable distances apart at the bot om, and converging upward toward a common center for bracing properly with a metal cap, to which all are connected at the top; said cap being also seal for the bridge shoe, to which cap the posts or bars are connected in and bottom with horizontal and diagonal braces. The posts are arranged with their greatest transverse diameter in lines radiating from the center trength in the direction of in the upper part for having the greaum or piers are used for one abutment, being placed side by side at a suitable distance for supporting the sides of the bridge, and connected together at the top. The sides are covered with planks extending horizontally between he posts or bars, fitted into the grooves between the flanges, and s
binding plates or bars running lengthwise of the posts and bolts.
binding plates or bars running lengthwise of the posts and bolts.
Caster for Tables.-Henry A. Hiestand, Hellam, Pa.-This invention
consists of a pair of bars for each side of the table or other article, on which two of the casters with long shanks are mounted, so as to have an as cending and descending motion. The bars have hooks with adjusting nuts, so arranged as to be readily detachably connected to the legs of the table. On the upper bar a pair of levers is pivoted and arranged for lifting the ta ble by bearing on the caster spindles at one end when the other end is raised. The latter ends of each pair are connected with a yoke, pivoted to top and extending from one side to the other for operating the levers a jothsides at once. When the table is raised off its legs and thrown on the casters, the point of connection of the yoke with the disk passes beyond he vertical line of the axis of the shaft and brings the yoke to bear agains the shaft in such manner as to be self fastening. The table is thus held on the casters,
apparatus.
Shears.-Charles Gudehus, of Hoboken, N. J.-This invention consists of close in cutting and the point of resistance shifts toward the points of the blades and increases by moving from the fulcrum, the force will be ransmitted from the handle directly to or nearly to the point of the upper blade through the said lever and spring, so as to greatly lessen the labor of sutting through several layers of cloth. The arrangement is also such that at the handles, the spring will throw the blades open again, and thus greatly relieve the hand of the operator of a difflcult part of the labor.
[OFFICIAL.]

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Sash balance, H. Gross. .... Sash fastener, G. E. Farmer, Jr Saw mill, H. D., E. N., and C. T.
Sawing machine, W. C. Daniel. Scaffold, J. Gorman.
Scaffold, adjustable, w. A. Jester
Screw, F. Washbourne (resser
Screw, F. Washbourne (re
Seed planter, J. H. Daney.
Shears, die for making, S .
Shingles, machine for sawing, J. R. Hall...
Shutterfastener, H.D. Chance.
Shutterfastener, J.C. Hanna
Sickle grinder, Fisher and Coon
Sletgh bell, Gough and willard
Sleigh bell, Gough and Willard.
Snow excavator, M. v. Nobles
Soldering apparatus, w. T. Gre
Soldering furnace, Ewalt and 'rillery
Spinning, counter twist tube for, B. H. Jenks
Spokes, machine for turning, L. Ward



Stove, reservoir cooking, Swett, Quimby and Perry (reissue)
Stove and drum, heating, L. R. Comstock
Stove and furnace grate, H. W. Pell
Stove and furnace grate, H.
Straw cutter, J. Eiberweiser
Sugar into blocks, machine for cutting, Brunges and Benneckendorf Switch, rallroad, A. and J. C. Rants.
Switch locking devi
Tent, w. W. Wells.
Thaumatropes, J. H.Layman.
Tobacco catters, feed
Tongs, tubing, G. A. Holden.
Toy rocker, A. W. Browne
Ton rocker, A. W. Browne
Trees, composition for renovating and invigorating apple, C. F. Smith Trunks, address plate for, J. E. Kirk..

Valve, balanced, W. R. Dunlap.
Valve, balanced,
Valve, slide, H. A. . Jamieson..
Vehicle wheels, hub for, A. M.
Vehicle wheels, hub for, A. M.
Vehicles, wheel for, P. Jones


Washingmachine, W. Church.
Water closet valve, w. s. Coope
Water closet valve, w. Gordon
Windmill, P. C. Perkins, (re
Windwheel, J. A. Risdon
Windwheel, J. A. Risd
Wire way, G. Killam..
Wire way, G. Kilam....................................
Wire brush for foundery use, steel, P. Farley
Wood, preserving, W. H. Jones
Wrench, J. H. Strickler
Wrench, pipe, A. Gauntt................
Wrench, socket, Arnold and Wilcox.
Wrench, socket, Arnold and Wi
Wringer, clothes, J. H. Park....
Wringing machine, A. Burbank
$132,693,132,694$
$132,695,132,696$

APPLICATIONS FOR EXTENSIONS
Applications have been duly filed and are now pending for the extension of the following Letters Patent. Hearings upon the respective applications
are appointed for the days hereinafter named. Atkinson. January
22,786.-HARVEsTER.-C. G. Dickinson. January 15, 1873 .
22,787.-STove.-P. Dodge. January 15, 1873.
22792.-MACINE
22,792.-Machine For Maiting Wooden Trovars.-S. T. Field. Jan. 15, 1873
22,802.-Mil for Grinding Cane, etc.-I a. Hedges
22,802--Mill For Grinding Cane, etc.-I. A. Hedges. January 15, 1873 .
22,809 .-BAEER's Over.-G. C. Jennison. January 15.
22,809.-BAEERR'S OVEN.-G. C. Jennison. January 15, 1873.
$22,841 .-$ HARNESS SADDLE TREE.-S.E.Tompkins, J. Maclure.
22,81.-HARNESS SADDLE TREE.-S.E.Tompkins, J. Maclure. January 15, 1879EXTENSIONS GRANTED.
13,897.-Gimlet.-C. C. Tolman.
16,814.-Cirgevlar Sawing Machine.-C. P. S. Wardwell.
21,917-HULL OF STEAM VESSEL.-R. and T. Winans
DISCLAIMER.
16,814.-Circular Saw Machine.-C.P.S. Wardwell. 1872. DESIGNS PATENTED
$6,220 \& 6,221 .-$ Carpers.-T. Barclay, Lowell, Mass.
6,222 to $6,225 .-$ CARPEss.
6,226.-CARPETS.-J. M. Christie, Brooklyn, N. Y.
6,227.-Carpets.-J. Hamer, Lowell, Mass.
6,228.-Coffin Handle Ears.-N. Hayden, Essex, Conn.
6,229.-Pencil Case.-E. S. Johnson, Jersey City, N.J.
6,239-PENCLL CASE.-E. S. Johnson, Jersey
6,230.-CARPETS.-D. MoNair, Lowell, Mass.
6,231 to 6,234.-CARPETS.-EE. Perrin, Kidderminster, England: TRADEMARKS REGISTERED.
1,040.-Medioine.-J. s. Coleman, San Francisco, Cal.
1,041.-Smokina Tobacco.-C. R. Messinger, Toledo, 0
1,041.-SMOKING Tobscco.-C. R. Messinger, Toledo, O.
1,042.-PREPARED PLUMBAGO.-Morse Brothers, Canton, Mass.
1, 1,043 to 1,045.-CorsErTs.-Ottenhermer, Rothschild \& Co., New
1,46 .-TAGS AND LABELS.-C. S. Schenck, New York city.
1,047.-Emery Wheels, etc.-The Tanite Company, Stroudz. .g. Pa.

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