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Armored Cruiser "Charner." "Bruix" Class of Four Ships.



From photograph by Symonds \& Co., Portsmouth, England. First-class Battleship "Bouvet." "Carnot" Class of Four Ships.

NAVIES OF THE WORLD-III. FRANCE.-[See page 56.]

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## NEW YORK, SATURDAY, JANUARY $28,1899$.

## THE ART CRITIC AND THE TALL BUILDING.

 To say that the tall building is, architecturally con sidered, a monstrosity, is to give utterance to a commonplace which has of late become positively wearisome in its perpetual reiteration. It was pointed out years ago, when these structures were first put up, that a commercial building whose height was three or four times its base. and whose cornice to wered some 300 feet above the curb, was a problem that was from a purely architectural point of view impossible of successful treat ment. It was realized at the veryoutset that, inasmuch as the lofty building met an urgent economic condition and had come to stay, all that the architect could do was to mitigate its inherent ugliness to the best of his ability, and give its towering facade such treatment as would mercifully cloak, if it could not conceal, the staring abomination of glass, brick, and stone. Many of our architects have shown considerable skill in deal ing with this, undoubtedly the most difficult problem of its kind in the history of the art.In our recent article on the new Park Row building we presented the subject somewhat lengthily from an engineering and structural point of view, and dismiss ed the question of the architectural features of tall buildings with the following remark: "It cannot be denied that their exaggerated vertical proportions render it impossible to judge these buildings by the ordinary canons and pronounce them beautiful. The modern office building, however, is not to be judged by the usual architectural standards. It professes to be nothing more or less than what it is-a strictly utilitar ian structure, admirably adapted to its purpose of hous ing the greatest possible number of business men upon a limited area in the city's busiest center." We naturally supposed that, having thus defined our position as to its architectural shortcomings, we might proceed to a discussion of the engineering and structural features of the building without any risk of being supposed to consider it an architectu
ously compounded city.
But we were mistaken. A recent edition of The New York Times surrenders three whole columns to its flamboyant and fantastically facetious art critic, who being like Shakespeare's worthy evidently "graveled for lack of matter," takes up this old, old story of the tall building's ugliness, and labors to prove what al the world very well knows and by this time, surely, is utterly weary of being told. In this, of course, the art
critic is entirely within his right. When, however, in the fervor of his imagination the writer goes on to misquote our article on the engineering features of the
Park Row building as being full of "ecstasies of admiration" of its architectural beauty, he either willfully misrepresents or is incapable of understanding the point of view from which our article was written.
We are willing to believe that it is ignorance that ha led him into error-the more so as we have rarely known the art critic, so called, to open his lips upon
any great work of engineering, but what he has distinguished himself more by his assumption of superio knowledge than by his understanding of the true inwardness of the science.

We remember that when Wm. Morris, an art critic, we believe, who was an unimpeachable authority on carpet patterns, criticised the æsthetic features of that masterpiece of engineering, the Forth Bridge, Sir Benjamin Baker, the designer, replied that the ques tion of the beauty of an engineering structure could only be intelligently passed upon by those who knew
something of the meaning of the particular forms and proportions adopted for the structure. He suggested, incidentally, that while a classic column was an inimit able piece of work as it stood in the portico of the Parthenon, it would scarcely be beautiful if stood up on deck to do duty as the smokestack of a trans atlantic liner! So with the tall building. It is the engineer's solution of one of the many economic prob lems that are forced upon us by the conditions of our crowded and complex modern life. It is the despair of the architect, for it is grossly and irredeemably utili tarian, from the shoe of its nethermost pile, 50 feet be-
low ground, to the truck of its topmost flagpole from low ground, to the truck of its topmost flagpole from which the sacred flag of the country will do duty as
the advertising agent of the exaggerated pile over
which it floats. The raison d'etre of its existence is the necessity of accommodating a maximum number of people on a minimum plot of ground. The engi neer-architect has been requested to work out thi least possible cost per pound and per foot; and he has done so, we venture to think, with the very best results that the hard conditions of the problem will allow.

To consume three columns of a daily journal in re viling these buildings as arehitectural abortions is to miss the mark entirely, and emphasizes the fact that
even an art critic can be narrow in his outiook. The even an art critic can be narrow in his outiook. The
problem of the tall building is more one of engineering than architecture, and the structural features, as we have set them forth, are a subject which will alway possess a positive interest for the intelligent reader. Sutor ne supra crepidam, says the old adage, "Let the cobbler stick to his last;" and, shall we add, "the art critic to his carpet patterns and bric-a-brac." Ther are some subjects which are to him a sealed book, and if he ventures to discuss them with that airy self-com placency with which his kind is apt to pass judgment upon any and all the works of God and man. we can only say to him, as someone said of old : "Sir, the well is deep, and thou hast nothing to draw with."

COMPRESSED AIR TRACTION IN NEW YORK CITY. The rapidly growing interest in the development of self-propelled vehicles is resulting in a vast amount of experimental work in the effort to produce a satis factory motor. Among the various forms of motive power that have been tested, compressed air has in the last two years shown very good results. To those who have not kept in touch with the subject, it may be surprising to learn that compressed air motor have been improved to such a degree that, in point of economy, they compare favorably with other and better known motors which of late years have been more in the public eye. During the earlier stages of the development of the steam locomotive, the attention of eminent encineers was directed to compressed air as possessing some excellent features for purposes of mechanical traction, and half a century ago the great Brunel, with characteristic boldness, equipped
several miles of what is now the Great Western Railway, in England, with compressed air, building powe stations and laying conduits between the rails. It was a failure, as were all the early attempts in this direc tion, chiefly because in the Great Western experi ments, and those of later date, there was a great loss of power due to the unscientific methods of com pressing and expanding the air in the compressors and motors. Brunel's system consisted of a pipe or conduit of compressed air laid between the rails and fed from central stations, and pistons, sliding within the pipe, which were attached to the cars by means of a plow in much the same way as the grips on our modern cable cars. The grips passed through a longitudinal slot on
the top of the conduit, which was closed by leather the top of the conduit, which was closed by leathe he plow. Asened and closed to allow the leather strips wore out and failed to close the conduit.
In this and in all the later attempts to use compressed air, however, there was a serious loss due to the fact that a large portion of the energy expended in compressing the air was transformed into heat, which subsequently was lost by radiation. Moreover, where the compressed air was utilized in motors, its expansion was accompanied by a reduction of temperature which produced accumulations of ice sufficient to choke the exhaust
These difficulties have been overcome by better methods of compression (the work being done in successive stages with intermediate cooling) and by re heating the air prior to its introduction into the cylin ders of the motor. During the past two or three years careful experimental work has been done in this di rection on two of the leading street railways in New York city. On the One Hundred and Twenty-fifth Street line of the Third Avenue Railway Company several motor cars have been running which were con structed under the Hardie patents, and on the Lenox Avenue line of the Metropolitan Street Railway Com pany a thorough test has been made of the Hoadley $\&$ Knight compressed air motors. In both systems the ir was carried in storage flasks, and was heated, by passing it through a tank of hot water, before bein used in the cylinders. The Hardie motors were of the ingle expansion and the Hoadley of the compound ype; and in the former the cylinders were direct con nected to the axles, while the Hoadley cylinders were connected to a countershaft whose pinions engaged ear wheel on the axle.
The compound system is said to have given the best results, and it has proved so satisfactory that the two companies have been consolidated into what is now known as the International Air Power Company. A arge factory is being built adjacent to the present works of the American Air Power Company, and the ompany is now busy upon the new motors for operat ang several important cross-town lines in this city. At an early date the Twenty-eighth and Twenty-ninth
Street lines will be in operation, and other main
arteries of cross-town travel will be similarly equipped as soon as the motors can be built. It is expected ultimately to have the whole of the Metropolitan Com pany's great system under either electric or compressed air operation; the former being used on the great trunk lines, running north and south on the avenues and the latter haudling the cross-town and branch lines.

Contemporaneously with the consolidation of the Ha: ie and Hoadley interests in the International Company comes the announcement of the formation of the New York Autotruck Company, a companion concern th the former. The autotrucks are to use the Hoadle: Knight system, and they will be designed for hand ing the neavy trucking which is now entirely moved by horses. The press reports speak of the new auto ruck as having in active service proved more economi cal than the horse. This is, we believe, a trifle prema ure, as the only actual motor thus far constructed is a rather crude affair used for carting material at the orks which supply some of the compressing ma chinery
As a competitor in the field of automobilism, com pressed air will have to prove itself at least the equal of electricity, steam, gas, hot water storage, and othe vstems before it can hope to fulfill the promise of the promoters that it will remove the hoise from the treets of this or any other city. If the motors do as well on the trucks as they have or the street cars, the autotruck may not only replace the horse, but prove to be the coming and abiding type for al orms of automobilism: This, however, has yet to b moved, and if the curiously named vehicles make thei appearance on the streets of New York, their per formance wiil be watched with no little interest.
Until, however, an experimental truck has been made and fully tested, and has proved that it can stand the test of actual and continued service in ou city streets, it seems premature to expect the public to ake very much interest in the extravagant notices which appear in the daily press, stating that a con pany has been formed with $\$ 10,000,000$ of capital for exploiting these vehicles. It looks as if the autotruck should and probably will become an actuality, but its serviceableness for the purposes for which it is de signed has yet to be proved

THE BUSINESS OF THE PATENT OFFICE IN 1898 The year 1898, which will ever be memorable as a year of victories, can also be looked upon complacently when the arts of peace are considered, for, notwith tanding the trying nature of the year, our export trade has been the most wonderful ever known, and only on one point have we fallen below the prosperity of former years. This is in the failure of the figures of he business of the Patent Office to show an increase Indeed, the business of this important branch of the government service, which serves to protect industria property, shows a falling off of 25 per cent in the pplications filed. This is, of course, readily ac counted for by the war, which turned the energies of many inventors into other channels and crippled the neans of others to such an extent that the protection of a patent could not be obtained by them. In brief, he number of patents, designs, reissues, trade marks, abels, prints, and caveats filed in the last five years is as follows :


#### Abstract




The average number of applications for the year $1893-97$ was 46,433 , so that the applications in 1898 fell behind this average some 6,770. This decrease may at first seem appalling, but with the advent of peace and table conditions in the business world, we do not loubt that in a short time the work of the Patent Office will be restored to normal and show a substantial increase.
The small number of applications, together with the pecial appropriation made by Congress, enabled the office to clear up the arrears of cases. Before the war there were 14,000 cases awaiting action, now there are only 5,000 in this condition, a gratifying advance. Such activity has naturally caused the number of patents issued to be large, compared with the smallness of the number of applications. In 1893 there were 23,769 pat ents, designs, and reissues; in 1894, 20,857; in 1895, 22 557 ; in $1896,23.273$; in 1897, 23,794; while in 1898 they only dropped to 22.267 , the difference in the two las vears being 1,527 patents issued against the loss of 12 , 456 in applications filed.
In still another branch of the operations of the Pat at Office is a decrease ; this is in the number of trade marks issued. In $1897,1,946$ trade mark applications were filed, 1,671 trade marks were issued; in 1898 there were 1,796 applications, but only 1,238 were issued. It will be seen that the war did not bear as heavily upon this branch of the business of the Patent Office, and the decrease in the number of trade marks issued may ather be laid to the very restrictive attitude which th Patent Office has assumed for some time past toward the registration of trade marks.

## PRINTING BY X RAYS.

Dr. Frederick Strange Kolle, in the last number of The Electrical Engineer, publishes a description of the "new process of printing by the use of X rays," which opens up what he claims to be a feasible method of producing an immense number of impressions or re cords. Dr. Kolle states that printing by the use of $X$ rays was, perhaps, first suggested by an article by Elihu Thomson in 1896, wherein he showed that mul tiple radiographs had been made at one exposure these were called multiple skiagraphs. The experi ment proved that more than a single sheet of sensitized paper would be affected by the rays when laid one upon the other, setting aside the theory that the chemical composition of one sensitized film would absorb most of the rays. Owing to the thin sensitized films of the printing paper, very unsatisfactory skiagraphs were obtained. Dr. Kolle now declares that he has overcome these difficulties and that the process of typo radiography is not a theoretical dream, but is a self-evident and systematic method of procedure. In regard to the practicability of this process, it may be said to overcome first the cost of labor of composition, secondly, the limited time of striking off copies, and thirdly, the advantage of keeping the entire work a total secret from the printer, a very valuable fact not to be overlooked in diplomatic documents, letters, communications, etc. Dr. Kolle finds a suitable writ ing ink for this purpose to be composed of red lead, powdered gum arabic, glycerine, and water. Fo type work a semifluid mixture of red lead, potassium
bromide, and glycerine sufficient to make a paste
would be necessary.
These inks will, however, only permit of white text on a black background unless certain photographic methods are followed, as in the employment of "upset developers," therefore, a second or "unfatty" ink which will permit of black characters on a white back ground, must be used. These are made preferably o bichromated mucilage. Bichromated mucilage which has not been exposed to light previous to its use in order that its non-adherent property may be retained, is sug gested for the writing. The fatty ink then applied with a roller will adhere to the unwritten portions of the paper, leaving the letters uncovered or free for the penetration of the $X$ rays. The third method of preparing the phototype is to print or write a text with an adhesive or mucilaginous ink composed of a tacky varnish or gum and then dusting it over with some opaque metallic powder such as mercury biniodide, zinc oxide or lead oxide. The copy would then have to be blown off to render the characters clear cut and the unused space free from mottling opacities resulting from retained dust
After the copy is prepared, the sensitive paper on which it is to be printed is made into what Dr Kolle calls a " senso-block "which contains fifty to one hundred sheets. It is then mounted or clamped into a form, the sensitized side upon which the copy or pho totype is laid facing up, and it is thus subjected to the action of the $X$ rays. The current is then turned on for an exposure of ten or twelve seconds, and the block taken to a dark room to be developed. Twenty blocks each containing fifty sheets of paper might be arranged around one X ray tube to give one thousand impressions every ten seconds of exposure. This would give about six thousand copies a minute. Prof. Kolle suggests that special gelatino-bromitized films be used and after being photographed to form a block should be made so that it will still retain the features of single sheet.

The process is extremely interesting, and though it is not regarded as a menace to printing, at the same time there is, unquestionably, a field for the X ray printing establishment which may only require intelligent de-
velopment to bring it within the domain of the workvelopment

## CIVIL ENGINEERS IN SESSION.

The forty-sixth alinual meeting of the American Society of Civil Engineers was begun on January 18, at the Society's building, West Fifty-seventh Street, New York. President Alphonse Fteley occupied the chair. The meeting was for three days, and during it excursions were made to a number of interesting engineering works and establishments in the vicinity of New York. Mr. Willard Smith, of Chicago, who has been appointed to supervise the engineering exhibit from the United States at the Paris Exposition, spoke on that subject. He stated that 13,000 feet of the building already constructed had been given to the American exhibit in this department and that additional space would be found in the United States Weather Bureau Building. Mr. Smith recommended that there should be a plentiful exhibit of models, and he named, as among those which he thought would be of unusual interest and value, models of American cities. These show the real situation in reference to har bors, railways, plans of streets, intramural communication and in general the larger features of the city. Mr . Smith said one of the disadvantages in which the engineering products and achievements of the United

European countries. Hence the special value of the op portunity offered to Americans by an exhibition such as that at Paris. The course of action by the Society was referred to the Board of Directors.

## the pirates and brigands of the Philifpines.

The brigands and pirates which infest the islands the Philippines and the adjacent waters have, fron time immemorial, been regarded as among the most des perate freebooters to be found in any part of the world The inhabitants of these islands are composed of many different tribes and mixed races. The races or tribes are somewhat different on all the larger islands, and on very one of these there are tribes that never knew the rule of Spain. On these islands there are no less than eventeen pagan and half a dozen Mohammedan tribes. Luzon, Mindanao, Cebu, Negros, Mindoro, and a dozen other islands all have their lawless freebooters, th mnant of some native tribe
To get a correct idea of the great bands of lawless natives who infest these islands, it will be necessary to go back to a date much earlier than the beginning of Spanish rule in these islands. Prior to the coming of Magellan, these islands had already suffered several oreign invasions. But these were peaceful ones A way back in early ages, the Chinese or Inglotes sought hese islands in great numbers, and their coming proved of much good to the islands. They had indus trious waye and soon imprinted these upon these islands, Lazon in particular. Later, the Indian or Tagal invasion occurred, and these, like the Chinese were soon absorbed in the population of these islands. Thus were made up the three early races in thes lands, to which all tribes can be traced. These ar the Negrote, Ingrote, and Tagal. The Negrote was the boriginal race, and in many of the races the Negrot can yet be fouind. In nearly all cases the pirates and
brigands are made up of these fierce tribes. The Tagal brigands are made up of these fierce tribes. The Tagal
is, to day, regarded as the real native of the Philippines. This tribe is the only one of the early races which, a his day, can be considered a factor in the islands.
Until a comparatively late day these islands have been the center of piracy. For more than three cen turies Spain has been fighting to get rid of the pirates and subdue the native brigands, but without success or many whole islands have practically always been independent of Spanish rule, while many tribes on the arger islands were also independent. On Luzon, Mindanao, Negros, Paney, Zebu, Leyte, Bohol, Samar and Mindoro there are as many different tribes as here are islands.
In the earlier years of Spanish rule, the Tagals and isayas gave the conquerors no end of trouble, and no sooner had these tribes been subdued than the Mores, in the south, began lawless operations. From that time to this, they have carried on their lawlessness, and have never been subdued. The Chinese pirates, in earlier days, also gave the Spanish much rouble. They captured a number of smaller towns long the coast, and even made attempts to capture anila during the sixteenth and seventeenth centuries In the island of Sula, Mohammedanism is particu larly strong, and the sultans of the islands have, from ime to time, given the Spanish rulers much trouble but some years ago their power was broken. During the sixteenth century, the Mohammedan tribes were particularly strong on the islands of Mindanao, Palawan, Tawi Tawi, and Basilan. But the pirates of Min danao have always been the most troublesome. Th Mores still inhabit the islands, and live entirely inde pendent of any outside rule.
The Mores are a peculiar tribe, which originally cam from the surrounding islands and mixed with the na tive tribes of Mindanao. The Mores are the most war like people of the islands and are a powerful race They regard all foreigners as their enemies. This is probably due to the bad treatment they have received at the hands of the Spaniards. Most of the Mores ar well organized and well equipped. The barong is terrible weapon, and with it an
cut a man in half at a single blow
The peculiar native crafts, so common on the river and harbors of these islands, are particularly adapted oo the use of the pirates. They are long, narrow, and sharp at both ends and the natives are very skillful in handling them. They carry large sails and have out riggers to prevent the boat from capsizing. Before the days of steam navigation these crafts were easily abl to avoid pursuing parties
The brigands of these islands are no less notoriou than the pirates, and while the latter are pursuing their lawless calling along the coast, the former ar carrying on their system of plunder in the interior Every island has its lawless tribes which never knew Spanish rule. These native brigands were in many cases led by the charm men, who, even to this day, are found among the native tribes.
Probably the most noted brigands of the islands are the Maccabebes, who are found on a number of the larger islands. The Maccabebes know nolaw save their
insurgents, and natives and Spanish alike fall before this murderous gang. The Chinese are the particula mark of the Maccabebes, and scarcely a night passe but what some Chinaman is killed. Already our but what some Chinaman is killed. Aready ou authorities have begun the work of breaking up the
Maccabebes, and quite a number of the gang here in Maccabebes, and quite a number of the gang here in
Manila have been executed. But this is only the be Manila have been executed. But this is only the be
ginning of the trouble with the wild tribes and th ginning of the trouble with the
lawless bands of the Philippines.

## the great strength of bears

The strength of grizzly bears is almost beyond belief says a hunter, in Public Opinion. I have read abou he powerful muscles in the arms of African gorillas, but none compared with those in the arms and shoul ders of big grizzly bears. I have seen a grizzly bear with one forepaw shot into uselessness pull its own 1,100 pounds of meat and bone up precipices, and per form feats of muscle that trained athletes could no do. I have seen grizzly bears carrying the carcasses o pigs that must have weighed seventy pounds severa miles across a mountain side to their lairs, and I have eard hunters tell of having seen cows knocked down a if by a thunderbolt with one blow from the forepaw of a bear. Three summers ago I spent the season in he coast mountains, near Hudson's Bay, and one moon ight night I sa w a big grizzly bear in the act of carry ng a dead cow home to her cub. I had a position on he mountain side where I could see every movement of the bear in the sparsely timbered valley below me The creature carried the dead cow in her forepaws fo t least three miles, across jagged, sharp rocks ten fee high, over fallen logs, around the rocky mountain sides, where even a jackass could not get a foothold, to a narrow trail up the steep mountain. She never stop ped to rest a moment, but went right along. I followed, and just about half a mile from the beast's lair I laid her low. The heifer weighed at least 200 pounds and the bear about 450 .

## the progress of the zoological garden.

The Board of Managers of the New York Zoologica Society held their annual meeting on January 17. The chairman of the executive committee reported that 16,977 had been expended on the works for the instal ation of the animals at Bronx Park, work on thirtee structures being under way. These will cost, when completed, about $\$ 83,000$
One of the most important buildings which is now going up is the reptile house, which is, perhaps, the most perfect building for the purpose ever built. It i $145 \times 100$ feet, and will cost about $\$ 40,000$. It pre sents an arched central hall, without columns, and it will include a crocodile pool, sand pile, and a con ervatory of thick vegetation, and will provide room or the $\mathbf{v}$

## ards, etc.

The elk house is nearly finished, and excavations for ome of the bear dens have been completed. Various other works have been carried on, such as the con struction of duck ponds, with three islands, and a stone wall about the home of the prairie dogs. Excavations or the stone walls of the wolf and fox dens have als been made, as well' as for the beaver pond and buffalo house.

## DEATH OF THE LIBRARIAN OF CONGRESS

Mr. John Russell Young, Librarian of Congress, died at his home in Washington, January 17, 1899. Mr. Young was born fifty-eight years ago, at Downington Pa. When a young man he was employed on The Philadelphia Press, and served during the civil war a correspondent in Virginia and afterward on the Red River expedition with General Banks. Afte he war he was connected with various newspaper in Philadelphia and New York, including the Tribune and Herald. In 1877 he accompanied Ex-Presiden Grant on his trip around the world. He was Minis er to China during 1882-1885. President McKinley appointed him to the office of the Librarian of Con gress in the summer of 1897, to succeed Mr. A. R. Spof ord, who became his assistant. Under Mr. Young' excellent executive management the library has proved much more valuable to readers than ever before.

## BOSTON ELEVATED ROAD

Ground has been finally broken on Boston's new ele vated road, which will connect two widely separate districts, and, most important of all, unite the two new Union stations. The road will begin at Sullivan Square, in the Bunker Hill district, and will then pro ceed down Main Street, across the Charles River, until the North Union Station is reached. Then, after mak ing a turn, will run along Atlantic Avenue and finally each the new South Union Station, after which it wil continue up Washington Street until Dudley Street is eached. The entire distance from Sullivan Square to Dudley Street, which is in the Roxbury district, will be about 10 miles. Of course the subway will really orm a portion of the line. Electricity will be used as a motor power ; a third rail will be used. Branch lines to other suburbs will be built later on. It is expected the work will be completed in about two years.

## AN IMPROVEMENT IN ICE-SKATES

In the accompanying illustration we present a skate which is provided with an improved lock for the heel and sole clamps, the lock being so constructed that either of the clamps may receive an initial or broad adjustment without disturbing the adjustment of the other clamp.
Fig. 1 is a perspective view of the skate, and Fig. 2 is a top plan view in which the clamps areshown in closed position by positive lines, and in open position by lotted lines.
The runner, in order to offer as little friction as pos-


## FILOR'S IMPROVEMENT IN ICE-SKATES

sible, is arched, so that it bears on the ice only beneath the heel and sole plates.
Upon the heel plate a clamp is held to slide, and upon the sole plate diverging clamps pivoted together at their rear ends are held to slide. Between the sole and heel clamps a lever is fulcrumed. Oppositely curved links pivoted to the lever, one at each side of the fulcrum, are adjustably connected by means of screw shanks with the sole and heel clamps. The pivotal connections between the links and the lever are out of alinement with the center of the fulcrum, so that when the curved portions of the links are brought close together by the movement of the lever, they will lock themselves in this position.
As each link is independently adjustable upon its clamp, the throw of the clamps may be separately reg. ulated to change the locking action of the lever. The skate is the invention of Charles F. Filor, care of S. S. Moore, Trenton, N. J.

## A GIGANTIC ARTIFICIAL MOON. <br> by oliver c. farrington.

Under the above heading, the Scientific AmeriCAN of April 9, 1881, urged the attendance of its read ers upon an exhibition at Steinway Hall, New York city, of a model of the moon 16 feet in diameter. The article closed by expressing the hope that the model might ultimately find a permanent abiding place in "some of our public institutions." After a lapse of nearly eighteen years, this wish has been realized, and the model is now permanently installed at the Field Columbian Museum, Chicago. Students of science, whether casual or professional, may well rejoice over the opportunity thus afforded them to become familiar with the physiography of the earth's satellite with but a tithe of the labor and equip. ment required to study it by means of a telescope. What was said of the model by the Scientific American then is true still: "It is by far the largest, most elaborate, and expensive portrait of the moon ever made, and, seeing that it was constructed for and under the immediate direction of one of the most eminent selenographers, Dr. Schmidt, Director of the Observatory at Athens, Greece, we may safely accept it as a faithful portrait." The model is a hemisphere $19 \cdot 2$, not 16 feet in diameter. It is made up of 116 sections, $15^{\circ}$ in length by $15^{\circ}$ in breadth, which serve to mark upon the surface parallels and meridians. The horizontal scale is $1: 600.000$, the vertical $1: 200,000$. The elevations are therefore exaggerated but three times, a much smaller increase than is usually necessary to bring out features of detail on relief maps of
the earth's surface. By means of this scale the various features of the moon's surface have been accurately and vividly portrayed. The extraordinary volcanic one at the first glance, while the mountains, plains, cliffs, and chasms, surpassing in grand, ur anything to be found upon the earth, are vividly shown.

Here, for instance, are Copernicus with its vast crater 46 miles in diameter, its interior marked by terraces formed by huge landslips which took place along the mighty ramparts; here are the awful chasms, a mile wide and 100 miles long, radiating from Triesnecker; the magnificent group of Theophilus, Cyrillus and Catharina, with craters 60 and 65 miles in diameter merging into one another; the walled plain Schickard, 153 miles in diameter, with ramparts several miles in height; the "thin cheese" of Wargentin, apparently a crater that has been filled with lava to the brim which remains in place cold and hard; the mighty "seas" of Oceanus Procellarum and Mare Crisium, which are in reality vast plains, covering areas of 90,000 and 78,000 square miles ; and all the other objects to the number of twenty thousand, which it has been the labor of astronomers from the earliest times to measure and describe. Later discoveries are not likely to add much detail necessary to the completeness of such a model, for the features sufficiently large to be shown by it have been agreed upon by astronomers for many years. The impression gained of the condition of the moon's surface by looking at the model is that it is a scene of utter desolation and ruin-a globe without life or comfort for beings such as man. This is undoubtedly what one would find could he make a trip to the moon itself, and a view of this model is perhaps the best substitute for such a journey which has yet been devised.
Mr. Lewis Reese, of Chicago, was the donor of the model to the Museum.

## Cloth from Pineapple Fiber.

In an article on "Possible Fiber Industries of the United States," in Appleton's Popular Science Monthly (November, 1898), C. R. Dodge tells us the leaf of the pineapple contains a very fine silky fiber that may be utilized in the manufacture of textile fabrics. He says: "A pineapple plant matures but one apple in a season, and after the harvest of fruit the old leaves are of no further use to the plant, and may be removed. The leaves have the same structural system as the agaves-that is, they are composed of a cellular mass through which the fibers extend, and when the epider mis and pulpy matter are eliminated the residue is a soft silk-like filament, the value of which has long been recognized. Only fifty pounds of this fiber can be ob tained from a ton of leaves, but, as the product would doubtless command double the price of Sisal hemp, its production would be profitable. How to secure this fiber cheaply is the problem. The sisal hemp ma chines are too rough in action for so fine a fiber, and


MODEL OF THE MOON NINETEEN FEET IN DIAMETER RECENTLY INSTALLED IN THE FIELD COLUMBIAN MUSEUM.
at the rate of ten leaves to the pound, working up a ton of the material would mean the handling of over twenty thousand leaves to secure perhaps three dol lars' worth of the commercial product. Were the fiber utilized in the arts, however, and its place estab lished, it would compete in a measure with flax as a spinning fiber, for its filaments are divisible to the ten thousandth of an inch. The substance has already been utilized to a slight extent in Eastern countrie (being hand-prepared) in the manufacture of costly, filmy, cobweb-like fabrics that will almost float in air."

## A COMBINATION-TOOL

An ingenious combination tool has been invented by Beniamino Ibelli, 139 Hudson Avenue, Brooklyn, New


## IBELLI'S COMBINATION-TOOL.

York city, which comprises essentially a rule, a penknife, a gage, and a weighing-scale.
Referring to the annexed illustration, it will be seen that the tool consists of a rule formed in two sections, hinged together, each section being recessed at one side. Within the recess of the first section and between the side walls are pivoted two knife-blades, the backs of which are adapted to be received by the re cess of the second section when the tool is folded and the blades are closed
Behind the rear-wall of the recess in the second section, a chamber is formed, which receives the gradu ated bar of a weighing-scale, controlled by a retractile spring. On one of the outer surfaces of the section a gage is adapted to slide in guideways, and is designed accurately to caliper shorter diameters when the two rule-sections are closed.

## Kitchen Bacteriology.

According to The Dietetic and Hygienic Gazette, a Königsberg doctor, Privat-docent Dr. Jäger, recently gave a course of hygiene and bacteriology for ladies which included practical exercises in applied bacteri ology, for instance, in the preparation and preserva tion of food by methods used in bacteriol work. At the close of the lecture the hearers were allowed to invite their friends to an exhibition of kitclen products - some raw and some cooked-that had remained in a warm room for periods varying from five to sixteen days, and which were all found perfectly fresh and quite unchanged in ap pearance and taste. Nor had any complicated procedure been re quired to obtain this result.
The method simply consisted in 1. The use of vessels with wellfitting, overlapping lids, instead of the inside lids used in kitchens the world over, which allow stray bits of matter that may adhere to their rim to fall into the food. 2. Avoid ance of opening the vessels in which the food was kept, or, where this was indispensable, careful manipulation as in bacteriological work. 3. The use of cotton wool as a covering. Cotton-wool lids had been specially prepared to fit the wide tops of the food vessels they consisted of a circular disk of cotton wool, tightly held between two metal rings, the outer of which formed the overlapping rim of the lid. The Gazette says that it is to be hoped that Dr. Jäger will find imitators, and that "kitchen bacte riology" may become a study with ladies. Certainly there is much room for improvement in the oldfashioned kitchen methods to which our "family plain cooks" cling with such desperate energy, and which they seem to regard with an almost superstitious reverence.

The Progress of the Trans-Siberian Railway.
For a long distance toward the Pacific Ocean it is expected to lay the rails of the Trans-Siberian Railway at the rate of four miles per day. The road is way at the rate without foreign employes, road is now being built without foreign employes, except for a number of Italian stone cutters. The rails are being
turned out by subsidized Siberian foundries. Every seven miles a side track is being built, so that the entire route may be cleared for military trains, should it become necessary. A train de luxe now runs once a week from Moscow as far east as Tomsk. From that point a second-class passenger train runs three times a week as far as Irkutsk. The cost of a second-class ticket from Moscow to Lake Baikal, where the government is now laying rails, is about $\$ 40$, and the journey lasts some twelve days.

## AN IMPROVED WOOD-WORKING MACHINE

A machine for doing a variety of work is a necessity in any factory where there is not a full line of machinery, and the universal wood-worker, which has just been redesigned and patented by the Egan Company, Nos. 327 to 347 West Front Street, Cincinnati, O., is well adapted to meet the various requirements f the wood-worker The machine will make glue joints, will chamfer, tongue, and groove, raise panels, joints, will chamfer, tongue, and
miter, rabbet, flute, and bead.
niter, rabbet, flute, and bead.
The column is cored out, cast in one piece, and is heavily braced. The connected and novable bearings are laterally adjustable across the machine in square gibbed slides. When the operator has his fence set for doing work, he can adjust the head with the greatest rapidity to the exact line desired.
The spindle has an outside bearing which can be instantly removed by loosening one hand bolt, to give free access to the head. All cutter-heads used are adapted to run at the highest speed.
Both tables may be adjusted vertically, horizontally, and to the circle of the head independently, or may be drawn clear back from the cutter-head, to give free access to the mandrel in order to put on any cutters, heads, or saws, by means of the hand wheel at the working end of the machine. Both tables may be raised and lowered together, following the circle of the head. By the large hand wheel at the front both tables may be raised and lowered together vertically. The relative positions of the tables are not changed, and the adjustment is accomplished in either instance by means of a single hand wheel. There are four inclines to each table, one at each corner, so arranged that all wear may be taken up and the tables always kept in perfect alinement, notwithstanding any wear that may take place.
For panel-raising, two panel-heads, with a special fence, are used. Both sides of any door-panel of any shape can be raised at the same time.
An adjustable bevel-fence is provided which can be set to any angle desired by loosening one clamp bolt, and which has a free movement across the table for the different kinds of work to be done. The face for the different
of this fence is of this fence is
planed perfectly true.
The boring side can be used for al kinds of boring or routing. The ta ble is raised and lowered indepen dently by the cranks shown in cranks shown in for angle boring is fitted on the table. with stops fo spacing the holes and routing.
The Egan Com pany's woodworker was awarded a medal awarded a meda at the Cincinat Industrial Expo sition October 3 1882; October 6 1883; at the Cin cinnati Centenni al Exposition 1888 ; at the World's Fair, Chi cago, 1893; at Ant werp, Belgium werp, Belgium 1893 ; and at San tiago, Chile, 1894 for convenience of adjustment and originality of con struction and the trustworthy and thorough work manship display ed throughout.


PLANING AND JOINTING SIDE OF AN IMPROVED WOOD-WORKING MACHINE.
grind the ore, by reason of the movement of rotation imparted by the cog-wheels.
The inventor of this mill, Mr. A. A. Parker, of Ridgway, Col., informs us that his apparatus has been used with gratifying results. A battery of four stamps driven by a ten horse power engine, it is said, will crush twen-ty-five tons of ore in twenty-four hours with screens of sixty-mesh fineness.

## American Capital in Brazil.

An article on the resources of Brazil, written by L. Lipman, a prominent local authority, at the request of Consul-General Seiger, at Rio Janeiro, has been published by the Department of State. Supplement. ing the writer's observations, Consul-General Seiger says:
'I regard with much favor the proposition of organizing an American syndicate for business operations in Brazil. While the present financial and commercial depression is unfavorable to new industrial ventures and to rapid increase in the sale of American merchandise in Brazil, it offers, on the other hand, excellent opportunities for the investment of capital in industrial enterprises already established on terms much more favorable than could be obtained when the country is once more placed on a solid financial basis.
' European capitalists, especially British, are for these reasons making investments here. American capitalists ought to combine to send financial and technical experts to this country, men of experience and mature judgment, who speak the French and Portuguese languages, and let them look around in Rio, in Minas Geraes, in Parana, in Santa Catharina and Rio Grande do Sul. There is no lack of opportunity for good investments. This is also a good time for the preparatory work that may lead to permanel: commercial relations at the time of a general trader vival, which is sure to come sooner or later.
"A great deal of harm has been done lately by ad venturers who come here from the United States with a great flourish of trumpets, but without any means, experience or knowledge of French or Portuguese. They bring a great variety of 'samples' (easily convertible into cash) from manufacturers anxious to extend their trade in Brazil. Such unscrupulous and ill-prepared agents can only harm American prestige in this market
"I would advise our export associations to quit sending circulars here, which are never read, and to establish a monthly American trade paper in Rio, printed in the Portuguese language. Such a paper could easily be made self-sustaining, and, if properly conducted, would pave the way to closer business relations be tween the United States and Brazil.

A profitable business might be done in the ship ment of Brazilian hard woods to the United States. This business is at present, so far as my observation goes, almost exclusively confined to rosewood; but there are many other fine cabinet woods in Brazll, some of which are much cheaper and even more beautiful. of which are much cheaper and even more beautiful. very considera bly, that of Teu tonic and Anglo Saxon origin hav ing almost entire ly ceased. This fact is due to the extremely $h$ ard times now prevail ing in Brazil and also to the fact that the national government, as well as the state governments in the south, are at present financial y unable to grant substantial assistance to immi grants.
"The overpro duction of coffee is now forcing the Brazilian agricul turists to diver sify agriculture so as to produce the foodstuffs neces sary for home con sumption." ln his connection Mr . Seiger aive Mr. Seiger give the figures of the crop for 1897-98 a about $11,000,000$ bags of 132 pounds each, while that for $1898-99$ is esti mated at from $7,000,000$ to 9,000 , 000 bags.

## RECOGNITION OF REAR-ADMIRAL DEWEY.

 As soon as possible after the news of the splendid victory of Commodore Dewey at Manila Bay, on May 1, reached the United States, it was determined by Congress that the hero of this great naval engagement should receive in substantial form a token of appreciation from the nation, and on June 3, 1898, by a joint resolution of Congress, a sword of honor was ordered to be presented to Rear-Admiral Dewey, and, in response to the resolution, a number of designs were submitted. A representative committee, composed of Assistant Secretary of the Navy Charles H. Allen, Hon. Henry Cabot Lodge, United States Senator from Massachusetts, and Prof. Marshal Oliver, of the United States Naval Academy, selected the design, the one chosen being that of Mr. Paulding Farnham, the secretary and one of the directors of Tiffany \& Company, the well-known jewelers of New York, who is an excellent designer and sculptor as well.The sword is one of the finest and most costly testimonials of the kind which has ever been presented. With the exception of the steel blade and the metal body of the scabbard, it is made entirely of pure twen-ty-two carat gold. The grip of the sword is covered with fine sharkskin, which is held in place by gold wire and is studded with gold stars. Above the grip the handle terminates in an elaborately chased and enameled gold collar and pommel, a narrow band of oak leaves uniting the collar to the grip. On the pommel is carved the name of the battleship "Olympia" and the zodiacal sign for the month of December, which is the zodiacal sign for the month of December, which is Commodore Dewey's natal month. The
cled by a closely woven wreath of oak leaves, which are the standard decoration for a naval officer of Dewey's rank. At the very top of the hilt are the arms of the United States, the blue field of the shield being in enamel. Below them are the arms of Vermont, the native State of the Rear-Admiral. The guard is composed of a conventional eagle terminating in a claw clasping the top, and the outspread wings form the guard proper. The eagle holds a laurel wreath in the beak. This, besides being symbolical, serves as a protection, covering the point of the beak. The sword blade is of the finest steel and is damascened with the inscription which should be honor enough for any man. It reads: "The gift of the nation to Rear-Admiral George Dewey, U. S. N. in memory of the victory of Manila Bay, May 1st, 1898." The blade is ornamented with Phœnician galleys, and on the reverse of the lettered side are shown eagles in flight-symbolic of victory. The scabbard is of thin steel and is damascened in gold, with sprays of a delicate sea plant, which signifies fidelity, constancy, and remembrance. The sprays are interlaced so as to form, as it were, a series of cartouches with stars in the center. At each side of the bottom of each cartouche is a dolphin. The lower portion of the scabbard terminates in entwined gold dol-
phins. Sprays of oak leaves and acorns secure the rings and trappings of the scabbard. The top of the scabbard is terminated by a raised monogram in diamonds, with the letters "G. D.," which are entwined, and below them are the letters "U.S. N." This eminently appropriate testimonial to the great sailor cost $\$ 3,000$.
We also illustrate the handsome medal which has been struck in honor of the victory. It was designed by Mr. Daniel Chester French, the well-known sculptor, and is made of bronze. The obverse has a medallion portrait of Rear-Admiral Dewey and bears the words, "The gift of the people of the United States to the officers and men of the Asiatic Squadron under the command of George Dewey." The center of the reverse is occupied by a gunner naked to the waist, who sits on a gun, holding an American flag, and around it are the words, "In memory of the victory of Manila Bay, May 1, 1898." The rear-admiral and all his officers and men will receive these medals.

The Dangers of the 'Dry-cleaning Process.' The extreme care with which easily inflammable liquids should be handled was exemplified some time ago in the case of a paraffin hair-wash. This unfortunate occurrence, which resulted in the death of a lady from shock and burns, would appear to have been due to the ignition of benzine by the production by friction of an electric spark. It is well known that when the air is particularly dry the production of an electric spark, say by stroking the hair or by rubbing flannel, is a very simple matter. Under the very dry conditions of the atmosphere there is a strong tendency
for opposite electrical conditions to exist on the slightest provocation. This probably accounts for a somewhat remarkable accident which occurred in a "drycleaning room" at Ashton, England. Some workmen were engaged in cleaning by the dry process certain garments, such as pants and vests. During the rins ing process a flash suddenly occurred in the "rinse kettle." "It was a bright flash like lightning. Then everything became one mass of flame, the spirit, garments, and everything." The fire extended, and one man unfortunately lost his life. The witnesses were one and all positive that the flame had its origin in the "rinse kettle," and every precaution was taken to exclude any possibility of ignition from naked flames or from lighted tobacco pipes. The igniting cause was probably, therefore, an electrical phenomenon, and it only remains to suggest that when the weather is remarkably dry the air in dry-cleaning workshops should be kept moist by suitable means, and extra care should be taken to avoid friction in the cleaning process.

## Bread Fruit Trees.

Of the various trees that produce fruit which is used as a staple article of food by man may be mentioned those of the genus Artocarpus (a word meaning "bread fruit ") of tropical countries.
The bread fruit tree (Artocarpus incisa) of the south ern part of Asia and the South Sea Islands bears a roundish fruit of the size of a melon, rough on the exterior, marked with hexagonal knobs, and of a green color. The pulp of the interior is whitish and of the color. The pulp of the interior is whitish and of the
consistence of new bread. It is roasted before it is

Uranium is obtained chiefly from the mineral pitchblende, an oxide of uranium, but generally contain small quantities of other metals, as the following result of the analysis of a typical specimen show :


It is now prepared by calcining uranium nitrate in porcelain crucible until a reddish-colored mixture of the sesquioxide and green oxide $\left(\mathrm{W}_{3} \mathrm{O}_{4}\right)$ is formed. The mixed oxides are thoroughly ground with a slight excess of pulverized charcoal and tightly packed in a carbon crucible. On subjecting the charged crucible to an electric current of about 450 amperes and 60 volts the reduction is completed in a few minutes. The metal thus obtained is not pure, but contains carbon in amounts which vary between 5 per cent and 14 pe cent. This carbide has a brilliant fracture and great hardness, and when thrown on a slab of porcelain o closely pulverized and shaken in a glass flask, exhibit the singular property of discharging copious shower of sparks, resembling those displayed when freshly reduced iron is quickly moved about in air. The fusing point of uranium car bide is very high-much higher than that of platinum-and the alloy will pro bably be found to possess advantage over platinum for use in pyrometers and similar instruments. Carbide of urani um would make a splendid alloy with steel, and if it could be obtained cheaply it would probably supersede nickel and wolfram in the manufacture of high-clas steel.
Pure uranium is a perfectly white, non magnetic metal which takes a good pol ish, and can be easily scratched with a file. When subjected to high temperature, it is much more volatile than iron Finely powdered uranium takes fire in an atmosphere of fluorine, and is attacked by chlorine, bromine, and iodine at different high temperatures. It is also com pletely burnt in an atmosphere of oxygen at a temperature of $170^{\circ} \mathrm{C}$. At high tem peratures uranium directly combines with nitrogen.
An alloy of uranium and a small quantity of silver, cop per, or lead is used in the manufacture of a yellow glas which arrests chemically act ive light rays. It is employed in making windows for chemi cal laboratories and photo graphic developing rooms and for bottles and flasks for holding substances sensitive to light. The salts of urani um are largely used in photo-
no seeds, the tree being propagated by shoots that spring from the roots.
In the South Sea Islands the bread fruit constitute the principal article of diet of the inhabitants. It is prepared by baking it in an oven heated by hot stones. The plant is now cultivated in the West Indies, but does not there equal the plantain as an article of food. The fruit of the bedo, another plant of the genus, contains two large pulpy seeds that swim in a semi liquid substance of a vinous taste. It, therefore, offers the natives of Java and the Marianne and Philippine Islands, where the tree grows, both food and drink.
The jack (Artocarpus integrifolia), another bread fruit, is a native of the Indian Archipelago and is cul tivated in Southern India and all the warm parts of Asia. The fruit is a favorite article of food among the natives, as are also the roasted seeds
The roasted nuts of Brosimum alicastrum, a tree be longing to the same order as the Artocarpus, are used instead of bread, and have a taste something like that of chestnuts.
To this last named genus belongs also the famous cow tree of South America, which yields a copious supply of rich and wholesome milk, as good as that of the cow. In the same order we find the genus Phytocrene, one species of which, when wounded, discharges a large supply of pure and wholesome liquid, which is drunk by the natives. By a singular anomaly, the order of plants that includes these useful trees embraces the celebrated upas tree, which, when pierced, exudes a milky juice which contains a very acrid and virulent poison into which the natives of Java dip their arrows.

medal commemorating the victory of manila bay.


SWORD PRESENTED BY THE NATION TO REAR-ADMIRAL GEORGE DEWEY. graphy and as chemical reagents. Some of them are used in glass painting for making apple-green tints, and in porcelain painting for producing black tints Recent researches in chemistry and physics have made us familiar with the properties of a number of new or rare metals, but few of them possess so many valuable properties as uranium, and it is to be regretted it is so sparingly and irregularly distributed.-Mining and Scientific Press.

## Rice Cultivation in Russia

While rice has long been grown in Persia and the Trans-Caucasus, it was almost unknown in the interior of Russia up to 1886 , the supply being imported from India, and, as it was subjected to high duty, its use was naturally confined to the wealthier classes.
Russia first commenced the cultivation of rice in the early eighties, and in 1888 the first steam rice-cleaning factory was opened at Baku, and 1,612 tons were produced the first year. There has been a steady increase in the production of rice, and there are now five rice cleaning factories in operation and the annual product is more than 48,000 tons. The demand for rice has increased and it is now generally used by the peasants throughout the empire. The quality of the native product is equal to that of the imported article. The residue is utilized, the broken grain being made into starch and the flour is given to hogs.

The Havana Electric Company.
A company with a capital of $\$ 5,000,000$ has been formed to operate street railways through the city of Havana and elsewhere in Cuba.

## Sorrespondence.

## Tregaron Bogs.

To the Editor of the Scientific American :
Some years ago I saw in the Scientific American articles on the working of peat bogs in Germany, I believe ten or twelve years ago, and since then I have been endeavoring to bring these bogs of several thousand acres before the commercial world, and lately some German chemists have been here experimenting, with very satisfactory results. One of them, Mr. Spray born, has obtained a patent on his process. His mode of working it is by distilling the wet peat. A certain weight is put in a retort, some chemicals being previously mixed with the wet peat, about 5 ounces to every 112 pounds, and the different oils are abstracted, leaving nearly pure carbon in the retort, which is then put into a mould and compressed and comes out a solid briquette; and they maintain that these briquettes will burn equal to coal with very little smoke and only two or three per cent of ashes, and which they can sell at 6 shilings per ton. They reckon that they can obtain from 40 to 50 gallons of refined oils from each ton of wet peat. On one trial at which I was present they put 70 pounds of peat in retort, obtained over 6 gallons of crude oils, some of the light oils escaping, and there was only 8 pounds of carbon left. The oils obtained are lubricating oils, naphtha, camphor, ammonia, paraffin wax and tar. The proportions of each I do not know, and there are one or two by-products, besides the peat, which is from 25 to 30 feet deep. There is fine clay from 15 to 18 feet thick, which will make good earthenware and bricks, and both can be baked by the turf briquettes, the ashes being used for mixing with
the clay for the coarser bricks.
T. W. Jones. the clay for the coarser bricks
Tregaron, South Wales.

## A Chinese Typewriter.

To the Editor of the Scientific American
The interesting article on typewriters in your number of August 13 would have been more complete had the writer known that there was a machine for writing Chinese. He was correct in assuming that the entire bulk of the written language, some 14,000 characters more or less, is too large a dose for any machine with which we are acquainted, but, as the most of these are rarely used, one can get on with a much smaller number; in fact, about 4,006 make a very comfortab vocabulary,'and can express quite a range of ideas.
A machine writing about this number of characters has been invented by Rev. D. J. Sheffield D.D.. presi has been invented by Rev. D. J. Sheffield D.D
dent of the North China College, A. B. C. F. M.
The only specimen as yet existing is the one made to his order. by an American firm, and in constant use at the college at Tungchow, near Pekin.
The mechanism is peculiar ; the characters defy analysis in any way to make possible building them up piecemeal, so a keyboard is out of the question. They are arranged on the face of a stereotyped wheel, about 2 feet in diameter, in radii of the circle. The wheel is mounted horizontally, type face downward, while homologous printed characters on the upper surface serve to locate them. The radius carrying the desired character must be brought into the printing line. A simple link motion finder brings the paper to the right place, and a lever below presses it up against the type.
The machine is marvelously compact and simple, The machine is marvelously compact and simple,
considering the large number of ideograpins which it must carry. One fairly expert with it can write four or five times as fast as a very rapid writer with the brush pen.
In the ordinary course of Chinese business, either governmental or mercantile, this dispatch would not commend itself particularly, and, in fact, would arouse strong opposition, as depriving a very worthy class of people of employment, but the impact of the occidental has a tendency to "hustle" the East. And in the railroad business, which is beginning to assume tan-
gible proportions, there is a call for celerity which is gible proportions, there is a call for celerity which is
likely to demand more of these ingenious typewriters likely to demand more of these ingenious typewriters.
You, sir, have doubtless followed somewhat the course of political events in China, during the last few exciting months, and know how the young Emperor Kwang Hsii, after developing a wonderful eagerness for the improvement of his country, through the introduction of western learning and methods, has been dethroned by a coup d'etat, imprisoned by the Empress Dowager, who was regent during his minority, and compelled to petition her to assume the prerogatives of sovereign, which she has done, while he is held in durance at her palace in Eho Park. His trusted advisers, who were working for enlightenment and progress, are beheaded, banished, or fled, and almost all his reform measures are reversed. Among them was the establishment of a
bureau for the encouragement and protection of inventors, and he began a system which practically initiated a patent law for the empire, giving a monopoly of ated a patent law for the empire, giving
the manufacture of worthy inventions.
This has gone with the rest, and recently a local mechanic at Foo Chow, who had invented a spinning ma chine, which, before the coup d'etat, had been recogniz-
ed by the viceroy of his province, and for which he had been given the privilege of sole manufacture and sale, applied for a passport to the provincial judge, that he might exhibit his invention in the interior of the province. To his great surprise, however, the judge and patents as a means of tempting deluded people to desert the good old ancestral ways.
A. P. Реск, M.A., M.D

Pang Chang, North China, November 7, 1898.

## Miscellaneous Notes and Receipts.

The first international exposition in Japan is planned for the year 1902. The Japanese government is already getting ready to take the first preliminary steps, and a uitable site for the exhibition is being chosen. A notification of the exhibition project is likely to be sent to the European and other governments as early
as next spring. -Internationaler Techuischer Courier.
An Old Receipt for Violin Varnish.-In 1696 there appeared at Nuremberg a book entitled "Kunst and Werkschule," published by one Johann Ziegers. This book, which is very rare, gives in the first chapter two hundred and four receipts for the production of differ ent lacquers and varnishes. The following is a trans lation of one of them, bearing the pompous caption, Exceedingly handsome violin and lute varnish of a "amous violin maker at H ."
This, to be made right, should be prepared in three glass vessels at the same time. In the first glass place rood gum lac. 8 ounces; sandarac, 3 or 4 ounces; pow der all very finely and pour on 4 "fingers" of the best and strongest spirit of wine, allow to dissolve, strain it hrough a linen cloth, and leave it stand in a quie place until the clear varnish is on top, when it is poured into another glass. In a second glass resolve or extrac cleanly dragon's blood, 1 ounce; "rother Beern-Wurzel" (red bear's wort ?), 3 ounces. In the third glass dissolve colophony, 8 ounces; aloes succolini, 2 ounces ; orlean (annatto, a yellow vegetable pigment), 3 ounces and when everything has been sufficiently extracted and colored, pour together the contents of the vessels, put up the glass in a good manner, allow to stand undisturbed for eight days, pour off what is clear, and train through a clean cloth. If the varnish is to thin, let some of the spirit of wine evaporate, until it is of the proper consistency, and keep in a good place.
This will give a handsome red varnish, which can also be employed for gilding zinc.
Solubility of Certain Sulphides in Glass.-It is known that sulphides of the heavy metals, and especially cadmium sulphide, are dissolved unaltered by melted class, which enables one to obtain a number of color ng substances for glass. In the production of glass colored with cadmium sulphide, certain difficulties had formerly to be surmounted; to-day, fancy glass, colored with cadmium sulphide, under the denomination of "Kaisergelb," is manufactured on a large scale, which is distinguished from the brownish-yellow silver glass by its brilliant deep yellow color, with a faint tinge of green.
As regards the solubility of other sulphides, we would mention the following mixtures :
A. Sand, 65 decigrammes; potash, 15 decigrammes; oda, 5 decigrammes; lime, 9 decigrammes; molybde num glance, 3 decigrammes; sodium sulphide, 2 decigrammes. From this results a handsome, dark red brown, ruby color. In thin layers the glass appears light brown-yellow; flashed on opal, it turns a dirty black-brown, which appearance is, by the way, also observed with other sulphides, and may be traced back to the fact that the sulphide precipitates from the rather concentrated solution on repeated heating. B. Sand, 50 decigrammes; potash, 15 decigrammes soda, 5 decigrammes; lime, 9 decigrammes; molybdenum glance, 1 decigramme; sodium sulphide, 2 decigrammes. This gives a yellow which strongly tarnishes glass.
C. Sand, 10 parts; potash, 3.3 parts ; soda, 0.27 part; lime, 1.64 parts; molybdenuin glance, 0.03 part. This ives a reddish-yellow glass with a very handsome inge of red.
D. Sand, 100 parts : potash, 26 parts ; soda, 1.8 parts; ime, 12 parts; cupric sulphide, 1.7 parts; sodium sulphide, $1 \cdot 3$ parts. This yields a sepia to sienna colored glass, dark brown, no longer transparent in a tolera bly thick layer, but clear and undimmed. By heating, it turns dirty dark brown and dim; thinned with cutting-glass and flashed on opal, agreeably warm sepia shades are produced which. obtainable in any desired intensity, resemble the natural paper of the painters, and are especially suited as a background for designs or glass painting.
Experience has shown, however, that glass colored with sulphides is not so easy of production as that colored with silicates.
This is for the most part owing to the nature of the sulphides, to their ready oxidability, their comparatively greater volatility, and to the fact that metallic sulphides are entirely different from the substance of
glass and cannot, therefore, be melted together with it in any desired quantity.-Diamant.

A Galvani celebration took place at Bologna, Sunday, December 4, 1898. This was the centenary cele bration of his death, which occurred December 4, 1798 Luigi Galvani was a great anatomist of the Bolognese school and is best known by his discovery of animal electricity. The celebration was very interesting and a committee of Italian telegraphers is now organizing a similar commemoration for Alessandro Volta.
It would appear that the Electrolytical Marine Salts Company dies a hard death. A committee was ap pointed last August to investigate its affairs and a re port was made against the receivership, recommending that a committee of citizens would take the company's business in hand with ample authority to test the Jernegan process for getting gold from sea water and to disentangle, if possible, the legal snarl into which the affairs have drifted. It is extraordinary that people in the closing y ears of the nineteenth century, should be so deluded by such an ignis fatuus.
An interesting discovery has just been made in the Library of the Vatican. The assistant librarian has just found the original manuscript treatise of Galileo Galilei on the tides. The manuscript is entirely in Galileo's handwriting and ends with the words "written in the Medici Gardens, June 8, 1616." His Holiness Pope Leo XIII. has taken great interest in the discovery, and the manuscript is to be published in sumptuous form at the expense of the Vatican. It has always been considered that the original of this work was lost ; so it is all the more valuable, as it differs considerably from the text hitherto accepted as Galileo's, which is now in process of publication, together with Galileo's complete works, by a learned Italian society, the Accademia della Crusca.
Sir Edward Cecil Guinness, now Baron Iveagh and head of the great brewing firm in Dublin, has presented $\$ 1,250,000$ to the Jenner Institute of Preventive Medicine, in Great Britain. The purpose of this munificent gift is to promote researches in bacteriology and other forms of biology as bearing on the causes, nature, treatment, and the prevention of disease. Heretofore, there have not been adequate facilities in the United Kingdom in carrying on investigations of this nature, as there should be, but now by this princely gift the opportunities for research will compare favorably with any simiar establishment in the world. The gift comes at an opportune time, as many of the misguided inhabitants of England refuse to have anything. to do with vaccination, and the time is almost ripe for an epidemic which will bring them to their senses.
A colored person called William King, of New Bedford, Mass., has enjoyed the uninterrupted possession of two hearts for a century, as he is one hundred years old, and is still so hale and literally hearty as to be able to bend bars of iron across his arm. According to The New York Herald, which records this remarkable freak of nature, Dr. Munroe B. Long, of the Muhlenberg Hospital staff, a physician of high repute, after visiting King, said: "King has one heart on the right and one on the left side of the chest, whose separate beats in unison could plainly be determined. By a certain muscular contraction King let one heart drop to the left iliac region, where I clearly heard the beating; then let the other heart drop to the right iliac region, where its beating was also plainly heard, both beating in the lower part of the abdomen in unison. Next, King threw over the interior of the abdomen a wall of bone from the neck down, giving every evidence of having two sternums, or breastbones, one of which is movable at his will and seems to lie behind the regular breastbone when in repose."
Experiments in the use of kites for meteorological purposes recently tried by A. L. Rotch, of the Blue Hill Observatory, Boston, Dr. Hergesell, of the Meteorologisches Landesinstitut, Alsace-Lorraine, and others, have given such very satisfactory results as to arouse the greatest interest in all scientific circles. The experiments with this kite, which was 26 feet long and 13 feet wide, weighed 16.5 pounds, and had a surface covering an area of 129 square feet, were made last August at Krzeszowice, near Krakow, and were remarkably successful. The kite rose with a rush, and the entire length of the string, 1,115 feet, was let out by using a windlass with a band brake. With a wind of about 20 feet the kite carried a load of about 66 pounds, which is more than even the heavy instruments weigh. The motion of the kite was quiet and uniform, only a slight tacking indicating a change of wind. At a height varying from 190 feet to 330 feet the only effect of a change in the pressure of the wiud was to cause a moderate ascension when the force of the wind increased, and a slow descent when the wind pressure decreased. The use of a tail or landing-line, such as is generally attached to a balloon, proved most satisfactory. The line was 33 feet long, and hung from the neck of the rudder. The experiment of securing a dynamite cartridge to the landingline and exploding it at a considerable height was tried, and the result showed that the kite could, if desired, be used for the purpose of producing rain by explosions.-Illustrirte Zeitung.

NAVIES OF THE WORLD.
III.-FRANCE.

In many respects the French navy is unique among the great navies of the world. There is no other in which the ships, as a whole, differ so markedly from those of other nations, or in which such a wide diversity of design is shown among the battleships and cruisers themselves. In any great naval review, such as has recently taken place at New York, Kiel, or Spithead, it is a matter of small difficulty, even for the layman, to pick out the vessels of the French republic. The long protruding ram, the sharp "tumble-home" of the sides, the towering upper works, and the enormous , military masts, bristling with guns, are characteristic features more or less conspicuous in all the ships that fly the tricolor.
The French naval architects have always worked with a free hand. From the days of Napoleon III.,
sign, the French have had the good sense not to leave knots. Fifteen knots for the cruisers and 12 knots for a single foot of the waterline unprotected by armor, the gunboats and small cruisers was adopted as a and, with scarcely an exception, they have carried the limit. topsides of their ships high above the waterline and given the guns an unsurpassed command.
It is true these qualities may have been pushed too far. While the waterline has been protected, a vast area of the ship's sides, extending from the top of the armor belt to the bottom of the barbettes, has been left unarmored and would be exposed to destruction even by the smallest rapid-firers of the enemy. It is also true that many of the French ships have proved to be top-heavy, the margin of stability being in some ships so slight that they dare not put the helm hard over at full speed for fear of capsizing. These are grave defects, the former of which is irremediable, while the latter has been remedied by removing military masts and cutting down the mass of upper works.
limit.
B'attleships. - Because of the diversity mentioned above, the ships of the French do not lend themselve so readily to classification as do those of the British navy. It is not possible to give a photograph and diagrams of one ship and say that she stands, in respect of guns, armor, and speed, for any other vessel of her class. The French have not built so strictly in classes, and where they have, successive administrations of the navy department have introduced numberless and very radical changes in the ships during their construction. Owing to this fact, the French fleets lose something of their tactical value, for it is of very great advantage to a fleet if, in its evolutions, all the ships have the same speed, turn through the same angle for the same degree of helm, and have a common point or points on

"Valmy " Class. Four Ships.
"Valmy" and "Tréhouart " have $13 \cdot 4$-inch gune in the turretr and four $3 \cdot 9$-inch guns. The "Bouvine "and



"Carnot" Class of Four Ships.

The " Dupuy de Lome."



First-class Battleship "Charlemagne," 11,275 tons, 18 knots. Class of Three Ships. Also "Iéna" and "A 9." 12,052 tons, 18 knots.


The "Bruix" Class of Four Ships.

## NAVIES OF THE WORLD-III. FRANCE.

when "La Gloire" led the way in ironclad construction, they have been bold and original in their work, and many of the best features of modern construction are due to their initiative. Like all experimentalists, they have made many mistakes, as the French critics themselves have always been ready to admit; but there are certain excellent features of design to which, amid all the many fluctuations of style and type, they have tenaciously clung-features which the other nations are only now beginning to realize as absolutely essential in a first-class warship, whether she be battle ship or cruiser. First among these we may mention a continuous belt of armor from stem to stern at the waterline and a high command for the guns. Modern developments in shell-fire have rendered necessary the first feature, and the second is becoming increasingly necessary for those sea-going qualities which are put down as of prime importance in modern ships. Now, with all their passion for novel and even fantastic de-

On the score of appearance we must confess to a par-| which they can concentrate their maximum weight of tiality for the French vessels. While they may not fire. have the clean, ship-shape look of the British vessels and our own, they do certainly convey an impression of formidable fighting qualities to a degree that is not found in the ships of any other navy. If an exception is to be made, it should be in favor of the battleships Oregon," "Indiana," and "Massachusetts."
Fighting Strength of the Navy.-In our article "The Comparative Strength of the World's Navies" (Scientific American, December 31, 1898), we showed that the effective fighting ships of the French navy numbered 144, made up as follows: Battleships 10 year old or less, 14 ; battleships from 10 to 20 years old, 9 battleships of between 20 and 25 years, some of k hich have been refitted, 12 ; coast defense vessels, 14 ; armored cruisers, 20 ; protected cruisers, 37 ; small cruisers and gunboats, 38. In this estimate no coast defense vessels were included whose speed is below about 10

The most homogeneous and powerful squadron at present in commission is that composed of the four fine battleships of the "Charles Martel" type, a striking illustration of which is given on the front page. With these should be mentioned also the "Jaure guiberry." All of these ships have a speed of about 18 knots; all but the "Massena" have a complete waterline belt varying from about 10 to 17 inches in thick ness; and they all carry their heavy guns after the French characteristic style in four separate heavily armored turrets, one forward, one aft, and one on ither beam. They also have the excellent feature of carrying the eight heavy rapid-fire guns of the secondary battery in turrets of 4 -inch armor, the "Jaureguiberry" having these guns in pairs on the spar deck in four turrets, two forward, two aft, and the fou ships of the "Carnot" class carrying these guns singly


First-class Battleship "Hoche." * Class of Four Ships.
Displacement, 10.997 tons. Speed, 16 knots. Normal Coal Supply, 800 tons. Armor: Con.
tinuous belt, 18 inches; deck, 3 inches; gun positions, 16 inches.. Armament, two 134 -inch, two 108 -inch



Forward Pair of $13 \cdot 4$-inch Guns on the "Brennus."



 guns. Torpedo Tubes, 4. Complement, 515 . Date, 1890 .




* There are considerable variations in the vessels of this class.
by Symonds, 1892.
in eight turrets on the main deck. This disposition of the guns is made with a view to securing a heavy endon fire, which in the case of the "Carnot" class (see deck plan) consists of one 12 -inch gun, two $10 \cdot 8$-inch guns, four $5 \cdot 5$-inch, and four $8 \cdot 9$-inch rapid-firers
It will be seen that this quadrilateral arrangement of the heavy guns in four turrets, as compared with their arrangement in two turrets, as in our "Oregon," gives a heavier concentration ahead or astern (three cuns as against two), but a weaker fire on the beam (three guns as against four). It is doubtless the fact that most fighting will be carried on with the enemy abeam or on the quarter, that has led the French to abandon the quadrilateral arrangement in their latest ships of the "Charlemagne" and "Iena" type.
The guns are of a modern and very powerful type. The 12 -inch weapon, which weighs 46 tons, fires a 644 pound projectile with a muzzle energy and velocity of 30,750 foot-tons and 2,625 foot-seconds, the muzzle penetration being $37 \cdot 3$ inches of iron. The $10 \cdot 8$-inch gun, which weighs 35 tons, fires a 476-pound projectile with a muzzle velocity of 2,625 foot-seconds and a muzzle energy of 22,750 foot-tons, the penetration of iron being 33.7 inches, or equal to that of our 13 -inch gun, which weighs, by the way, nearly twice as much as the smaller weapon. Though the $5 \cdot 5$-inch guns of the rapid-fire battery are rather light, according to modern ideas, which favor nothing less than 6 -inch guns for this purpose, they are very formidable weapons. They fire a 66 -pound projectile with a velocity of 2,625 foot seconds and an energy of 3,100 foot-tons, the penetration being 17.7 inches of iron. This is a little more than our present 6 -inch gun. At long ranges, however, owing to the rapid falling off of the velocity due to the lighter weight of the shell ( 66 pounds as agains 100 pounds), the French gun is not so effective. In ad dition to the rapid-firers in turrets, the "Carnot" car-
ries eight 4 -inch rapid-fire guns on the superstructure ries eight 4 -inch rapid-fire guns on the superstructure and bridges, very efficient weapons, capable of pene-
trating 14.3 inches of iron at the muzzle. These guns are mounted behind $2 \cdot 8$-inch shields at a height of 35 and 40 feet above the sea.
The remarkable form of the hull of these ships above the water is due to what is known as the "tumblehome" of the sides, which curve sharply inward from the waterline and then with a reverse curve run verti cally up to the spar deck. This is an exaggeration of a system adopted universally in the old wooden men-of-war. It has the advantage of reducing the width and weight of the upper decks, thereby adding to the ship's stability, and it allows the turrets to stand clear of the hull and gives the guns a more extended are of fire fore and aft. In their latest ships the French show a disposition to adopt the vertical-sided form common in other navies.
Taken altogether, these ships with their water-tube boilers, high speed, ample protection, powerful and modern armament, and double armor decks, would probably prove to be the equal of any vessels afloat in fighting power. The name of the five are "Charles Martel," "Carnot," " Bouvet," "Massena," and "Jauré guiberry." An unusually handsome cut, showing the last-named ship on her trial trip, which was crowded out of the present article, will be shown in the SUP PLEMENT of next week.
In the later ships of the "Brennus" and "Charle magne" types the French have adopted the two-turre plan for the big guns, and have placed the secondary battery in an armored citadel amidships, thereby for the first time in their history following the lead of the English. The "Brennus" ( 11,824 tons and $17 \cdot 1$ knots speed) carries two $13 \cdot 4$-inch guns in a turret for ward and one $13 \cdot 4$-inch gun in a turret aft. She has continuous belt of $153 / 4$ inches maximum thickness,
and above this is a $41 / 2$-inch belt also reaching from and above this is a $41 / 2$-inch belt also reaching from
stem to stern. The powerful secondary battery of ten $6 \cdot 4$-inch rapid-fire guns is carried on two decks in a cen tral citadel of 4 -inch armor, which extends from the top of the belt to the main deck. The $13 \cdot 4$-inch guns are the most powerful weapons carried in any navy a the present time. Their muzzle energy is 44,230 foot-tons and they can penetrate 425 inches of iron at the muz zle. The $6 \cdot 4$-inch gun is also of exceptional power It fires a $99 \%$-pound shell with a velocity of 2,625 feet per second. The resulting energy is 4,730 foot-tons and penetration of iron, 20 inches at the muzzle
In the "Charlemagne," "St. Louis," and "Gaulois," sister ships of 11,275 tons and 18 knots, now about com pleted, the French have returned to the 12 -inch gun, the main armament consisting of four of these weapons, carried two forward and two aft in turrets. The second :y battery of ten $5 \cdot 5$-inch guns is carried in broadside behind a citadel of 3 -inch steel, but the space betwee the gun deck and the armored deck is entirely unpro tected and would be open to destruction by shell fire In addition to the $5 \cdot 5$-inch these ships carry eight 3.9 inch rapid-fire guns. The most novel structural fea ture in these ships is the waterline protection. First there is a continuous belt $153 / 4$ inches thick, 6 feet 7 nehes in depth. Above this belt is another, 3 feet in depth and 3 inches thick. At the top of the main bet
is an armored deck, $31 / 2$ inches in thickness, and at the bottom of the belt, below the waterline, is a $11 / 2$-inch
armored deck. The vitals of this ship should be absolutely proof against projectiles.
Except for the unarmored space between belt and citadel, these vessels are extremely formidable both for attack and defense, and the French are so well satisfied with the type that they are building two others, the "Iena" and battleship "A 9," of slightly larger dimensions and more powerful armament. Their displace ment will be 12,052 tons, speed 18 knots, and they will carry $6 \cdot 4$-inch in place of $5 \cdot 5$-inch guns in the secondary battery. Like the "Charlemagne" type, they will have triple screws and water-tube boilers.
The "Hoche," 10,997 tons, 16 knots, 18 -inch belt armed with two $13 \cdot 4$-inch, two $10 \cdot 8$-inch, and eight $5 \cdot 5$ inch rapid-fire guns, launched in 1886, is the only modern French battleship of low freeboard (see illustration). Her main battery is not of the modern type found in the "Carnot" and "Charlemagne," the guns being much shorter and of less power, and while she makes a good coast defense ship, she is not to be compared with the splendid vessels of later construction. Much trouble has been experienced in rectifying her bad points, the chief of which was the enormous superstructure amidships. By reducing this and removing her after military mast altogether the vessel has been rendered fairly stable, although she is still, on account of her heavy rolling, an unsatisfactory ship.

Of the oider ships built over ten years ago, the " Ma genta," "Marceau," and "Neptune," of 10,850 tons and $161 / 4$ knots, are the best. They have a lofty freeboard and carry their four $13 \cdot 4$-inch guns (older pattern) at the level of the main deck, in four separate turrets They have a powerful battery of fourteen $5^{\circ} 5$-inch rapid firers on the gun deck, mounted in broadside but un protected. Their good points are high command for the main battery and good waterline protection. Thei defects are the vast area of unprotected side between barbettes and belt and their instability. Inferior ships these are the "Amiral Baudin," of about 11,911 ton and 15 knots, the "Formidable," 12,165 tons and 16 knots, and the "Amiral Duperre," 11,209 tons and 14.2 knots. All these have continuous belts $21 \frac{1}{2}$ inches in thickness, whose resisting quality is about equal to 10 inches of Krupp steel, and $173 / 4$ inches on the barbettes. The guns are mounted in barbettes high above the waterline and, as in all the French ships, there is no protection between barbette and belt other than an armored ammunition trunk. The armament consists of two $14 \cdot 6$-inch B.L. guns, eight $6 \cdot 4$-inch rapid-fire, and eight 5.5 -inch guns, besides many smaller rapid-firers The " Courbet" and "Devastation," launched in 1881 and $18 \% 9$, are of 10,800 tons and 15 knots. Each carries four $10 \cdot 8$-inch, four $9 \cdot 4$-inch, and six $5 \cdot 5$-inch guns. The armor is 15 inches on the belt, $91 / 2$ inches on the gun positions, and the deck is $21 / 2$ inches in thickness.
In the list of old battleships of over twenty years, there are a dozen ships, four of which are of wood and he rest of iron. Their speed varies from 10.8 to 14.8 knots, and their average displacement is about 7,500 tons. Their guns are of an old model and therefore of limited power. In fighting qualities these ships are comparable to the old broadside battleships of the
British navy, though the breech-loading French gun of this period is superior to the muzzle-loading British gun.
CoAST DEFENSE VESSELS.-There are 14 coast "Valmy" and her class are the best representatives. If the United States must build ships of the strict coast defense class, it would be far better to expend th money on vessels of the "Valmy" class instead of putting afloat such archaic designs as our new monitors of th Arkansas "type will be. The "Valmy" (see particu ars beneath engraving) is a 6,592 -ton vessel of over 16 knots speed and great power. This vessel and the Trehouart" carry two of the new powerful $13 \cdot 4$-inch guns, while the "Bouvines" and "Jemmappes" carr each two 12 -inch guns. These weapons are sufficiently elevated to be fightable in a fairly heavy sea. and the speed of the ships coupled with their $173 / 4$-inch armo wou d render them formidable antagonists for any bat leship. Four other formidable coast defense ships ar he "Caiman," "Indomptable," " Requin" and "Ter ible," of about 7,500 tons and 15 knots, with $191 / 2$-inch armor and carrying 16.5 and $13 \cdot 4$-inch guns in the main battery. A new coast defense ship of 8,948 tons and 1 knots, the "Henri IV.," is now building. She will be armed with two new type $10 \cdot 8$-inch breech-loading guns and seven $5 \cdot 5$-inch rapid-firers. The other coast de ense ships are of less size, from 1,800 to 5,000 tons, and though they are older, they are heavily armed and well protected.
Armored Cruisers.-In the armored cruisers we find another class of vessels of which the French people may well be proud. On the first of January 1898, there were twenty of these very effective ship either built or building. The best known of these i the "Dupuy de Lome." She is remarkable as being the only warship in the world that is completely clothed with armor. From stem to stern and from be low the waterline up to the main deck she is protected by 4 inches of steel. Equal protection is given to the guns, each of which is inclosed in a separate turret

4 -inch steel. These guns are so disposed as to secure a theoretical concentration of fire as follows: Two 7.6inch breech-loaders and three $6 \cdot 3$-inch rapid-firers ahead or astern and one $7 \cdot 6$-inch breech-loader and four 63 -inch rapid-firers on either beam. In the four 63 -inch rapid-firers on either beam. In the of the French experiments with shells loaded with high explosives. The 4 -inch armor was supposed to insure the bursting of these shells outside of in stead of within the vessel. In the four ships of the Bruix" class the armor is not carried so high, but as the turrets rotate upon the main deck immedi ately above the side armor, the protection to the turn ing-gear and ammunition is fully as complete. The other ships of this class are the "Charner" "Chanzy" and "Latouche-Treville." The speed is about $18 \cdot 5$ knots. For further particulars, the reader is referred to the cut of the "Charner" on the front page.
The "Pothuau," a vessel of 5,360 tons and $19 \cdot 2$ knots is an enlarged "Charner," her battery being increased over that of the "Charner" by the addition of four $5 \cdot 5$-inch guns.
There is no doubt that French influence and example are responsible for the present disposition to build ar mored instead of protected cruisers. At present they have ten of these fine ships under way, none of which is of less than 7,700 tons displacement and 21 knots speed The particulars are given in the accompanying table

|  | Displace ment in Tons. | Speed. | $\begin{aligned} & \text { Belt } \\ & \text { Brmor. } \end{aligned}$ | Main Armament. |
| :---: | :---: | :---: | :---: | :---: |
| Jeanne d'Arc.. | 11,270 | 23 | 6 in . | Two 76 -in., eight 55 in r. f., twelve $3 \cdot 9-\mathrm{in}$. |
| Dupetit Thouars. | 9,517 | 21 | " | Two $7 \cdot 6$-in., eight $6 \cdot 4$ |
| Gueydon. | " | " | " | Two 7\%6-in., eight 6. |
| Montcalm........ | " | " | " | Two $\begin{gathered}\text { T. } \\ 7.6 \text {-in., } \\ \text { eight } \\ \text { en }\end{gathered}$ |
| C 4..... | " | " | . |  |
| C 7. | " | " | * | Two f., four 6 -in., eight 6. |
|  | " | " | " |  |
| Desaix... |  |  |  | r.f. four 3.9-in, |
| Duplex. | ". | " | " | " " " |
| Kleber... | " | " | " | " " |

Protected Cruisers.-The French navy includes 37 protected cruisers of a speed of 15 knots and over The largest of these at present is the "Tage," 7,585 tons, 19 knots; though a larger ship, the "D'Entre casteaux," 8,114 tons and 19 knots, was launched in 896 and is nearing completion. Two commerce de troyers of the "Columbia" type are under construc tion. They will be known as the "Chateaurenault and the "Guichen." They are about 800 tons large than the "Columbia," are somewhat faster, and are considerably stronger in armament, but they do no carry so much coal. The particulars are: Displace ment, 8,277 tons ; speed, 23 knots ; horse power, 24,000 coal supply, normal, 1,460 tons : armament, t wo 6.4 nch, six $5 \cdot 5$-inch, ten $1 \cdot 8$-inch, all rapid-firing
Of cruisers between 4,000 and 7,000 tons displace ent the French navy possesses thirteen, of which the "Jean Bart" class (six ships) is the best representa tives. This vessel was at New York during the Colum bus celebration and will be familiar to our readers Her particulars are given beneath the illustration of the vessel. There is nothing special in the design of these ships, and the speed is about a knot less than that of similar vessels in other navies. There is not much disposition on the part of the government to in crease the numbers in this class, the requirements of the French service calling for battleships and armored cruisers and the larger type of protected cruisers rathe than vessels of the "Bruix" class.
In the small cruiser and gunboat class France pos esses 38 vessels of an average displacement of 988 ton and an average speed of 17.1 knots, the speed being higher than that of similar vessels in any navy but that of Italy. Among the small cruisers the "Ealande." 1,926 tons, 22 knots, is the best representative. He peed is 22 knots and she carries six $5 \cdot 5$-inch guns as her main armament. Fourteen of these vessels are of over 1,000 tons displacement, with an average speed of about 18.5 knots; the others range from 400 to 900 tons in displacement and from 12 to 23 knots in speed Taken as a whole, the French navy, though less than half as large as the British navy in numbers and dis placement, is, we think, fully equal to it in quality. It is true, many of the ships show grave defects; it is also rue that they present many excellent qualities which are not to be found in the British ships. In the way of defects, the unarmored space between barbettes and belts in the French ships is fairly offset by the unar mored waterline at the ends of the British vessels, while we think the French plan of placing the rapid fire guns in armored turrets is preferable to the British plan of placing them in broadside armored casemates. In action the fragments of bursting shells that have passed into the ship will penetrate the thin rear wall of the armored casemates on the lee side of the ship where the walls of the turrets would be proof against such fragments. In point of coal capacity, stability,
and seaworthiness the British ships are superior; but it must be remembered that the French battleships and armored cruisers would probably never operate at any distance from the Channel or the Mediterranean.
In point of personnel, if past history is a sure guide, the British fleet is superior, possessing at least equal skill and certainly more tenacity. The seamen are largely recruited from the hardy fishermen of the Brittany and Normandy coasts, and to-day, as in the time of Nelson, they would doubtless exhibit the splendid qualities which were too often handicapped in the days of the frigate and three-decker by lack of dash and skill on the part of the captains and admirals of the navy.

THE KEELY MOTOR FRAUD.
Ever since the death of John W. Keely, the fantastical collection of apparatus with which he puzzled the public, and incidentally diverted a golden stream into
tion to the Keely mania, and endeavored, we think with considerable success, to check, if it could no wholly prevent, such obvious swindling of the public We pointed out that all of the results obtained by Keely could be duplicated by using compressed air in suitable apparatus, and in 1884, in the case of the Keely gun, conducted experiments which proved that in this case, at least, we were correct.
Keely had many different names for his newly dis covered force, and just at the time of the famous gun experiments at Sandy Hook, he was pleased to call it "etheric vapor." Representatives of this journal were present on the occasion, and the accompanying illus trations were published in the Scientific American of October 11, 1884, in connection with an article exposing the trick by which the Keely Motor Company was able, in a single day, to send up its stock from
nine cents on the dollar to fifteen cents, and swell its nine cents on the dollar to fifteen cents, and swell it own bark account proportionately.
connected by a wire, $C$ (so said Keely; the wire was actu ally another tube) to a second magazine, $B$. The supply from the small to the large magazine and from the large magazine to the gun was controlled by stop valves, as shown in the cut. These magazines, accord ing to Mr. Keely, had been charged with "interatomic ether," which had been evolved by a "generator" se up in Mr. Keely's Philadelphia workshop.
In loading the gun the gas check was first placed in position and the muzzle screwed up tightly; then the ball was introduced at the muzzle and rammed home Next the stop-cock was opened to admit the "etheric vapor" to the breech, and, after waiting a few seconds the "vibrator," $H$, was struck with a wooden mallet, and the charge exploded, driving the bullet at a targe 500 yards from the gun. Nineteen rounds were fired and then a conical steel bullet was driven through 4 inches of pine plank placed a few feet from the gun The noise of discharge closely resembled that caused by


GAS CHECKS BEFORE AND AFTER DISCHARGE OF GUN.


LONGITUDINAL SECTION AT BREECH OF GUN.
his private purse, has been as jealously guarded as ever it was in his lifetime. Recently the motor was removed, and the laboratory (Heaven save the mark!) in which for a quarter of a century he had conducted his so-called experiments was vacated. Whereupon Mr. Clarence B. Moore, whose mother had been the most generous of Keely's many victims, rented the premises, and calling to his assistance several gentle men of high standing in the scientific world (some of whom, by the way, had been baffled witnesses of the
Keely phenomena), proceeded to explore the premises Keely phenomena), proceeded to
in search of evidences of fraud.
in search of evidences of fraud.
The result proves not merely that the motor was a fraud, but that it was a fraud, as we pointed out fifteen years ago in the columns of this journal, of the very simplest and most transparent kind: in fact, the presumption is strong that this most colossal humbug of the centiry depended for its success upon that ever fruitful theme of the bogus company pro moter-com pressed air. In the first place, hidden be neath the floor of the building was found a large and massive metal sphere, whose weight is give as three tons, and whose bursting strength under pressure is stated to be so many tons to the square inch. Appainch. Appa rently at one time connected
with this was with this was
found, hidden found, hidden
in the brick wall, a quan tity of small brass tubing of just the size and strength to match the strength of the steel reservoir, and corre sponding to the tubing (see cut) used by Keely in his various public and private exhibitions. Under neath the upper floor of the house was found a false ceiling, well calculated to hide the necessary tubes for conveying the compressed air to the different air mo tors with which he produced his results; while a num ber of trap-doors were found scattered over the floo of this stage, from which, for a quarter of a century, this prince of humbugs played his part!

Many of our older readers will remember that from the very first this journal was emphatic in its opposi-

The "vaporic" gun used on that occasion (it was nothing more or less than an air-gun) had a spherical knob secured to the breech, from which projected a "vibrator" (!) $H$. The breech was $41 / 2$ in. external diameter, the bore $11 / 8$ in., and the total length was $31 / 2$ feet Just forward of the trunnion, at the point, $F$, the muz zle unscrewed, this construction being adopted to per mit the placing of a gas check, $b$, in position. A sleeve c. with a bore equal to that of the gun, was fitted in an annular recess in the forward part of the breech, $F$.
It will be seen that when the muzzle was screwe home, the sleeve was forced in until it held the gas check firmly in place. The latter consisted of three disks, having a common diameter of $1 \frac{5}{8}$ inches. The wo front disks were of common hard rubber, $\frac{1}{32}$ inch in thickness, while the third disk, which was placed a common shotgun when loose powder having no ram-
ming upon it is exploded. A small cloud of white vaming upon it is exploded. A small cloud of white va
por, which immediately disappeared, followed the discharge. The velocities of three consecutive shots were 482, 492, 523 feet per second. "The gun was then un screwed,"saystheaccount of the proceedings, "the valve at the magazine was opened, and visitors were permitted to examine the 'interatomic ether' as it issued from the pipe. It had but a small trace of odor no taste, and had no effect upon the lungs." Precisely; for there is not a question in the world but what the "interatomic ether" as it issued from the pipe was the common air at atmospheric pressure.
We declared at the time that the magazine, $A$ and $B$ had been charged with compressed air at many thousand pounds pressure, and that when the stop next to the pressure chamber, was of soft rubber pack- cock was opened, the air, owing to its high pressure,


TEST OF THE KEELY "VAPORIC" GUN AT SANDY HOOK, SEPTEMBER, 1884. passed rapidl to the breech, behind the gas check, where it developed suf ficient pressure ficient pressure
to burst the to burst the
check and excheck and
pel the ball. pel the ball.
The tappin! on the "reson ator," $H$, hal nothing what ever to do with the discharge and was merely one of the char latan "passe of the wand by which this accomplis hed rogue bewild ered his audi ence.
To prove the fact to his sat isfaction, th representatir of the Scien tific Ameri CAN requested Keely to allow him to handle the wooden mallet (his purpose being to pose being to
ing, $\frac{1}{1-}$ of an inch thick. The disks are shown in full $\mid$ ping until after the discharge). It is needless to say size in Figs. 1 and 2, the former figure representing the that Keely refused. disk before discharge, and the latter after discharge It will be noticed that the broken disk shows clearly the imprint made by the end of the sleeve. The bore of the gun was $11 / 8$ inches, and a.spherical lead bullet, $a$, was used. A copper tube, $D, \frac{3}{16}$ of an inch in exter nal diameter and $\frac{1}{16}$ of an inch internal diameter, a full size cross section of which is shown between cuts 1 and 2 , led the breech of the gun to the magazine, $A$, which was made of wrought iron and was $81 / 2$ inches external diameter by 4122 feet long. Another tulue was

Soon after Keely's gun experiments the editor of this journal conducted experiments in the same direction in New York, and an experimental gun was made o seamless drawn brass pipe of 1 inch bore and 2 feet in length, and set vertically under a skylight shaft seve ral stories in height. A union joint was screwed to the bottom of the pipe, with a pipe connecting to a coil of about 100 feet of $11 / 4$ inch pipe, placed beneat he gun.
A further connection was made with a hydraulis
testing pump and high pressure gage. In the union testing pump and high pressure gage. In the union
joint were placed two disks of hard rubber, each about $\frac{1}{88}$ of an inch in thickness, and above the disks a lead $\frac{\sqrt{32}}{82}$ oll, 1 inch in diameter, was placed. On the railing of the next story above was laid a target of five tiers of $11 / 4$ inch plank, directly over the range of the gun. The whole pipe being full of air atatmospheric pressure, the pump was put in operation, water being forced into the lower end of the pipe reservoir. This forced the air up through the pipe line and compressed it under the hard rubber disks. When a pressure of 1,500 pound per square inch was reached, the disks ruptured and the gun was discharged.
The bullet passed through the $61 / 4$ inches of pine planks, making a clean cut through the first planks and badly shattering and displacing the last plank of the target, then struck and splintered a beam under the roof and rebounded to the floor. This was repeated several times, the disks bursting at between 1,300 and 1,500 pounds and showing the great power of comprestidigitator part of Keely's exceedingly small feed pipe to the chamber behind the disks and bullet, and pipe to the chamber behind the disks and bullet, and were not included in our experiment.
In conclusion we would remind our readers that the death of this prince of rogues does not imply that the type is extinct; and that "resonators," "vibrators," "etheric vapors," and others of that ilk, still walk the earth dressed in the ever-varying garb with which such human sharks as Keely are still seeking to catch the unwary.

## Radium: A New Body, Strongly Radio-Active, New Body, Strongly Rad Contained in Pitchblende.

by m. p. curie. mme. p. curie, and m. g. bemont
Two of us have shown that, by purely chemical pro cesses, a strongly radio-active substance can be ex tracted from pitchblende. This substance is near bismuth in its analytical properties. We therefore came to the conclusion that pitchblende might contain a new element, for which we proposed the name of polonium.
Our subsequent researches are in accord with the results first obtained, but, concurrently with these, we have met with a second substance, strongly radio active, and entirely differing from the first body in it chemical properties.

Polonium is precipitated from its solution by sul phureted hydrogen. Its salts are soluble in acids and are precipitated by water ; polonium is completely precipitated by ammonia. The new radio-active substance we have discovered has, to all appearance, the properties of almost pure barium. It is not precipi tated either by sulphureted hydrogen nor by ammo nium sulphide nor by ammonia; its sulphate is in soluble in water and acids; the carbonate is insoluble in water; the chloride is very soluble in water, but insoluble in concentrated hydrochloric acid and in al-
cohol. It gives the barium spectrum easy to recognize. Nevertheless, we believe this substance, although in reater part consisting of barium, contains besides new element which gives to it radio-activity, and which s close to barium in its chemical properties.
Here are the reasons which lead us to this opinion :

1. Barium and its compounds are not radio-active also one of us has shown that radio-activity appears to be an atomic property, persisting through all the
chemical and physical states of the substance. From this point of view the radio activity of our substance, not being due to barium, should be attributed to an other element.
2. The first substances we obtained had, in the state of hydrated chloride, an activity 60 times as great a that of metallic uranium (the radio-activity was meas ured by the amount of conductivity conferred on air in our apparatus). On dissolving these chlorides in water and precipitating a portion by alcohol, the part pre ion. Taking advantage of this fact, we may, by eries of fractionations, obtain chlorides more and more active. We have thus obtained chlorides having an activity 900 times greater than that of uranium. We were stopped here by failure of material, but, from the rogress of the operations, we could see that the activ ty would have augmented still more had we been able to continue. These facts may be explained by the pre sence of a radio-active element, the chloride of which is less soluble in alcoholized water than is that of barium.
3. M. Demarcay has been good enough to examine the spectram of our substance. The results are given in a note following this. M. Demarcay has found in its spectrum a ray which does not appear to be due to any known element. This ray, scarcely visible with the chloride 60 times more active than uranium, is notable with the chloride concentrated by fractiona tion to an activity 900 times that of uranium. The intensity of this ray augments, therefore, with the radio-activity, and this we think is a very serious rea-
son for attributing it to the radio-active portion of on for attribu
These different reasons lead us to believe that the new radio-active substance contains a new element which we propose to give the name of radium.
We have determined the atomic weight of our active barium by estimating the chlorine in the anhydrous chloride. We have found numbers differing very little from those obtained with inactive barium chloride;
however, the numbers for the active barium are always a little higher, but the difference is of the order of magnitude of experimental errors. The new substance certainly contains a very large proportion of barium. In spite of this, its radio-activity is considerable. The radio-activity of radium ought therefore to be enorous.
Uranium, thorium, polonium, and radium, and their
act photographically on sensitive plates. From these points of view polonium and radium are considerably more active than uranium and thorium. On photographic plates we obtain good impressions with radium and polonium in half a minute. It requires several hours to obtain the same result with uranium and thorium.
The rays emitted by compounds of polonium and radium render barium platinocyanide fluorescent. Their action in this respect is analogous to that of the Roentgen rays, but is considerably more feeble. To make the experiment place on the active substance a very thin sheet of aluminum, and on this a thin layer of barium platinocyanide; in the dark the barium platinocyanide appears feebly luminous over the active ubstance.
We thus realize a source of light, very faint, it is true, but functioning without a source of energy. There is here a contradiction, at least apparent, to the principle of Carnot.
.Uranium and thorium under the same circumstances -Comptes Rendus.

A Cable Steamer for the Philippines.
The War Department has authorized the Quarternaster's Department to secure at once an iron ship of from 1,000 to 1,200 tons burden to lay cables to connect the islands of the Philippines. The War Department has already ordered 166 miles of cable, which weighs 525 tons. It will be coiled in skeleton tanks in the vaious holds in the vessel. It is considered very important by the government to connect the various islands of the Philippines by cable.

The Current Supplement.
The current Supplement, No. 1204, is a very ineresting number. It is begun by "The Beginnings of Plastic Art in Europe," in which some curious archæoogical specimens are presented and a recent book is reviewed. "The Mineral Resources of Cuba" is a timely article. "Methods of Preparing Rubber" is an important technical paper. The work on the new buildings of the Paris Exposition is described in detail. "Acetylene," by Prof. Vivian B. Lewes, is an important and authoritative treatment of the subject. The usual three columns of notes are published.


## recently patented inventions.

## Agricultural Implements.

 SUGAR-Cane Wagon. - Mark r. Spelman, New Orleans, La. This vehicle has fifth-wheels connectingbie vehicle-body with the front and rear axles. A reach diec vehicle-body with the front and rear axles. A reach
pivotally connects the axles with each other at their midlies. Frames, connected at their outer ends with the respective axles, extend inwardly toward one another;
and the sides of the frames converge at their inner ends. and the sides of the frames converge at their inner ends.
Diagonal braces crossing each other are pivotally conDiagonal braces crossing each other are pivotally conA wagon thus constructed can readily turn in a narrow Planter.-Chiever C. and Lemuels. Caves, Fremont. Iowa. This planter is especially adapted for
planting potatoes, and is so constructed that the potaplanting potatoes, and is so constructed that the pota-
toes are introduced whole into the planter and autotoes are introduced whole into the planter and auto-
matically cut into proper pieces and planted. The matically cut into proper pieces and planted. The
planter is adapted to plant two rows simultaneously. planter is adapted to plant two rows simultaneously.
Although designed primarily to plant potatoes, the machine can also be used as a corn-planter.

## Bicycle-Contrivances.

BICYCLE OR SIMILAR MACHINE.-. John A. Kelle, Brooklyn, New York city. The bicycle of this inventor is driven by hand-power and is so constructed
that both hands can be used at the same moment that both hands can be used at the same moment
for driving and steering. A shaft or bar is connected with the driving-levers and with the steering-wheel, and has endwise movement in a direction transverse to the frame of the bicycie to effect the steering. The bar or rod, in steering the bicycle, is operated by moving the propelling levers in a line transverse to their driving motion.
BELL.-Orvey Price, Forty Fort, Penn. The pur-
pose of this invention is to provide a bicycle-bell which pose of this invention is to provide a bicycle-bell which s. arranged to permit a rider to throw the bell into gear
with one of the bic cle-wheels in order to sound the gong. With this end in view, the inventor has provided his bell with a revoluble wiper, and with a loose clapper adapted to pass into the path of the wiper and to be thrown outward
sound the bell.
Chainless gear.-Karmell Brooks, New York city. The bicycle-gear of this inventor is essentially a roller bevel-gear, the novel features of the device residing
in the peculiar construction of the shaft. The device is in the peculiar construction of the shaft. The device is
made so that it will constantly maintain a proper relation made so that it will constantly maintain a proper relation
between the driving-gears. The shaft of the gear is of spring or flexible construction, and by reason of this
construction is enabled to compensate for any deflection
of the frame, and to relieve the rider of the jar experienced when riding over rough roads. A nov
provided, which is applied by back-pedaling.

## Mechanical Devices.

ALARM Clock.- Arthur C. Reichel, Union
Hill, N. J. To provide an Hill, N. J. To provide an alarm clock with two bells,
differing in sound or pitch, and arranged that both differing in sound or pitch, and arranged that both alarms may be so sounded by one spring that one bel
will ring alone for a short time, and then the two will ring together for a short time, is theobject of the will tion. The two alarms are respectively driven by primary movement gear-wheels. A lever coacts with one
of the aiarns to hold the alarm normally inactive. A of the aiarms to hold the alarm normally inactive.
slotted wheel has a projected portion engaging and n slotted wheel has a projected portion engaging and nor mally holding the lever. A collar, driven by one of the
gear-wheels, has a finger coacting with the slotted gear-wheels, has a finger coacting with the slotted
wheel, whereby the wheel is periodically moved so as to release the lever.
EXCAVATOR.-William S. Russell, Toledo, Ohio. This invention seeks to equip an excavator with an efficient device for supporting the front end of the machine
and for turning the whole main car and frame comand for turning the whole main car and frame com-
pletely around in order that it may work in both direcpletely around in order that it may work in both direc-
tions. The turn-table used supports the end of the ma tions. The turn-table used supports the end of the ma
chine while moving over the rails, and supports the whole machine while being swung around. The turn
table is detachable from the car-body and, though loose table is detachable from the car-body, and, though loose, receive the upper ball-bearing ring of the turn-table. In order to turn the machine around, the front end of the car is raised by jack- screws until the flanges on the metal ring are clear of the turn-table. The table is then shifted back under the balance-ring, and the machine is lowered in place, the whole weight resting upon the
turn-table.
dish washing machine.- Robert R. Parry and Edwin Evans, Poultney, Vt. The machine has
reservoir and cover therefor. Two carriers are mounted to rotate in the reservoir and cover, and are adapted to be raised and supported above the water in the reserorr. A series of open-work receptacles contain the
articles to be washed, and are arranged to conform with the outline of the carriers. Brushes are secured to one of the carriers. Means are provided upon the other car ushes.
MERRY-GO-ROUND.-Peter J. Spracklen, Kenor merry-go-rounds, which attachment is so constructed that a number of figures or articles may be brought, at the
will of the riders, into the path of ihe striking section of
a wind-engine or other form of motor for the purpose of determining how many, if any, of the figures
can be dislodged by the action of the motor.
MACHINE FOR SHAPING PLASTIC MATERIAL -Gustav Stoff, Berlin, Germany. The machine i pieces from rods of plastic material such as march pieces from rods of plastic material, such as march-
pane, chocolate, caramel, and clay. The rods are placed above a pair of horizontal rotating rollers, each having several annular furrows or channels divided by sharp edges. The rollers are constructed to engage and to roll the rod placed above them, to change the rod by squeez ing and forming while rolling into round-shaped pieces,
and to cut the rod into sections.

Railway-Appliances
Car-brake.-Ernest b. and adolph L. Gesche Bingham Lake, Minn. The brake provided by this in-
vention is controlled mainly.from the draw-heads of the car and is applied upon the inward movement of the draw-heads, the movement being caused by the stopping of the locomotive and the bumping together of the veral cans of the tran.
GRaIn-DOor FOR CARS.-Benjamin W. Davis. Rock Springs, Wyo. Vertical guideways are arranged adjacent to the door-opening, which guideways are con
tinued at their upper ends by a curved portion and horizontal portion having a drop at its inner end oftsets or supports are arranged without the guideways and ad jacent to the curved portion, the upper surface of the offsets forming a portion of branch guideways extending outwardly from the main guideways. The door is provided with pins mounted to move in the guideways and branch guideways. By reason of this construc tion, the door can be held open, com
way, when the car is being unloaded.
MEtallic railway.tie. - George A. and dith, Ark. The purpose of this invention is the pro vision of a tie, designed to be held in place without the use of spikes, the adjacent ends being fastened together
without the use of fish-plates. The tie is made in longiwithout the use of fish-plates. The tie is made in longi-
tudinal sections, each formed with a pair of lugs, artudinal sections, each formed with a pair of lugs, ar
ranged so as to engageopposite sides of the rails. The ranged so as to engage opposite sides of the rails. The
lugs extend over the corresponding base, web, and unlugs extend over the corresponding base, web, and un-
der side of the rail. Each lug is provided with an extension. Bolts pass through the lugs, extensions, and web of the rails.

Miscellaneous Inventions.
Elastic tread horseshoe. - Arthur $W$
horseshoe is fitted hot to the hoof, so that the rubber
pads will form part or the shoe, the pads being remova pads will form part or the shoe, the pads being remova
ble and being provided with side calks ble and being provided with side calks. The pads li
snugly in panels made in the bottom face of the shoe between the heel and toe calks, and are held in position by nails driven through the shoe. The nails pass through eyelets which serve to prevent the pads from becomirg lacerated by the nails, should they work loose.
AUTOMATIC LOCK FOR DUMB-WAITERS. Gustave Seaberg, Brooklyn, New York city. 'This nvention seeks to provide a hoisting and operating mechanism which will hold a waiter at any point, and
which will operate as well with the waiter which will operate as well with the waiter supporte
from one side of the pulley as from the from one side of the pulley as from the other. By
means of a novel arrangement of two disks provided with interlocking inclines, of sheave-wheels and collars, the rotation of the supporting shaft in either direction is prevented when power is applied by the pulley carrying the hoisting rope. The shaft can nevertheless be al-
lowed to rotate in either direction when the handlowed to rotate in eit
operated rope is pulled.
ACETYLENE GAS-APPARATUS.-EUGENE Bo ACETYLENE GAS-APPARATUS.-EUGENE Bour-
Nonville, Jersey City, N. J. This apparatus comprise nonvilue, Jersey City, N.J. This apparatus comprise
essentially a generating-chamber, a gasometer, and auto matic means for controlling the ganeration of gas. The generating chamber has a tapering bottom to permit the ready withdrawal of the lime residue, and is provided with a carbid-receptacle, wheel-like in form, and divided into a number of radial, carbid-containing compart ments. The gasometer, by its action in rising and fall
ing, automatically controls the generation of gas by ing , automatically controls the generation of gas by
means of a system of levers and rods connecting the carbid-receptacle with the gasometer. In order to pre vent the escape of gas from the generator, a layer of oil is used, which constitutes an effective seal and render the generator air-tight
FOLDING-BED.-JACOB Levy, Brooklyn, New York city. The purpose of this invention is to provide which may be readily folded into a small space. Each side and end of the bed is made as a frame. The part are hinged together at the corners, so that when the bottom is removed or swung up these frames may fold so as to lie parallel to each other, and thus occupy less ace than when opened out
SPECTACLE ATTACHMENT FOR EYEGLASSES -John J. Mundorff, New York city. It sometime happens that, in violently moving the body, eye-
glasses fall off. For this reason an attachment has glasses fall off. For this reason an attachment has
been devised which can be temporarily secured to the glasses and which converts them into a pair of spectacles. The attachment consists of sprring-arms
extending along opposite edges of the lenses, and
having jaws attached to their ends adapted to embrace
the edges of the lenses. The spring arms are bent to
the edges of the lenses. The spring arms are bent to one side, in opposite directions, so as to throw the jaws
normally out of line with each other, the object being normally out of line with each other, the object being
to enable the jaws to be firmly clamped upon the
lenses.
Censes.
CANOPY FOR BOATS.-John C. Harlow, Janesville, Wis. This canopy is so constructed that it can be
secured at any desired distance above the gunwales or lowered in order to protect the coclpit when the boat is not in use. The canopy is made so that a half-section at either side may be raised to_enable a person to enter or leave the boat.
WIRE-NETTING FOR USE IN MANUFACTURING Paper.-Karl Klfferath, Mariaweiler, Ger many. The rapid wearing away of the wire fabrics
used in carrying the films of pulp has been a great disadvantage in paper-manufacture. It is the purpose of this invention to overcome the difficulty, by pro-warp-threads of which fabric are passed, with respect to the top of the fabric, over one weft-thread and under two of the contiguous weft-threads.
BOX-FASTENER.-Rudolph C. Kuhn, La Crosse, Wis. The fastener is adapted to be applied partially to the body of the box and partially to the cover. The parts of the fastener are so applied that the cover may
be quickly placed in position and securely locked and unlocked. The cover has at one edge bracket-carrying projections upon tts inner face, one member of each bracket being adapted for engagement with the under surface of a cover-projection. The other member of
the bracket is provided with a spur adapted to enter the the bracket is provided with a spur adapted to enter the end of the projection. A lug extending from the end of the lower member of each bracket and beyond the up-
wardly extending member encages a staple on the cover when the latch of the cover is in its full locking position.
Shuttle guard for looms.-Major t. Mel VIN, Fall River, Mass. To provide a shuttle-guar,
which shall prevent the shuttle from leaving the loom, should it fly out of the shed, is the object of the presen invention. The guard comprises brackets having aper tures, a rod secured at its ends by the brackets, and a connecting-piece for the brackets formed at its end in the brackets.
adjustable chair-Dan E. Carter, Traverse City, Mich. By the combination of a stationary fram and an adjustable frame, this chair is adapted for use a couch, or a stretcher. The back, seat, and direct sup port for the lower limbs of the person occupying th chair are made of canvas, which, by means of a rolle may be placed under any desired tensio
COMBINED CLOTHES RACK AND CLOSET. Eugene Chrieten, Decatur, Ind. 'The combined
clothes rack and closet has its back fastened to a support and provided with hooks. A shelf is supporte from the back. Segmental doors hinged to the ends of the back abut against each other at their free ends. Th top of the doors and the shelf are connected with a
flexible cover. A mantle made of two pieces of fabric flexible cover. A mantle
is attached to the doors.
COMBINED CANE AND FOLDING-CHAIR. Niels Christianson, Brooklyn, New York city. Tw half-tubes curved at one end to and hinged together, serve as the casing of the cane and the back of the chair. A seat-bar curved to lie in the crook of each half-tube extends down to about the middle of the tubes, and is pivoted to swing outward, being held in this extended position by a post adapted to lie within the tubes.

## Designs.

Cigar-counter utensil.-William e. Par sons, Jr., New York city. This design provides box of cigars supported by a standard, an alcohol lamp, before which are placed two cigar-lighters, and a cigarcutter
game-board. - Simon M. Lutz, Bedford, Pa This game-board is an ordinary checker-board, havin horizontally at the center of the board. These additional rows are red in color and constitute a red cross.
When upon the red cross, a player is upon neutral round, as it were, and cannot be taken ; he has, more ver, other privileges which may be decided upon before the game.
clock-back. - nathan L. Whedon, Everet, Wash. The leading features of the present design con-
sist in an offset on the back and in star ornamente o sist in an
the surface.
covered dish. - Adolphe paroutaud, New York city. The body of this dish has an npward swell, ornaments. Ribbon-like handles are provided for the body and the cover.
Note.-Copies of any of these patents will be furn
ished by Munn \& Co. for 10 cents each. Please send he name of the patentee, title of the incention, and da

## NEW BOOKS, ETC

Military Notes on the Philippines. War Department. Washingrton, D. C. : Adjutant-General's Offic
vember, 1898 . Pp. 309. 8vo.

An excellent collection of notes compiled from the best data supplied by the military map of the island of
Luzon, plans of the cities and charts of the bays, harbors

Bush Fruits. By F. W. Card. New $\begin{array}{lr}\text { York: Macmillan Company. } & 1898 . \\ \text { Pp. } 533 . & 113 \text { illustrations. } \\ & 12110 .\end{array}$ Price $\$ 1.50$.
This is the sixth volume of what is known as the
Rural Science Series," which is intended to include "Rural Science Series," which is intended to include
books which state the underlying principles of agricul books which state the underlying principles of agricul-
ture in plain yet scientific language. They are suitable for consultation alike for the amateur and professional
tiller of the soil, the scientist or the student. They
are edited by L. H. Bailey, of Cornell University, N. Y., which is in itself sufficient guarantee of the excellence and accuracy of the volumes. The book before us 18
most valuable, and it is an extension of the thesis pre most valuable, and for it an extension of the thesis pre
sented to Cornell for the degree of Master of Scienc and sented to Cornelf for the degree of Master or Science and
gariculture. The author was a bush fruit grower before he was a university student. He is now Professor
of Hoticulture in the Rhode Island College of Agricul of Horticulture in the Rhode Island College of Agricul
ture and Mechanical Arts, so that in this instance a ture and Mechanical Arts, so that in this instance an
ideal combination of the practical man and the scientist ideal combinatio
Boilers and Furnaces. Considered in Their Relations to Steam Engineer ing.
phia By William Barr. Philadel phia: J. B. Lippincutt Company.
1899. Pp. 405,468 illustrations. 8vo.
Price $\$ 3$.
Price
It is a pleasure to examine a technical book which The page is large, the type is clear, the illustrations lucid the text and the tables are valuable. The author is already well known in steam engineering; so that he hardly needs the present book to assure the reader of hi
professional standing. No one is better qualified to trea of the subject. The book is of great value, and will be warmly welcomed by all who are interested in manufac turing or using boilers. It is a book we heartily recom mend to the mecharical engineer.
 8 vo. Profusely illustrated. Price $\$ 3$ The present volume deals with cotton-its use, varie ties, fiber, structure, cultivation, and preparation for the market and as an article of commerce : also the manu
facture of the cotton seed, and fertilizers, with a specia eference to cotton growing, ginning, and oil pressin rector of the London Technical School and is a recos nized expert on the textile industry, both in the United States and in England. Cotton is the greatest of all oughly scientific manner with the interesting problem which the growing, ginning, and shipping of cotton in olve. The volume might readily have been made dul be, but instead it is filied with interesting illustration nd is printed in clear type, admirably illustrated by igh class engravings, although some of the engraving of the machines show their orign, the trade catalogue The text is interesting even to the general reader, and we do not see how anyone who is interested in any way in
the cotton industry can fail to own this really importan the cotto
Prismatic and Diffraction Spectra.
Memoirs by Joseph von Fraunhofer
Translated and edited J. S. Ames
New York : Harper \& Brother
Pp. 68 , plates. Price 60 cents.
Fraunhofer in 1814 worked independently of Wollaston bear his name. The paper of Fraunhofer in which describes the results of his experiments is printed in uil in this volume. The great merit of Fraunhofer work is the systematic, logical method by which he proeeds from investigation to investigation. All moder work in spectroscopy is based upon that of Fraunhofer butions is appended to this volume. We believe that this the first volume of "Harper's Scientıfic Memoirs" we have reviewed. A number of volumes are in preparation which will deal with original memoirs by celebrated phy
Tue
Mree Expansion of Gases. Joule and Thomson. Translated and and London: Harper Brothers. 1898 Pp 106. Price 75 cents.

The present volume is another one of "Harper's Sci intific Memoirs," and the remarks made above upon the work before us. The papers are accompanied by bio graphical sketches of Gay-Lussac and Joule. They will prove of great interest to the physicist.
Fowler's Mechanical Engineering
Pocker Book For 1899. By William
England: $\begin{aligned} & \text { pany. 1898. } \\ & \text { cents. }\end{aligned}$ Pp. 324 . 18mo. Price 60 cents.
'The author is the editor of The Mechanical Engineer which, though started only a short time ago, has already
shaken up the dry bones of English technical journalism. There was an ample field for this newspaper in England, and we feel sure there will be for this new pocket book, which is certainly published in a cheap and useful form. There must be some reason at the present time for
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Sewerage. The Designing, Con Struction and Maintenance of Prescott Folwell. New York: John Wiley \& Sons. 1898. Pp. 381. 8vo. Price $\$ 3$.
For a number of years the author has been looking for the appearance of a work on sewerage which should em-
body the most recent data and ideas relating to the subject and treating of both the combined and supply sys ject and a comprehensive manner, recognizing the fact that such a work is needed hy engineers and engineering schools. We have also looked for a work of this class, and it has not been forthcoming. In view of this fact, the author has undertaken the task of supplying the deiciency. While primarily intended for practicing engiers, the work has also been arranged with the idea terest many engineers who have desired a really modern book on sewerage.
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(7576) J. A. W. asks: 1. Which is the better way to make core of induction coil-of disks of sof iron and tissue paper like an armature core or to
make it of small iron wire? A. The core of an induc tion coil is arranged so that it can be magnetized length wise as easily as possible. It is therefore made of wire extending through it lengthwise. These are shellacked o prevent magnetic continuity through the mass crosswise, so that each wire shall act alone. In the armature core of a dynamo the object is to have the magnetic flu crosswise. Hence, disks of sheet iron are used, and the
flow of magnetism lengthwise is prevented by disks o aper. These arrangements cannot be interchange dvantage in shellacko would be ruined. 2. Is there an insulates the wire. 3. Have you any back numbers wit a good article on coil making? A. A good coil giving PLemen spark is described in Scientific American su Llement, No. 1sis. A smaller coil is to be found in
(7577) J. H. B. asks: 1. Can you tell me how to make a primary battery that will give eight built and run at a reasonable price? A. Five cells of bichromate plunge battery will give you this current See Scientific american Supplement, No. 792, for plans and description of this battery, price 10 cents. 2 .
Can you give me any information or reference where it can be found in regard to phatographing an eclipse of the moon? A. Lunar photography is not different from any other astronomical photography. A good equatori-
ally mounted telescope with clock work is required. tach a camera in place of the eye piece and expose as for any other photograph. We fail to see what advantage there is in photographing the moon in eclipse, since there is less light then than at other times, and the moon
has little light at best. Tudd's "New Astronomy," price $\$ 1.50$, will give you simple instructions for celestial photography.
(7578) J. T. F. writes: Five dynamos, each of 20 lights, are run by five different engines. Can the current from these five machines all be turned into one line and run 100 lights? If so, supposing that one generate a current, are there devices made that will cut it out of the circuit without injury to it or the others? A. The five dynamos supposed in your query may be
connected in parallel to the line, and each will send its current of the same voltage into the line. Such an arrangement is not to be approved. There are numerous automatic cut-outs on the market for breaking circuit,
(7579) F. A. B. asks: Would it not be ust as well oo use a solid iron hoop in place of the iron described on pages 497 to 508 of "Experimental Sci-
dind ence"? A A wrought iron ring may be used in place core.
(7580) E. M. M. asks : How can I con-
amperes to 8 or 9 amperes, so I can charge a storage battery by attaching to the incandescent line? Or give me wish a current of 9 amperes, divide the voltage of the current by 9 . The quotient is the number of ohms of resistance required. You do not tell us the voltage, no do you give the number of cells in the battery to be your question. See answers to query 7232 .


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