
a Weekly journal 0f practical information, art, science, mechanics, Chemistry, and manufactures.

|  | NEW YOPK, MARCH 11, 1899. |  |
| :---: | :---: | :---: |


1.-First-class Battleship "Sissoi Veliky." Also witn modincations, "r'welve Apostles" and "Rostislav."
 rapid-irers, twelve $1 \cdot 8$-inch and four $1 \cdot 4$-inch rapid-firers. two machine guns. Torpedo Tubes, 6 . Complement, $3: 5$. Date, 1894.

2.-First-class Armored Cruiser "Rossia." Class of Three Ships.

Displacement, 12,130 tons. Speed, 20 knots. Maximuin Coal Supply, 2,500 tons. Armor: Belt, 10 inches; deck, $21 /$ inches; bulkheade, 9 inches. Armament, four 8 -inch B. L. rifles, sixteen 6 -inch peed, 20 knots. MIaximuin Coal Supply, 2,500 tons. Armor: Belt, 10 inches; deck, $21 /$ inches; bulkheads, 9 inches. A rmament
rapid-firers, twelve 3 -inch rapid-firers, eighteen 18 -inch and 14 -inch rapid-firers. Torpedo Tubes, 5 . Complement, 725 . Date, 1896 .

NAVIES OF THE WORLD-IV. RUSSIA.-LSee page 152.]

## Srientifir Smmeriam.

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NEW YORK, SATURDAY, MARCH 11, 1899.
ANNUAL REPORT OF THE COMMISSIONER OF PATENTS.
In our issue of January 28 we gave a brief account of the business of the Patent Office for the year 1898 which was based upon advance sheets of the annua report of the Commissioner. We now have before us the full report, a lengthy digest of which appears in the current issue of the Supplement. From the opening summary we learn that the total number of patents, designs, reissues, etc., filed in 1898 was 39,663 , a decrease of 12,456 on the previous year. The total expenditures were $\$ 1,136,196.20$ and the receipts over expenditures were $\$ 1,538.28$, while the total balance to the credit of the Patent Office in the Treasury of the United States on January 1, 1899, was $\$ 4,972,976.34$
The Commissioner acknowledges the granting by Congress of the greatly needed increase in the force of the Patent Office, and states that as a result "for the first time for at least ten years it is unnecessary for a Commissioner of Patents in his annual report to plead for an additional force." Proof of this is afforded by the fact that while on March 15. 1898, there were 14,842 patents awaiting action, by December 27,1898 , only 5.467 applications were subject to delay. The siguificance of these figures, however, is modified by the fact that the business of the office was seriously affected by the war. A similar reduction, due to the civil war, in the number of applications occurred in the year 1861, when there was a reduction of 40 per cent as compared with the previous year.

Commissioner Duell urgently reiterates the request of his predecessors for additional room in which to trans act the business of the office. At present only a por tion of the Patent Office building is allotted to patent business, the legitimate tenants of the building hav ing to share the space with other branches of the Department of the Interior; of which the Patent Office forms a division. The space so allotted is, and for some years has been, altogether inadequate for the growing necessities of the office. The crowding has affected the filing of the records and the printing o needed copies of the patents so seriously that it now
takes days to obtain copies of the patents granted in any particular class which should be obtainable on demand. The obtaining of copies is of vital import ance, both in defending suits or passing on supposed infringements, and as matters now stand inventors' in terests are gravely jeopardized, simply for the want of a little more room in which to carry on the printing, classifying, and filing of the necessary documents. This is a matter for prompt and thorough remedy, and the case can best be met by giving up to the Patent Office the whole of the building which is known by its name

The report contains several proposed amendments to the patent and trade-mark laws. One suggestion is to appoint the Commissioner and Assistant Commissioner for a stated term of not less than six years. Since the year $18 \pi 0$ the average term of service has been only two
years. This quickly recurring change is certainly not conducive to "stability of office practice."
As we are just now seeking certain important concessions from some foreign countries, the amendment permitting aliens to file ca
as little delay as possible
But the next amendment, providing for the publi cation of three thousand additional copies of the Official Gazette, is decidedly objectionable. These additional copies are to be given to Senators and Representatives for free distribution among [the faithful] manufacturers and mechanics [of their constituencies]. We believe that this political alms giving is thoroughly bad in principle, whether it takes the shape of "free seeds" or free Gazettes The price of the Gazette is entirely within the means of all who have need of it, and why John Doe should have to pay for his copy and Richard Roe secure his for nothing is an ethical mystery which the movers of this amendment are requested to solve.
We are pleased to learn from the report that the commission appointed by the President on July 7 last to revise the statutes relating to patents, trade and other marks, and trade and other commercial names,
will submit a proposed trade-mark law, which will provide for the registration of trade-marks used in interstate commerce. At present, before a trade-mark can be registered, it must be put into use in trade with one or more foreign countries or Indian tribes. It is hoped that the law will be modified so as to allow the use of a trade-mark in this country without any refer ence to foreign countries or tribal Indians. There i also room for improvement in the matter of fees, the present fee of $\$ 25$ being obviously excessive.
In concluding his report Commissioner Duell makes an eloquent plea for the full recognition by the government of the leading part played by the Patent Office and the inventor in the promotion of American industries. We fully agree with him in his conviction that, in view of the fact that we owe so much to ou inventors, the government has hitherto doue comparatively little to encourage them in their work. The Patent Office is more than self-sustaining, and all that the inventors and manufacturers ask is that the money paid into the Treasury shall be used in providing the needed facilities for carrying on the work of the office

## the government as an advertising agency

The bill introduced by Senator Burrows prohibiting the insertion of business advertisements in any officia publication of the government is aimed at such abuses as have been practiced in connection with the printed matter of the Bureau of American Republics. This organization. which was formed for the ostensible and very laudable purpose of promoting trade between the United States and the South American republics, has been in the habit of inserting paid advertisements in The Monthly Bulletin and what it calls The Commer cial Directory. The former contains miscellaneous in formation of a kind which is useful to the wholesale retail, and columission merchants. While it is per fectly unobjectionable in its reading matter, as
soon as it solicits advertisements from the public it soon as it solicits advertisements from the public it
loses its original character and becomes at once a com wercial enterprise and a direct competitor with the trade journal, whose field of usefulness it consciously or unconsciously usurps. The Commercial Directory again, uses the august influence of the government to impel commercial houses to place their names upon its lists at the rate of so many dollars per insertion. With all the "drawing" power of the government behind them, it is not surprising that these ventures have proved to be lncrative, the annual report showing a balance in hand.
It is gratifying to realize that the impropriety of the government going into industrial enterprises and be coming a commercial rival of its own citizens is being rea'ized by Congress, and it is hoped that a stop wil now be put to a tendency which is, beyond measure a menace to the commercial rights of the people There is no more reason why the government should compete in the publication of books and business direc tries than that it should undertake the manufacture of corsets or engage in the sale of chewing gum. Such work should be left to the enterprise and industry of the people, who will be deprived of legitimate means of livelihood in case the United States government with the financial support of the whole nation be hind it, becomes their rival and competitor

## an american canal at panama

The desire of the American people to have a canal at the isthmus built with their own money and perfectly proper. In a recent editorial upon the canal question The London Times says. "We are quite ready to admit that while our interests in the canal cheme are large, those of America are vital," and what s openly and frequently acknowledged by England is tacitly admitted by every civilized people throughout the world.
The strength of the recent movement in favor of building a canal at Nicaragua has lain in the mistaken impression that the Panama Canal scheme was a gov ernment enterprise and must therefore be built with French capital, controlled by French influence, and guarded by the military forces of France. If the scheme, indeed, were so entirely under the control of a foreign government, the Scientific American would be mong the first to advocate the building of an inde pendent canal, even though, as at Nicaragua, it should be greatly inferior, judged from an engineering and commercial standpoint. As a matter of fact, however the new Panama Company is a private corporation and its operations at the isthmus are no more controlled by the French government than the English owned mines and factories in this country are The Panama Comp The Pana United Star-general, has made a proposition to th the bugaboo of foreign control, and leaves the way open for this country to step in and push the Panama Canal to completion, securing for itself at the sam time every rightful advantage which could be gained by the construction of the Nicaragua Canal.

The offer made by M. Hutin is as follows: "While the new Panama Canal Company does not seek any government aid, it recugnizes the national sentiment n favor of acquiring some pecuniary interest in any canal connecting the Atlantic and Pacific Oceans Therefore the new Panama Canal Company declares that if, as the result of any investigation, the govern ment of the United States adopt the Panama route the company, if the government so desires, will rein corporate under the laws of the State of New Yori (under the laws of which State the Panama Railroad Company has existed for nearly fifty. years) or of some other State of the Union, subject to the provisions of its concession, and vest its concessions and property in such corporation. It will also in said event accord to the United States such representation in its board o directors and such opportunity to acquire an interes in its securities as may be permitted by its concessions, which, of course, must be scrupulously observed."
The most important stipulations of the concession ere mentioned are article 5 , which assures the neu trality of the canal, and article 6 , which states that the passage of the canal is strictly closed to war vessels of nations which may not have secured by treaty with the Colombian government the right to pass through the canal at all times. The United States is the only nation to which this right has been granted, and thi was done in the treaty of 1848 , in which we guaranteed the neutrality of the isthmus for all time
Looking at all the circumstances, it will be seen that his offer of the Panama Canal Company invests the canal with every political advantage which could b afforded by a canal at Nicaragua : and this fact, coupled with the enormous engineering and operating superi ority of the shorter route, points to the completion of the Panama Canal as being the course most consisten with not merely our own interests, but the interests of the world at large.
At the same time we should " make haste slowly" in a matter involving such vast interests, and we think th decision of Congress to investigate the comparativ advantages of the two routes, indicates the next and most obvious step to be taken at the present junc ture.

## THE SENATE AND THE NAVY APPROPRIATIONS.

We are glad t attempt to cut down the appropriations for the nav to an extent that would have caused several of the ships now in commission to be laid up. while the num ber of new ships to be added to the navy would hav been reduced from twelve to six.
While we have no wish to criticise the actions of the Senate, who have, no doubt, in this, as in all other leg slation of the kind, acted for what they conceive to be the highest interests of the country, we greatly regre hat a reduction of appropriations should have been at tempted in this particular direction. The recommenda tions for the increase of the navy were based upon the fact that the Spanish war has greatly multiplied the esponsibilities and duties which devolve upon the havy. With the acquisition of Puerto Rico and the Phil ppines our vulnerable coast line has been extended a thousand miles into the Atlantic and six thousand miles into the Pacific. and a navy that was scarcely adequate to the defense of our own mainland must be greally augmented if it is to guard the scattered pos essions, the thousand and one islands, which have come into our keeping as the result of the war.
It did not strike us that the requested authorization of a dozen ships was more than sufficient to meet the new conditions which we have now to face. The ships noreover, were specially designed for work in tropica and southern seas, and at long distances from our oasts. To this end they were of great coal capacit and were in every case to be sheathed with copper Perhaps the Senate thinks that our present ships wil erve for foreign service just as well ; but they woul not. The battleships have not the desirable coal capa city, and, being unsheathed, they will have to make fre quent visits to the dry-dock. It is a matter of histor that when hostilities were pending, the voice of the Senate was strongly for war. and it is also a fact that our retention of the Philippines was strongly advocat d by the same body; hence it came in the nature of rude surprise that the Senate should have shown disposition to so far repudiate its own policy as to refuse to vote the needful appropriation for carrying that policy into execution.
No one could be more opposed to an unnecessary in erease of armaments than the Scientific American and we consider that the size of our naval and mili tary forces should be determined strictly by our actual necessities. A navy is large or small according as it exceeds or falls short of these necessities. A few year ago the United States navy was so inadequate as to be almost ridiculous. In the fifteen years previous to the late war we had brought it up to a fair standar of strength; but the war has so far added to our re ponsibilities that we need to make a considerable in crease-at least as large as that now authorized by Congress-if we are to keepour navy up to its prope standard.

NUTRITIVE VALUES OF HUMAN FOOD. It is certain that the majority of men are more conerned with the palatability of the food they eat than they are with its nutritive value. For the gourmand (happily a rarer individual than he was a century ago), the toothsomeness of his viands is the first and only, consideration, and their nutritive qualities are only suggested to his mind, and then painfully, by the ultimate and unmistakable evidence of corpulence and the gout.
Probably the only people in our midst who seriously consider the question with a view to giving it practical application are the athletes, all of whom, as a rule, know something about the relative fat and muscleproducing qualities of the standard articles of diet. Some few years ago Congress appropriated funds to enable the United States Department of Agriculture " to investigate and report upon the nutritive value of the various articles and commodities used for human food." Careful work along this line has been carried on during the past three or four years in the New England and other Northern States, and with a view oomaking the investigation as representative as possible and securing definite information regarding the food supply and consumption of people living under different conditions, it was decided to seiect the University of Tennessee, at Knoxville, as a representative place for the study of food nutrition in the Southern States
Prof. Chas. E. Wait, in the University of Tennessee Record, gives a valuable paper describing the results of interesting work recently published by the Department of Agriculture in its second bulletin on the subject. The paper is given in full in the current issue of the Scientific American Supplement. The investigations included dietary studies of students' clubs and mechanics' families in Tennessee; studies of the composition of Tennessee beef, mutton and chicken, and over a score of digestion experiments on healthy men.
The plan of the dietary studies includes the deter mination of the amounts and kinds of food bought and eaten during a stated period (from seven to thirty days), by a family or boarding club: the analysis of the food wasted, the record of the age, sex and occupation of the different subjects and the numker of meals eaten by each. From the data so obtained, the actual amounts of nutrients contained in the foods were calculated. From these amounts were deducted the amount of nutrients in the waste. It is interesting to note the factors assumed in calculating meals consumed in these studies. One meal of a woman or of a boy 14 to 16 years of age is equivalent to 0.8 meal of a man at moderate muscular labor. Onє meal of a child 6 to 9 years of age is taken as equivalent to 0.5 meal of a man, while an average child under 2 years of age eats about $0 \cdot 3$ as much at a meal as a man engaged in moderate muscular labor.
Three of the studies given in the report represent the food consumption of families of mechanics,' who were engaged in more or less active muscular work, which was moderately severe. Five of the studies are of clubs of college students, that is, persons engaged in mental rather than in muscular exercise. The tables show a considerable variation in the amount of protein actually consumed per man per day by the college club, ranging from 66 to 123 grammes, with an average of 92 grammes. The available energy or fuel value, however, was much more uniform, ranging from 3,450 to 3,650 calories, with an average of 3,545 calories per man per day. The daily waste of protein averaged 11 grammes or 11 per cent of the amount purchased, the waste of fuel ingredients being about 7 per cent.
The proportion of protein and the fuel value in the food of the mechanics' families was slightly larger than in that of the students' club, while it was found that the protein and energy of the dietaries examined in Tennessee differed but little from those of clubs and families examined in other parts of the United States.

The experiments to determine the composition of different kinds of meat showed that Texas range beef was the leanest of those tested, with Tennessee beef next, there being but little difference between the two. Next came the beef from the Colorado ranges, followed
by that raised in New England. By far the fattest beef came from the grain-producing States, Illinois and the neighboring region, this last containing 250 per cent more fat than the Tennessee beef. The Southern and Eastern meat is superior in protein to the Western beef, but as regards the energy it is greatly inferior. Comparison of a side of Tennessee mutton with Western mutton showed
than the local meat
Perhaps the most interesting investigation recorded in this report is the digestion experiments. The results are summarized in a table (for which and the other valuable tables the reader is referred to our current SuPplement) which brings out some very surprising facts. We learn, for instance, that the copular belief that a mixed diet is preferable to a diet composed of only one or two fools is fully indorsed by this scien
tificinvestigation, as the following facts will show : The
average of ten experiments with an exclusively milk average of ten experiments with an exclusively milk
diet showed $92 \cdot 1$ per cent of the protein and 86.3 per diet showed $92 \cdot 1$ per cent of the protein and $86 \cdot 3$ per
cent of the carbohydrates to be digested. Five expericent of the carbohydrates to be digested. Five experi-
ments with an exclusively bread diet or with bread and sugar showed 82 per cent of the protein and 99 per cent of the carbohydrates to be digested. On the other hand, five experiments with a diet of bread and milk showed 97.1 per cent of the protein and 98.7 per cent of the carbohydrates to be digested. That is to say, the protein in milk alone or in bread alone seems to be much less completely digested than when the two are eaten together. It has yet to be proved that similar results would follow if other food materials were made the subject of comparison ; but the general conclusion is drawn by the author of this very interesting paper that more complete digestion would occur when the diet was nearly normal, that is to say, made up of a number of food materials.

## OUR CONSULAR SERVICE IN RELATION TO AMERICAN

 MANUFACTURES.American manufactures seem likely to make their greatest record in the fiscal year which will end on June 30 next. Advance reports show that in the last seven months the exportation of domestic manufactures is $\$ 23,000,000$ greater than the highest record ever made in the corresponding month of any fiscal year. During the seven months ending February 1, 1899, the exports of domestic manufactures amounted to over $\$ 182,000$,000 , or an average of $\$ 1,000,000$ a day for every business day of that period. A decade ago the imports of manufactures were more than double the exports of manu factures; now the exports of manufactured goods are twenty-five per cent greater than the imports of manufactured articles. In ten years exports of the articles which we are considering have increased from $\$ 78,751$,433 to $\$ 182,336,503$, and our magnificent trade balance is to-day the envy of the world.
The government of the United States has very wisely adopted a plan of obtaining information from abroad which is simple and which is working admirably. The various officers of the consular service are instructed to notify the Department of State of any opening for American trade, any large contracts to be awarded. and matters of a like nature; besides, they give news of new industries, valuable statistics, and information as to trade methods in vogue abroad. These reports are printed daily in what are called "Advance Sheets of the Consular Reports," which are issued to the press and interested parties, and each month they are gathered together in a neat little magazine called "Consular Reports."
At the present time the United States has 39 consul generals, 260 consuls, and 33 commercial agents, 332 officials in all, who are gathering information in all parts of the world, in addition to the other duties which per tain to their office. These gentlemen are many of them trained business men, who are quick to seize upon the significant features of trade, and who are of their reports is freely acknowleged by foreign gov ernments. We have deemed the reports of our consuls abroad to be of such importance, in view of our constantly increasing foreign trade, that we have decided to establish in our SUPplement a new department, where many of these reports will be published in full, or where, owing to their length, it is not possible to do this, a careful abstract will be made. We feel sure that this feature will be appreciated by the readers of our Supplement, and doubtless many who are not at present regular subscribers to the Supplement would be glad to become so, owing to the importance of this new feature. We shall also publish consular reports which do not deal specifically with trade, but with new industries, etc., both in our Scientific American and our Scientific American SuppleMENT, as has been our custom heretofore.

## COST OF ELECTRIC LIGHT.

In the judgment of many persons the incandescent form of artificial light.
This opinion is due to the fact that incandescent light is more like sun light than that of gas, and also to the absence of combustion, with its consequent gases and odors and fire risk.
The increased cost of electric light over gas, when taken from public supply, is, without doubt, the main hindrance to its greatly extended use, and a glance at comparative figures shows the difference in cost for many cases to be considerable.
Gas at one dollar per thousand feet costs one mill per cubic foot, and as a regular gas burner requires five cubic fect per hour for a nominal sixteen candle
power light, the cost per burner is five mills per hour. The cost of incandescent light to the consumer varies much in different places and even between different cases in the same place.
There are two ways in which the charge for electric per lamp hour and an agreement as to the number of
hours per day or month the lamps shall be presumed to have burned. Under this arrangement it is usually impossible to tell beforehand whether the supply company or the consumer has the worst end of the barrain. The other and more satisfactory way to regulate the charge for electric light is by meter, and the meter records the actual electric energy used, and no more. It is the fairest method for both parties. A charge of a certain sum per lamp hour is known as a contract rate, and is based on one cent per lamp hour in many cases, though it may be higher and is frequently iower than this.
The unit of electric energy measured by the meter is the watt-hour, and a charge of fifteen cents per one thousand watt-hours is common, though contracts covering service for a large number of lamps can usually be made at a better figure. Incandescent lamps of sixteen candle power can be had from the large makers at twenty-five cents each in small lots and at twenty cents each in lots of two hundred; from the small makers these prices can be improved on by several cents per lamp. In nearly all large cities and many small ones electric current is sold on the meter method, and the cost of light to any consumer will depend to a large extent on the efficiency of the lamps he uses. By the efficiency of a lamp is of course meant the power or watts required to run it compared with its candle power. Incandescent lamps of sixteen candle power look much alike, but they vary fuily forty per cent in the watts required for the same light. Thus, sixteen candle lamps may be had from the same makers at the same price which require from fifty to seventy watts to operate per lamp. To get the more efficient lamps it is only necessary to so order, and then, if their quality is doubted, have a test made by a disinterested engineer. At the rate of fifteen cents per thousand watts per hour, the cost per hour for a fifty watt lamp will evidently be seven and one-half mills, or one and one-half the cost of gas, while for a seventy watt lamp the cost per hour will be ten and one-half mills, or slightly more than twice the cost of gas. A large per cent of the charge for operating incandescent lamps may thus be saved by using only those of high efficiency.
If the light from an incandescent lamp remained constant until the lamp gave out, the only thing necessary for economy would be to select the most efficient lamp; but, unfortunately, the light decreases rapidly in amount as the lamp grows older, while the power required by the lamp remains nearly constant. It is common for incandescent lamps to burn as long as one thousand hours, and many lamps, after burning this long, give less than half the light given at the start. The cheapest thing to do with a lamp that has fallen as much as twenty per cent in candle power is to destroy it and put in a new one, as the cost of a lamp is small compared with the cost of energy required to operate it during its life. Consider a seventy watt lamp that has burned one thousand hours. It has evidently consumed seventy thousand watt-hours, which, at fifteen cents each, have cost ten dollars and fifty cents. The lamp cost twenty cents.
Again, take a fifty watt lamp that has burned eight hundred hours. Forty thousand watt-hours have been consumed, which, at fifteen cents, amount to six dollars, the cost of lamp being again but twenty cents. In the first case the cost of lamp is about two per cent and in the last about three and one-third per cent of the energy consumed. Were fifty watt lamps burned only four hundred hours and only three-fourths as many used as when burned for eight hundred, more light would be had at a less total cost. The fact that consumers put up with electric lamps that have burned eight, ten, and even twelve hundred hours and lost fully half their candle power, shows that a sixteen candle power lamp is not required in many places, and this is confirmed by the many gas jets which, through poor gas or dirty pipes, give but ten or twelve candles.
It can also be shown that the great advantage of the electric light is in its quality rather than its volume, which, together with above facts, leads to the conclusion that a smaller lamp, say of ten candle power, could well be used instead of the sixteen candle incandescent lamp in many places, at a large saving in cost of operation. Above opinion is strengthened by the very general use of the ten candle incandescent lamp in England and the continent of Europe, for places where the sixteen candle lamp would be used by us. Ten candle power lamps can readily be had that require but thirty-five watts, costing, at fifteen cents per thousand watts per hour, but five and one-quarter mills per lamp hour, or about that of gas. These ten candle lamps, if burned only two or three hundred hours each, give about the same average light as the sixteen candle lamp burned eight hundred hours, and at about two-thirds the cost.

The Congressional Library at Washington has a set of The London Times from 1796. It is not strange that a file of this newspaper is now of great value, for in 1800 only 1,000 copies were printed. The set in the Boston Public Library dates from 1808 and consists of two hundred and thirty-two bound volumes.

WAX WORKS AT WESTMINSTER ABBEY. Westminster Abbey is the last place where one would expect to find a collection of wax works, and many of those who know the Abbey quite well will be surprised to learn that the historic building contains a collection of wax works of absorbing interest, and of greater authenticity than those exhibited at the celebrated Madame Tussaud's, also in London. Either becauso the authorities of the church are ashamed of this collection, or because they fear to have it injured, it is shown only on the free days by an order from the Dean. The collection is preserved in a chamber or gallery over St. John the Baptist's Chapel and access to it is gained by a modern flight of stairs which cover the ancient stone steps. They lead to the old oratory, or chantry chapel, where the wax effigies have been col lected since about the beginning of this cen tury. They are preserved in glass cases and are vulgarly known as the "Ragged Regi ment," and also as the "Play of the Dead Volks."
The additions to this rather incongruous side show occurred only after the death of the illustrious people they represented. The unerals of notable men and women gener ally took place by torch light, and it wa not until the eighteenth century that it wa abandoned. To the spectators of these pro cessions the chief object of interest was not the coffin of the deceased, but the "herse" which was borne before it. This name has nothing to do directly with the funeral car riage of to-day, but the name of the modern vehicle is derived from the older "herse," which was a wooden platform decorated
with black hangings bearing a waxen image of the deceased whose remains were about to be consigned to the tomb. The head of the defunct monarch, statesman, or warrior was modeled in wax, and an effigy was built up and clad in the actual garments worn by with false gems. When the coffin had been deposited in the vault, the wax effigy was either placed over the tomb as a sort of temporary substitute for a stone monument or in some other convenient spot.
They usually remained as a pageant in the Abbey for about a month; in the case of sovereigns, for a longer period. In the Abbey the royal effigies can be traced back to the fourteenth century. The origin of the custom is unknown, but it is surmised that it was derived from the Roman habit of introducing into the funeral procession of a notable a lay figure representing the ancestor of the deceased. The old English had a mania for making wax figures, and the populace was always sure to turn out en masse when it was known


Duke of Buckingham.
that there would be an effigy in evidence. There could be nothing more incongruous and grewsome than the appearance of the Abbey when these figures were scat tered around, but now they are preserved like zoolog ical specimens, which takes away from their horror and they are only interesting and amusing. The wax images which now exist are eleven in number, and the attention is naturally directed to that of Queen Eliza beth. The weird figure sits bolt upright, bedecked with quantities of paste jewels, and in her right hand she holds a scepter and in the left an orb. Her shrew ish face, as represented in the effigy, would undoubt

Queen Elizabeth.


King Charles II.
WAXEN EFFIGIES IN WESTMINSTER ABBEY.

ent. This is Edmund Sheffield, the last Duke of Buck ngham, who died in Rome in 1735.
Nelson's effigy is said to have been taken from smaller figure for which he sat, and the clothes, ex cepting the coat, were those which he actually wore, and when Maclise painted the "Death of Nelson," he borrowed it to copy. It is a curious fact that he found the eyepatch still attached to the inner lining and the stamp always found in old hats of that period in the crown. The makers were obliged to put it in to show that the "hat tax" had been paid. The face is pale and worn and has a sweet expression. On the left
edly be an arch-authentic portrait if it were not for the fact that the figure was restored in 1760, so that the face is probably a copy of that on her tomb. The original figure which was carried at her funeral was quite worn out in 1708 , the only remains of the robes being "a dirty ruff." At any rate, the restorers were true to tradition, because her majesty is attired in an extravagantly long-waisted dress with which her num erous portraits have made us familiar, and springing from the bodice is a pair of immense panniers which support a ponderous velvet robe covered with gold em-
breast are a galaxy of stars and the right sleeve of the coat is armless. The burial of Nelson in 1805 in St Paul's Cathedral drew such crowds of people there and away from the Abbey that, as a counter attraction, the Admiral's effigy was made and set up among the wax works, with the result that the crowds returned to Westminster. This was certainly very discreditable to the Abbey officials. Still, however Nelson seems to have looked forward to arave in the Abbey; for, have looked forward to a grave in the Abbey; for, at men as they boarded the "San Josef" with the cry "Westminster Abbey or glorious victory !" Among the other effigies which are dis played are Queen Anne; Williain and Mary Catherine, Duchess of Buckinghamshire Frances. Duchess of Richmond; the Earl of Chatham ; and General Monk. Our engrav ings are made from photographs taken by H. C. Shelley and originally published in Black and White.

## Nuts as a Diet.

Physicians in different parts of Europe have been experimenting as to the nutritive and medicinal qualities of all kinds of nuts, and in some cases have advanced views favoring the use of nuts as food under cer tain conditions for special diseases. It is said that nuts contain a special kind of sal especially adapted for lubricating or soften ing the muscles of the arteries. Some phy sicians claim that elderly people especially would be benefited by a more extensive nu diet. The only evil to be overcome is that the nuts are difficult of mastication, which process must be thoroughly performed, so
oidery, and around her neck is a curious spreading long, straight, stiff bodice, made stiffer and heavier by a mass of rich silver embroidery. At a respectful dis tance from the mighty queen is Charles II He is certainly the most amusing effigy in the collection. He certainly the most amusing effigy in the collection. He
looks as though he were in the last stages of inebriety, and as the face was probably modeled from death, it is of historic importance. The "Merry Monarch" is clad in a curious robe of red and blue velvet, sorely faded from its ancient splendor; his profuse locks are topped by a limp-looking hat with a tawdry feather. The effigy of Charles II. stood for two centuries over his tomb in the south aisle of the Henry VIII. Chapel, and formed his only monument. The words which will be noticed across the picture were written on the glass by the diamonds of admirers, and if this is any proof of popularity, the "Merry Monarch" retains his winning ways even as a wax figure. The most dignified figure ways even as a wax figure. The most dignified figure
is that of the Duke of Buckingham, which is recum-
that no hard pieces may enter the digestive organs.
In France the absence of Indian corn as an article of diet among the poorer classes is to a certain exten replaced by the popular chestnut. The peasants of hat country eat walnuts with bread that has been meared with garlic, of which diet the hygienic been meared with They also make bread of chestnuts. After blanching the nuts, they are dried and ground into a kind of flour from which a sweet heavy flat cake, resembling the oaten cakes so popular among the Scotch peasants, is nade
The pine nut of Korea, which is very rich in oil is supposed to be strengthening, for which reason it as well as the chestnut, is given to Korean children of weakly condition. The Koreans have also a nut that resembles in appearance our beech nut, having a white shell. It is called "uhn hang," which is translated in the dictionaries as Salisburia adiantifolia, or gingko in the dictionaries as Salisburia adiantifolia, or gingko
nut. This is roasted and used for food, and is also


Admiral Nelson.
very largely used in its raw condition as a remedy for coughs. - The Medical Herald.

THE atmosphere of London is particularly bad for tatuary. It covers everything with a layer of black and even corrodes stone. This was recently noted on St. Paul's Cathedral, where the heroic statues of the A postles on the coping are in a very bad state of decay. A close examination reveals the fact that they are pitted as if eaten by worms, and three of them were in such bad condition that they had to be firmly clamped and braced to prevent them from falling to the street.

## $\triangle$ NEW DOUBLE-ACTING PUMP

An efficient double-acting pump has been invented and patented by Mathias L. Koogler, of De Graff, Ohio, which presents various novel features of constuction. chief among which is the ready accessibility to all working parts.

The pump-barrel is made in two sections, which are joined together by a suitable connection, and which communicate with each other. The lower barrel-section is provided at its lower end with a valve controlling the admission of water to the barrel. The connection between the two bar-rel-sections carries a joint ring having orifices communicating with the exterior; these orifices are commanded by a valve seated on the joint ring Above the joint-ring valve a check-valve is mounted on an adjustable gland.
The pump-rod is hollow and extends longitudinally through the barrel-sec tions. At its lower end the rod carries a plunger provided with a valve controlling the admission of water. At its upper end the rod is formed with aper tures opening into a con duit-pipe secured on the upper barrel-section.
In operation the pump s so placed within the wa ter to be raised that the valve on the joint-ring will be below the surface of the water. On the up-stroke of the pump-rod, $t \mathrm{~h}$ plunger valve will be closed and the valve in the lowe barrel-section opened thereby drawing water in to the pump-barrel. The subsequent down-stroke of the rod will open the plunger-valve and close the barrel-valve, thus causing the water to be forced through the plunger-valve into the rod. After one or two reciprocations the rod wil be filled, and the water discharged into the conduit pipe through the apertures in the upper portion of the rod The down-stroke of the rod will produce a partial vacu um in the barrel-sections, thus causing the valve on the joint-ring to be lifted and drawing water down into the lower barrel-section. The next up-stroke will close the joint-ring valve and open the check-valve, to force the water out, the check-valve being closed on the next down-stroke of the rod. A continuation of the operation will cause a large amount of water to be elevated in a short time

## Poisonous Clothing.

A number of laborers employed on the street clean ing force of Birmingham, England, were provided with new overalls and overcoats. The men were employed one day in cleaning away snow, and some seventy of them began to experience a severe itching of the skin and a general irritation, and this outbreak was soon traced to the clothing, says The Druggist Circular Owing to its deliquescent nature, chloride of zinc is not a substance. one would expect to find used as a filler of clothing, but it was found that the fabric con tained a liberal amount of this salt, !and on account of moisture present in the air on the day referred to, it was freely dissolved, for the solution had reached the skin. About one-half of those who were made ill by the clothing soon recovered, but the remainder re ceived injuries of a very painful character. It has also been found that a sample of flannelette was examined and it was found to be loaded with zinc chloride.

## Discoveries About Jupiter.

Prof. George W. Hough, astronomer at the Dearborn Observatory, Evanston, Ill., has made public a new discovery in regard to the surface rotation of the planet Jupiter which is at variance with existing beliefs. It is the general tenet of astronomers that the surface ro tation of the planet Jupiter is similar to that of the sun being quickest near the equator and slowest in the higher latitudes near the poles. Prof. Hough, basing his observations over a period of twenty years, an nounces his belief that the surface of the planet Ju piter rotates upon its axis in separate envelopes or strata. He has further discovered, by a long series of observations, that the spots shift in longitude as wel as having a rotary movement, and this also support the ring or strata theory, evidencing the great insta bility of the surface, and strengthening Prof. Hough's belief of many years, that Jupiter is in a gaseous or plastic state.

Hotel Accommodation in Porto Rico.
United States Consul Hanna, of San Juan, Porto Rico, is constantly in receipt of letters from citizens from all parts of the United States, regarding hotels and hotel accommodations in Porto Rico. He concludes from these letters that many people have their eyes turned toward Porto Rico as a desirable winter resort He feels compelled to state that hotel accommodation is quite limited and that accommodations are far from first-class. The hotels are few in number and are gen erally run on the Spanish plan. The hotel rooms are as a rule, small, plainly furnished, and are generally lighted from the inside courtyard, with no outside win dows, and only a few rooms in each hotel front on the street. The cuisine is usually in Spanish style. The present rates are moderate. Before the American went to the island, family boarding houses were un known, but now they are springing up in all parts of the island. Some of them have American cooks and laim to serve their meals in Americin style Port in is in the Rico is in need of some good American hotels, and
doubtless they will be built as soon as the heavy duty doubtless they will be built as soon as the hea
is removed from American building material.
is removed from American building material.
The winter climate of the island is delightful and, ombined with the tropical scenery and healthy loca tion, the new possession of the United States cannot ail to become a most attractive winter resort, if good hotel accommodations are provided, and doubtless this will come in a short time.

## A PNEUMATIC BAGGAGE HANDLER.

When we see heavy trunks by the truckload brought up to the side doors of baggage cars, and the hurried work of transferring them begun, we have often wondered why practical mechanical devices had not been invented to facilitate this transfer. Baggagemen in this country have attained an unenviable reputation as destroyers of trunks, but after all it may be ques tioned if they are so much to blame, when we consider the enormous weight and size of some trunks of the o-called "Saratoga" order. The device which we illustrate is of considerable general interest, and would certainly do away with the evils of baggage smashing and, of course, heavy baggage could be handled much wore rapidly by means of this device than by hand The device consists of a hoist which can be thrown into action from the door of the baggage car. It con sists of a hoist operated by compressed air which i drawn from the trainline to a special reservoir, and i handled by train baggagemen by means of suitable cocks on the inside of the car; it has a lifting capacity of 500 pounds and is operated with an air pressure of 70 pounds to the square inch. Our engraving represent 218 pound trunk being raised by it. An auxiliary pring scale device is located at about the center of the vertical length of the baggage support. This provides for weighing the baggage as it is handled. The devic in use on the Grand Rapids and Indiana Railway nd we are indebted to the inventor, M. G. H. Wall, of Cadillac, Michigan, for our photograph and the fore oing particulars.


PNEUMATIC BAGGAGE HANDLER

A NOVEL METHOD OF CONVEYING FREIGHT. The device illustrated in the annexed engraving is a freight-conveyer which may be readily operated by a single man to transport loads from one place to an ther, and which is especially designed to be used in connection with the handling of building material, in brick and stone yards. The conveyer consists of a raveling crane carrying a truck from which the reight tran eight-transporug devices are suspended. One wheel hatt of the triok ng with a pinion on a shaft projecting from the truck and carrying a wheel about which there passes an end less chain. By pulling upon the chain, the truck can be moved to any point upon the crane. On the truck a frame is hung by means of a swivel-connection


A NOVEL METHOD OF CONVEYING FREIGHT.
r vertical pivot, and upon this frame, inclined tracks are arranged. Rollers provided with carrying-rods run upon these tracks, the carrying-rods being formed with hooks at their lower ends, to sustain the freight whic is to be transported. Upon the frame a windlass is mounted. Cables surround the windlass and pas about the rollers of the carrying-rods. By means of the cables and the windlass, the rollers are caused to travel up and down the inclined tracks. The windlass is operated by a handwheel through the medium of gearing, and is provided with a brake whereby the oad may be gradually lowered. When the hand whee of the windlass is operated, the cables will be wound up; the rollers will run up the inclined tracks; and the carrying-rods will elevate the load. By pulling upon the endless chain previously mentioned, the truck wil be moved to the desired position upon the crane When the crane has carried the freight-conveyer to the desired spot, the load can be gently deposited by means of the windlass and brake. The device is not limited to any special purpose, but is adapted for use in any place where large quantities of material are to be handled. The inventor of the conveyer is M r Michael Butler, of Austin, Tex.

## The "Reina Mercedes" Floated.

The "Reina Mercedes," which was sunk in the channel of Santiago Harbor during the bombardment of Santiago by Admiral Sampson's fleet on June 6, 1898, has been raised and pumped out, the government tugs assisting the wrecking company. She was brought to Santiago on the afternoon of March 2 Such repairs as can be readily effected will be made a that city, and she will then probably be towed to Ha vana. Final orders for her movements have not as yet been received.
The "Reina Mercedes" is a steel cruiser of 3,000 tons displacement ; she was built in Cartagena in 1887 ; she is 278 feet 10 inches long; beam, 42 feet 7 inches; draws 16 feet 5 inches of water; her engines are 3,700 indicated horse power. Prior to the bombardment her boil ers had given out and were practically useless. Of late years the "Reina Mercedes" was used as a transport. She had no protective deck and her armament consists of six 6.2-inch Hontoria guns ; two 2•-inch Hontoria guns; three 6-pounder quick-firing guns ; two 4-pound er quick-firing guns; six 3 -pounder quick-firing guns two machine guns and four torpedo tubes.

The Care of Children in German Schools.
A resolution has just been passed by the City Council of Wurtzberg, Bavaria, which is worthy of emulation According to this resolution, the teeth of poor pupils of public schools of the city are to be examined and cared for free of cost, provided their parents give their consent. It is intended to treat diseases of the ear and throat in a like manner, should the first experiment prove successful. It is probable that with slight ex pense the teeth of the children may be attended to so that if the latter live they will not suffer from dys pepsia owing to improper mastication.

## THE MAREORAMA.

One of the attractions of the Paris Exposition of 1900 will be M. Hugo d'Alesi's "Mareorama," the principal feature of which will consist of a large ocean steamer, the passengers upon which will have an opportunity of making a voyage from Marseilles to Constantinople; that is to say, an imaginary voyage, since the vessel will not move forward at all, the illusion of sailing being produced by an arrangement that has already been employed upon the spectacular stage. The vessel will be mounted upon a spherical pivot, and the only motions that it will have will be those of pitchingland rolling, which will be given it through the maneuvering of four pistons. It will be surrounded with genuine boiling and foaming water; and in the ventilators will be placed seawrack and algæ, traversed by a current of air that will become impregnated with marine odors.
The spectators, or the passengers rather, will walk about at their pleasure or sit at ease in rocking chairs upon the deck, which will reproduce that of a genuine steamer with the minutest accuracy, with all the details of masts, rigging, smoking and vibrating funnel, and a crew executing various maneuvers at the command of an experienced captain. At the same time, to the starboard and port of the vessel will unroll can vases fifty feet in height, painted with all the perfection that might be expected from the brush of M . d'Alesi, and representing the port of Marseilles flying to the rear, Frioul, Chateau d'If and fishermen's boats, and then the high seas and the Algerian and Tunisian coasts to ward which the vessel will be apparently steering. Over half a mile of canvas will unfold all the sites and episodes of this picturesque voyage. Everyone is acquainted with the phenomenon; the displacement of an object which occupies the entire field of vision gives the stationary spectator the impression that he himself is moving. Thus, when we sit in a motionless train and another train rushes past us, it seems to us that it is our own train that is beginning to move
"My Mareorama," says M. d'Alesi, " is based upon an analogous illusion. I shall keep up this simulation of a voyage by sea by every means possible. It is my intention to change my canvases after the Exposition is over, and we shall then, perhaps, make a trip to the North Pole.'
The Palace of the Mareorama, constructed after the plans of M. Lacau, will be situated on the Champs de Mars, between the Eiffel Tower and the Monlineaux Station. It will be 131 feet in length, 112 feet in width, and 75 feet in height. An immense terrace, covering the entire structure and converted into a hanging garden, will crown the palace. This terrace will be reached through two wide stairways and two large elevators.
For the above particulars and the illustration we are indebted to the Revue International des Expositions de 1900

## A Children's Museum

Brooklyn is to have a children's museum similar to those which have been established in St. Petersburg, Vienna, Berlin, Paris, and other European cities. The new Brooklyn Museum will be the first of its kind in this country. The suggestion emanates from Prof. W. H. Goodyear, the Curator of Fine Arts of the Brooklyn Museum, and the trustees of the Institute decided to equip the Bedford Park Museum for children. It will contain specimens and pictures illustrative of art and science. It will be rich in educational wateral relating to all departments of knowledge, and designed for children's use. Prof. Goodyear has suggested that the basis of the collection, or rather the initial purchase, should be the Musée Scolaire, published in Paris, which consists of over one hundred colored cartoous, each cartoon displaying a combination of specimens wired to the pasteboard, colored designs and text. In this way the making of such substances as glass, paper, cloth, bronze, etc., is illustrated, each cartoon of the series having the materials, processes, and stages of manufacture shown by natural specimens and colored pictures. This was practically what was done a few years ago in the technical museum of the Pratt Institute. Unfortunately, the collection in that 'verygood insulator, then applying a current of suitable museum, which was excellent, had been dispersed, most potential, and thus obtaining a brilliant light. The reof the specimens being sent to other departments in sult is clearly of great commercial importance, aside the Institute, where, of course, the main idea of the from its being interesting from the purely scientific side. technical museum is entirely lost sight of, so it will be gratifying if Brooklyn will, at last, have a technical museum.

Specimens illustrating zoology, botany, geology, etc., will be added to the new children's museum, and the result will be a complete museum of material for object teaching, the value of which lies in its systematic bal ance and comprehensive character. If there is a strict regulation prohibiting the acquisition or exhibition of isolated specimens and of incomplete and mixed col-
lections, the result cannot fail to be most gratifying.

The collection will be carefully labeled, so that catalogues will be unnecessary, and a competent person will be in charge to explain and help the young visitat once for the ing in whe repaired and ably be several months before it will be ready for exhibition. The new museum will also serve as a mode for schoolroom decoration.

## THE NERNST LIGHT.

The Nernst electric light is creating great interest abroad, and the paper of James Swinburne before the Society of Arts, of London, ends with the following sentences: "I feel that I have but feebly shown forth


PROF. NERNST'S APPARATUS.
the probable future of what seems to me to be the greatest invention in electric lighting that we have en for many years. Still, I am sure that I have not lamp, and in the current Supplement we publish Mr Swinburne's original paper, as presented before the Society.

Prof. Nernst has achieved a wonderful result by the ery simple means of rendering an insulator a conduc tor by heating it. The knowledge that an insulator could be made to conduct electricity by heating it wa known some twenty-three years ago, but apparently no one thought of the simple expedient of heating a


## THE MAREORAMA.

 The Nernst light appears to have very practical ad of from 500 to 1,000 volts, and any lamp which can be worked with voltages higher than those possible with the present glow lamp must bring about great econony in electric supply. It does not require a thin glass bell and a vacuum, and thus we get rid of a very seriare dificulty, because these bulbs are very fragile and lamp many of them are defective, owing, not to a fault . in the filament, but to an imperfect vacuum. Ocourse, a lamp of the Nernst type would not need regulating machinery and no trimming would be necessary, and on this account it would appear that an ideal form of street lighting has, at last, been found. The possi bilities of the carbon filament are about exhausted. There has been little improvement for a long time, and it is a remarkable thing that just when the carbon fila ment was failing to meet the requirements this new invention should be made, which seems to meet the case. It is very like the discovery of gutta percha. at the critical period, which brought electrical cable makers out of their difficulties. As yet the Nernst lamp is in an experimental stage, and it is possible that in time some of the features which militate against its success will be modified. At present the conducting and light emitting rod when cold is an insulator and must be heated with a match or by some electrical means While the Nernst lamp is far from being a commercial success as yet, still it is also far from being only the impractical scheme of an inventor. The lamp is based upon sound scientific principles which appeal at once to practical electricians, who have been extraordinarily quick in this instance to see the wonderful potentialities of the lamp.
The operation of Prof. Nernst's apparatus is as fol lows: The preliminary heating of the magnesia, $A$, the professor accomplishes by placing it in the focus of a reflector, $C$, see left figure. On the inner side o the reflector is a spiral wire of platinum, $D$, which when brought to incandescence by a current pro duces heat sufficient to render the magnesia a con ductor; a current is then passed directly through the oxide by the wire, $B$, and that in the spiral is shut off. A complicated form of lamp is seen in righ figure. Here the magnesia, $A$, is placed within a cylin der, $C$, which also incloses a platinum spiral, $D$. As soon as the incandescent spiral has heated the magne sia sufficiently, a current is passed through the oxide by the wire, $B$. Within this circuit is a coil, $G$, which pon becoming magnetic, draws do wn the iron bar, $E$ thus lowering the now incandescent magnesia from within the cylinder. Upon breaking the circuit the coil loses its magnetism, and, a spring, $F$, raises the iron bar and the magnesia to their former position.

## San Pedro Breakwater.

Work on the great San Pedro breakwater, which is to inclose a harbor of refuge on the lower coast of California, has begun. An appropriation of $\$ 2,900.000$, of which $\$ 400,000$ is available for each year, has been made by the government and now this colossal undertaking will be pushed to completion. The plan adopted by the government contemplates a detached breakwater 8,500 feet in length, with two arms of 3,000 and 3,700 feet, connected with a curve of 1,910 feet radius, 1,800 feet long. The shore end begins 2,100 feet trom land, in $31 / 2$ fathoms, gradually deepening to $81 / 2$ fathoms at the west extremity. The breakwater will consist of a random stone substructure surmounted by a structure of more regularly shaped rock rough ly placed, carried to a height of 14 feet above mean low water. The superstructure is to be protected at both ends by a block of concret 40 feet square, carried 20 feet above mean low water. The substructure rests on a base 90 fee wide, and finished 38 feet wide at mean low water, and will have a slope of 1 to 2 horizonta to 1 vertical, the whole height inside. For the 12 feet above the plane of rest on the ocean side the slope is 3 horizontal to 1 vertical. The breakwater will be 20 feet wide at the top The estimated quantity of material that will be consumed in this structure is $1,781,998$ cubic yards of rock of all kinds and 64,000 cubic fee of concrete.
The rock will be obtained on San Clemente Island, $5 *$ miles distant, where the contractor have already driven four tunnels from 50 to 30 feet in length, and built a protective breakwater allowing the barges to be loaded right at the face of the rock. A very large amount of machinery for derricks and other appliances has already been placed upon the island, and men are now at work getting ou rock. Air compressors and drills have been ordered, and will soon be on the ground. Abou $3,000,000$ feet of lumber will be required for building barges. Seventy-five men are employed now, but later this force will be much increased. Progress will be rapid as soon as the shipments of stone begin, as the sea at this part of the coast is rarely visited by severe torms. Work can be prosecuted throughout the year. The new breakwater will afford the only safe and capacious harbor, with the exception of San Diego, be ween San Francisco and Mazatlan. E. Brown.

## San Francisco.

Mr. G. A. Spottiswoode died in London on Febru ary 8,1899 . He was the head of the great publishing house of Spottiswoode \& Company, and was well known in religious and philanthropic circles.

A writer in The Cincinnati Lancet claimed that he ecently helped hold an autopsy on an old soldier who had been wounded in 1861, by irregular soldiers known generally as " bushwhackers." The wound was made gy a small rifle ball of the kind used by muzzle-loading rifles. It had embedded itself in the wall of the heart, near the lower part of the left ventricle. There had not been any depression of the heart in any way, and it seemed to be perfectly normal. After the war the man served as a farm laborer for thirty-seven years. A cancer of the arm was the cause of his death.
A new process for coating iron and steel consists in the use of a bath consisting of zinc, tin, and aluminum. It is claimed that this produces a coating which is much superior to any now known, adhering so firmly that the sheet will stand working after it has been applied and will resist corrosion and can even be heated red hot without injuring it. The coating is applied in the same manner as in the well-known process of galvanizing, that is, by dipping galvanized sheets in the metal alloy. The most approved mixture is made by melting together 84 parts of zinc, 14 parts of tin, and $11 / 2$ parts of lead and 0.5 of a part of aluminum. The process is patented.
An International Veterinary Congress will be held at Baden, August 9-14, 1899. The subjects to be discussed include prophylactic measures to prevent the spread of cattle diseases by the export of animals ; the treatment of tuberculosis in domestic animals; the use of the flesh and milk of animals affected by tuberculosis and requirements for the inspection of meat; the cure of foot and mouth diseases and diseases of swine; the dissemination of veterinary instruction, as well as the preparation of a uniform anatomical nomenclature in veterinary medicine and the cure of rabies, etc. The members of the congress will consist of delegates from foreign countries, as well as from the German empire, representatives of veterinary schools, public health officers, etc.
A curious case of the recovery of a woman who had been disemboweled by a cow is noted in The London Lancet. The woman, who was forty-two years of age, was tossed into the air, and it was found she was suffering with a severe abdominal wound through which twenty feet of small bowels protruded. The physicians washed the wound with a weak solution of carbolic acid, and the reduction was begun. Catgut sutures were introduced deeply, but not touching the peritoneum. It was thought at first that the patient would not survive the reduction, the shock having been so severe; but, fortunately, no hemorrhage or injury of the bowels had occurred, and when the reduction was complete and the wound had been sewed up, the woman expressed herself as feeling better. The after history of the case was most satisfactory, and in thirtyfive days after the accident she was up, moving around doing light work.
The various departments of the city government of New York that have engineering work to do employ no less than one hundred and seventy-two civil engineers, at salaries which range all the way from $\$ 1,200$ to $\$ 10,000$ per annum. To assist these engineers a host of draughtsmen, surveyors, etc., are employed. The Commissioner of Sewers has a chief engineer and twenty-six assistant engineers ; the Commissioner of Bridges has fifteen engineers; the Commissioner of Water Supply has twenty-seven engineers; the Commissioner of Public Buildings, Lighting and Supplies, has three engineers; the Dock Department, twelve; the Park Department has eleven engineers; the Board of Education, two ; the Board of Public Improvements, twenty-five ; the Commissioner of Highways, twentythree engineers; Commissioners of Accounts, six en gineers; Finance Department, six; the Chief Engi-
neer of the Croton Aqueduct has fourteen assistant neer of the Croton Aqueduct has fourteen assistant able showing of professional talent for even a city of the size of New York.

An association called the "Cuban Educational Association of the United States of America" has been formed, with offices at 289 Fourth Avenue, New York city, N. Y. The object of the society is to assist in educating the Cubans and Porto Ricans in the United States. A large number of applicants from Cuba and Porto Rico have asked to be educated in the United States; but many of them are, unfortunately, deficient in the English language, and, besides, have not sufficient funds to enable them to obtain a course in the United States. A large number of educational institutions in this country have offered to receive and instruct these young men, without charge, so that only necessary living expenses have to be provided. To meet the emergency the association suggests that in each city and town which has an institution willing to receive one or two of these bright young men, there should be formed a committee who will stand sponsors for the board and incidental expenses for each young man, for one year of trial work at school. This is
certainly a very interesting plan, and it is indorsed by such men as Major-Gen. Wheeler and Prof. 'Nicholas Murray Butler, of Columbia University.

## Miscellaneous Notes and Receipts.

Waterproof Glue-Besides with potassium chromate, glue may also be rendered impervious to water by admixture of linseed oil. The glue is first soaked in warm water and then melted at a moderate temperature in linseed oil, or else a liter of glue solution is simply mixed with $100 \mathrm{c} . \mathrm{m}$. of linseed oil. In the latter case a slight addition of nitric acid is recommended to keep the mixture liquid. A little borax will protect the glue from putrefying. - Oesterreichisches Lederblatt.
To extinguish oils which have taken fire, the Illustrirte Gewerbe Zeitung recommends the use of a finemeshed wire-net of the size of a boiling-pan, which should be kept on hand in every varnish factory, etc. In the same moment when the netting is laid upon the burning surface, the flame is extinguished because it is a glowing mass of gas, which the iron wire quickly cools off so much that it cannot glow any more. The use of water is excluded, and that of earth and sand undesirable, because both dirty the oil.
To Glue in Brass Ornaments. -The falling out of ornaments embedded in wood, where a visible screw is not desirable, is frequently very troublesome, and a renewed gluing in rarely obviates the evil, if it is omitted to dip the metal pieces previously in weak nitric acid for about half a minute. Such a bath, with subsequent drying, imparts a moderate roughness to the metallic surfaces, which makes the glue "seize" much better. The glue employed must be exceedingly viscous and never brittle. It is prepared as usual and receives a small addition-about a teaspoonful-of glycerine and as much of slaked lime. During the boiling the mixture should be stirred together intimately, so that the admixtures can properly combine with the giue. It should be applied hot on the slightly warmed pieces, which should be quickly pressed into the wood. The glue must not be thin, but sirup-like. Metal objects inlaid in this manner never drop out from the wood; they can only be torn out by force, on which occasion a thin layer of wood is carried along.-Zeitschrift für Drechsler, etc.

Treatment of Lime.-Lime ought to be, to the painter universal material, and yet many do not know how to handle it, and to use it in the proper place, says Ad. Körbler, in our Vienna contemporary, the Dekorateur. Lime is especially useful for façades churches, gateways, open halls, and verandas and particularly on damp walls. In all these places size-paint would not be suitable as the size would quickly putrefy, owing to the influence of the changes of temperature and dampaess, thus losing its binding power, while the permanency of the lime is enhanced by the action of the oxygen in the air. Especial durability is obtained
by roughening old walls with coarse pumice stone before painting subsequently washing off the walls or at least removing the dust. Peeling of a lime coating is due to too thick an application or to putting on a fresh coat before the first is dry
In order to enhance the durability of the lime vari ous binders may be added to it, as follows: If more earth colors are to be added to the lime than it is capable of binding, cașeine size should be employed. The caseine is rubbed up, together with the milkwater, with unslaked lime and thinned with milk. In Switzerland lime slaked with caseine water is used, thinned with milk, and the durability is excellent. Freis only advisabie for white work, as the salt sometimes effloresces, and the colored coating shows white spots after a few weeks.
Varnish and linseed oil also contribute largely to in crease the permanency of the lime, but it is best to add these binding agents during the slaking.
Blood is likewise a good binding material. It must be allowed to stand a few days, after hot water has been poured on it. Before use it has to be stirred up well and sifted. Besides, it is necessary to add, on ac count of the foul odor, 1 kilo. of boracic acid to every 100 kilos. of lime for disinfecting purposes.

Green vitriol imparts to lime a yellow color similar to ocher ; copper sulphate in lime gives a handsome blue green; green vitriol, copper sulphate, and lime give a nice sap-green; and to obtain a fine blue, take a sul-
phuric solution of cobalt. Such coatings adhere excellently to damp walls, as the substances admixed are much better than earth colors. At the same time they are much cheaper, for 1 kilo. of vitriol is sufficient for a room of considerable size.
All these chemical coloring substances are dissolved, if to be used at once, in hot water, but the solution can also be made with cold water if one waits a few hours It still deserves mention that these vitriols are not inurious to the skin, the floor or the brushes, that they re not caustic and do not burn
For smoky cafe ceilings it is well to force the thick soft soap together with thick lime, to dilute with water and to spread out rather compact. But green vitriol is also a good medium for such ceilings. Coat the ceil ing previously with lime and green vitriol, let this dry thoroughly, and only then coat with strong soap. I will be found that green vitriol will appear olive green
in the receptacle and draws together into $\because$ thick paste; this should not cause one any misgivings; it can, after all, be flowed on like thin paint, and turns a handsome ocher yellow.
By some experiments with the above chemicals in the employment of the quantity, the necessary experience in mixing and tinting will soon be acquired.

## A Suitable Ration for the Tropics

A ration for use by troops in the tropics must be nonirritating, easily transported, and, above all, easily preserved. The beef component and salt pork should be reduced one-half, farinaceous food being substituted therefor. Salt meats should not be issued more than once or twice a week, and if meat is needed, fresh meat should be supplied. Of cereals, hominy is the best, as the husks are removed in the process of manufacture. Equally valuable is rice, and the white bean of this country should not be issued, but instead the red bean commonly found in the tropics, as it breaks up rapidly in cooking and is more digestible. These beans and hominy form the staple diet of the Mexican army. In addition to the above, apples and prunes should be added to the ration for the tropics.
The German soldier in the tropics, says Dr. L. L. Seaman, Major of the U. S. Volunteer Engineers, in a recent lecture before the New York Academy of Medicine, reported in The Medical Record, gets $5 \cdot 33$ ounces of fresh meat or 4.4 ounces of salt bacon, while he receives 79 ounces of vegetables, including potatoes. The Japanese soldier receives a ration of 36 ounces of rice and an allowance of about 6 cents for his meats, tea, etc. The Surgeon-General's commission, which has just returned from the tropics, insisted that no improvement could be made in the diet of our soldiers. At present the daily ration of the soldier in the United States army consists of fresh meat, 20 ounces; or salt beef, 22 ounces; or pork or beef, 12 ounces; bread or flour, 18 ounces; potatoes, 16 ounces; peas or beans, $2 \cdot 40$ ounces; or tinned tomatoes, $5 \cdot 33$ ounces; rice, $1 \cdot 60$ ounces; sugar, $2 \cdot 40$ ounces; coffee, $1 \cdot 60$ ounces; salt, $0 \cdot 25$ of an ounce. The travel ration was made up as follows: Hard tack, 1 pound; beef, canned, 0.75 of a pound; baked beans, 0.33 of a pound; sugar, 1.5 pounds. The ration, as given, was the ration for soldiers in Alaska through the winter of a year ago, and was essentially the same as was issued to the army in Cuba. It is estimated that one-sixth of the total income of food is expended on mechanical force and five-sixths for the production of heat.
The general experience of inhabitants of warm climates was in favor of a diet which was chiefly vegetable. This offers a sufficient supply of albuminoids without giving an unnecessary amount of heat-producing ingredients. Dr. Seaman argues that the food products of each one would be found to be peculiarly well adapted for those particular regions. The natural appetite instinctively inclines one to eat those articles of diet best suited to the particular zone in which one happens to be.

The ration of the British soldier in India has a meat component which is less by from 4 to 6 ounces than in the United States ration, and the rice was greater by $4 \cdot 2$ ounces; but even so, the British ration has been criticised chiefly on the ground that it was too liberal, as it was well known that a moderate quantity of food was most desirable in the tropics.

## Central Africa volcanoes.

Captain Benthe, of the German army, has just re turned from his ascent of Mount Kirunga. The active volcano is north of Lake Tanganyika, and is over 12,000 feet in height. He was the second to climb the crater-a most difficult undertaking, which occupied two days. Count von Götzen, who discovered the mountain, found that lava was bubbling up through places in the bottom of the crater. Captain Benthe found that the crater was full of water, which indicates that for some time the volcano has not been in a state of eruption. All the surrounding regions are covered with lava, and many natives live in small natural caverns roofed over by sheets of lava. According to The New York Sun, the explorer discovered nine new lakes in this volcanic region. On the whole, Africa has remarkable immunity from subterranean disturb ances of all kinds. The only part of the continent which is known to be subject to earthquakes is the region of the Atlas Mountains, in Morocco, which occasionally share the disturbances which now and then cause considerable destruction in the neighboring Iberian peninsula.

## Serum Cure for Pneumonia.

One of Prof. Koch's pupils, Prof. Wasserman, thinks that he has discovered a serum cure for pneu monia. According to a cable dispatch to The New York Sun, he does not commit himself to a definite tatement, as he is,mindful of former disappointments which advanced experimentalists have suffered, but prolonged experiments with rabbits and mice have convinced him that an anti-toxin is produced in the man beings who have died from pneumonia.

## NAVIES OF THE WORLD.

IV.-RUSSIA

So extraordinarily rapid is the growth of the world's navies under the spur of feverish competition, that it is almost impossible to name the exact strength of each navy at any particular period of time. The present series of articles are based upon the actual number of ships built, building, or of which the keel was laid down on January 1. 1899. To secure this data, not to mention the copious illustrations, has been a work entailing no little correspondence and research; but our readers may rest satisfied that the comparisons as given in the general article of December 31 and amplified in the special articles treating of the separate navies are correct.
The tables of comparative strength show that on the opening day of the present year the effective and up-to-date vessels of the Russian navy numbered 86, with a total onnage of 453,899 tons divided as folonnage of 453,899 tons, divided as follows : Battleships, 23 of 250,891 total tonnage ; coast defense vessels, 14 of 40.810 tons; armored cruisers, 11 of 90,432 tons;
protected cruisers, 6 of 31,766 tons; small cruisers and gunboats, 32 of 40,000 tons.
The most striking feature in the Russian navy is the fact that more than half of its ships in numbers and 84 per cent in displacement consists of armored vessels in the shape of battleships, coast defense vessels, and armored cruisers. Out of a total of about 454,000 tons, only about 2,000 tons consists of unarmored ships Furthermore, it should be noted that the Russians, like ourselves, have shown a fondness for extremely heavy batteries, the armament of such vessels as the battleship "Tri Sviatetelia" and the armored cruiser "Rossia" consisting of batteries which surpass anything under construction, unless it be our own " Maine."
Battleships. - In battleships of the Batce Russia is exceptionally the first class Rus is exceptionally strong having 17 excellent ships, none of which is over 10 years old. This is just one-half


First-class Battleship "Tri Sviatételia." Also with modifications, the "Tavritchesky." Displacement, 12,480 tons. Speed, 18 knots. Normal Coal Supply, 1,000 tons. Armor: The armament is heavy and is disposed as far as the secondary battery is con cerned, after the manner of that on the French "Jaureguiberry," in pairs in tur rets. It consists of four 12 -inch, twelve


Armored Cruiser "Admiral Nakhimoff:"


First-class Battleships " Nicolai I." and "Alexander II."


First-class Battleship "Tchesme." Class of Four Ships.



Armored Cruiser "Rurik," 10,923 Tons. Also Three of "Rossia" aiser "Rurik," 10,923 Tons. Also Three
Class of over 12,000 Tons and 20 Knots.
as many battleships of this class as are built or building for the British navy, whose total tonnage is nearly four times as great as that of Russia; while France, whose tonnage is two-thirds greater than that of Russia, has only 14 battleships in the " 10 year old or less" class.
The latest and best of these vessels is represented by the new battleship "Retwisan," now building for Rus sia at the Cramps' shipyard, Philadelphia, and illus trated in the Scientific American of November 5 1898. Five of these ships are being built, the other four being under way in France and Russia. The particulars of the American-built vessel are as follows Displacement, 12,700 tons; speed, 18 knots. Armor Belt, 9 inches; upper belt, 6 inches; deck, 2 inches on fat, 4 inches on slopes. Armament: Four 12-inch B. L rifles; twelve 6 -inch, twenty 3 -inch, and twenty-eight
caliber will be scattered throughout the bridges, super tructure, and tops.
Preceding these five battleships in date of com mencement are the battleships "Oslabya" and "Peres viet," the "Peresviet" forming the prototype for the whole five. They are being built on the Neva for the Baltic fleet, and the particulars are as follows: Dis placement, 12,674 tons : speed, 18 knots; protection, to 7 -inch belt 9 -inch barbettes, and a deck from 13 to $23 / 4$ inches in thickness. The armament, though less powerful than that of the Cramp ship, is very effective consisting of four 10 -inch B. L. rifles, eleven 6 -inch rapid-firers, sixteen 3 -inch and twenty-nine smaller rapid-fire guns. The vessels will carry Belleville water tube boilers and will be driven by triple screw engines. The maximum coal capacity is over 2,000 tons.
Of earlier date, and now building, are the battleships

6 -inch, of which eight are in four turrets and four on the main deck mounted in casemates. There are twenty-four smaller guns. These three ships have easily maintained 17.5 knots on trial, and in every point of comparison they stand in the front rank as battleships.
The two sister battleships, "Sissoi Veliky" (1894) and "Rostislav" (1896), and the "Twelve Apostles" (1890), are similar in size, speed, and offensive and defensive qualities. The two former are of 8,880 tons and 16 knots, carry $153 / 4$-inch compound armor on belt and barbettes, and are armed, the "Veliky" with four 12 -inch and six 6 -inch rapid firers, and the "Rostislav" with four 10 -inch and eight $5 \cdot 9$-inch rapid-firers, both carrying the large number of small rapid-firers characteristic of Russian ships. The "Twelve Apostles," of 8,076 tons and 16.6 knots, has 14 -inch and 12-inch com-

3.-First-class Battleship "Tchesme." "Sinope" Class of Four Ships.



5.-First-class Battleship "Nicolai I."

Displacement, $9,6 \%$ tons. Speed, 148 knots. Coal Supply, 1,000 tons. Armor: Belt, 14 inches;
gun positions, 10 inches; deck, $21 / 2$ inches.
Armament,


7.-Armored Cruiser "Rurik."

Displacement, 10,923 tons. Speed, 18 knots. Maximum Coal Supply, 2.000 tons. Armor
 Dite, 1894

9.-Armored Cruiser "Pamyat Azova."

Displacement, 6,675 tons. Speed, 18.8 knots. Normal Coal Supply, 1,000 tons. Armor: Bifes 9 inchee, , riffes, fourteen small rapid-fire guns, three machine guns. Torpedo Tubes, 7 . Complement, 525.

4.-First-class Battleship "Navarin."


6.-First-class Battleship "Alexander II."

Displacement, 9,927 tons. Speed, $16-5$ knots. Ceal Supply, 1,200 tons. Armor: Belt, 14


8.-Armored Cruiser "Admiral Nakhimoff."

Displacement, 8,524 tons. Speed, $16 \cdot 7$ knots. Coal Supply, 1,200 tons. Armor: Belt, 1


10.-Armored Cruiser "Dmitri Donskoi."

Displacement, 5,882 tons. Speed, $16 \cdot 5$ knots. Normal Coal Supply, 400 tons. Armor: Belt
 fire, sixteen sm
Date, 1883 .
pound armor on belt and barbettes and is armed with four 12 -inch, four 6 -inch rifles, and eighteen small rapid-firers.
The other two battleships of the total seventeen that are ten years old or less are the "Navarin" (1891), of 10,206 tons and 16 knots, with 16 and 12 -inch armor and carrying four 12 -inch, eight 6 -inch rifles and eighteen smaller guns, and "George the Victorious" (1892), of 10,280 tons and 16.5 knots, with 16 -inch belt, 12 -inch barbettes, and armed with six 12 inch and seven 6 -inch rifles, eight $3 \cdot 9$-inch rapid-fire guns and several smaller rapid firers.
The latter ship is an improvement on the three wellknown battleships of the "Sinope" class (1886), the "Sinope," "Catherine II.," and "Tchesme." The distinguishing characteristics of these vessels is the large number of guns in the main battery (six 12 -inch) and the peculiar triangular redoubt within which they are carried. The belt armor, 16 inches in thickness amidships, is continuous from stem to stern. At the level of its upper edge is a protective deck, 3 inches in thickness, and upon this is buit up a huge redoubt through two decks to a vertical height of 18 feet, the upper edge of the redoubt being 3 feet above the main deck. In each angle of this central fort is placed a pair of 12 -inch guns mounted on disappearing guncarriages. The gruns are loaded and trained below the shelter of the redoubt, rising to fire over the main deck as a glacis. These are the only battleships in the world which carry more than four guns in the main battery. But although the main battery looks formidable on paper, it is not more so than the four-gun battery placed in the usual two turrets, fore and aft. The concentration of fire on the broadside or aft is no greater, and while it is true four guns can be fired ahead, the system adopted in the late" Maine" allowed a concentration of four guns both ahead or astern. The fact that the Russians have not repeated the type is proof that it has not the merits of the standard two turret system. The chief objection is that one big shell entering the redoubt might disable the elevating mechanism of all six gun-carriages.
The three ships just mentioned come in the class of ships " 10 to 20 years old." The other two battleships in this class are the "Alexander II." and the "Nicolai," the particulars of which are given beneath the cuts of these vessels. They are later vessels than the "Sinope" class, and great changes have been made as compared with their predecessors. Four of the 12 -inch guns are thrown out and the remaining pair are placed in a sin gle turret forward. The four 12 -inch are replaced by four 9 -inch rifles which are carried at the four corners of the broadside battery on the gun deck, and are capable of being fired dead ahead and dead astern. The secondary battery of eight 6 -inch guns is carried in broadside between the 9 -inch guns.
The modern character of the Russian navy is shown by the fact that among 23 battleships there is only one vessel in the "old battleship" class, the "Peter Veliky," of 9,891 tons and $14 \cdot 5$ knots, launched in 1872 . She has 14 and 8 -inch armor and carries four 12 -inch 40 -ton guns as her main battery.
Coast Defense Vessels.-The newest of the 14 coast defense vessels are the four ships of the "Admiral Oushakoff" class (1893-94), which are of 4,126 tons and
16 knots speed, are protected bv a 10 -inch belt, and a 3 16 knots speed, are protected by a 10 -inch belt, and a 3 -
inch deck, and have their four 9 -inch guns protected by 7 to 8 inches of armor. Each is provided with four torpedo tubes. They carry 400 tons of coal and the complement is 318 officers and men. The names of the other ships are the "Admiral Seniavin" and "Admiral Apreaine," while a new vessel of the class is being
built. 'These excellent little fighting ships constitute the best part of the coast defense flotilla. Next to them in value are the four modern armored gunboats of the "Gremiastchy" type (1890-95). of 1,500 tons and 15 knots speed, armed with one 9 -inch, one 6 -inch, and eight smaller guns, and protected by a 5 -inch belt and a $11 / 2$-inch deck. Each gunboat carries two torpedo tubes. Tine above eight vessels are the best of the
coast defense fleet, the other half dozen ships being old vessels of from 25 to 30 years of age. The most notable of these is the circular floating fort "Admiral Popoff" of these is the circular floating fort "Admiral Popoff"
(1875), of 3,590 tons, which mounts two 12 -inch guns and has a speed of 8 knots.
Armored Cruiskrs.-The Russian navy includes 11 of these very useful and all around fighting ships. The best known of these are the "Rurik" (1894) and the "Rossia" (1896). The former, on account of her unprecedented size and fighting powers, created a great sensation at the time of her completion, and was no loubt the direct cause of the British Admiralty building the "Powerful" and "Terrible." She is of 10,923 tons displacement, is protected by a 10 -inch belt, but has the moderate speed of only 18 knots. Her arm ament is, or was, the most sensational feature of the ship (we are familiar with mighty batteries now), comprising four 8 -inch rifles carried in sponsons forward and aft on the main deck on the beam, with a fore and
aft axial fire ; sixteen 6 -inch slow-fire guns, carried in aft axial fire; sixteen 6 -inch slow-fire guns, carried in
broadside on the gun deck; six 4.7 -inch rapid-firers carried between the 8 -inch guns on the main deck, and

18 small rapid-firers. Another valuable feature of these ships is the large coal capacity of 2,000 tons. The weak feature of the "Rurik" is that her large armament is but poorly protected, none of the guns being provided with casemates and the shields being comparatively light and ineffective against the more powerful rapid-fire guns. The guns, moreover, are nearly
all of the slow-fire pattern. The "Rurik" was folall of the slow-fire pattern. The "Rurik" was fol-
lowed by the "Rossia," an improved "Rurik." She is 1,200 tons larger, the same protection, practically the same battery, except that the six $4 \cdot 7$-inch guns are re placed by a numerous battery of 3 -inch guns and all the weapons except the 8 -inch are rapid-firers. The speed is raised to 20 knots and the coal capacity to 2,500 tons. Another change is the entire removal of the sails and yards, which are a conspicuous feature in the "Rurik." Critics complain that the same defect of limited protection for the guns exists in the " Rossia. The "Gromoboi" and another ship, both of the Rossia" type, are now under construction.
Another well known armored cruiser is the "Pamyat Azova," of 6,675 tons, 18.8 knots, whose particulars wil be found under the illustration of the ship. She is provided with full sail-power, the Russians showing a greater reluctance than any other nation to part with this relic of the days of wooden frigates and battle ships. The "Pamyat" has one peculiarity which will be noticed in the "Rossia," namely, a 6 -inch gun firing through a port directly in the bow. This is also seen in several of the French ships. The "Admiral Nakhimoff" (1880) is another fine ship of this class. She is brig rigged, and withdher single elliptical funnel presents a very handsome appearance. In her main armament she closely resembles the "Brooklyn," having the same number of 8 -inch guns similarly disposed, two forward, two aft, and two on each beaw. These guns, however are not so well protected, firing as they do from a bar bette, whereas the "Brooklyn's" guns are in turrets. The other six armored cruisers are of an average displacement of 5,754 tons and an average speed of 15.6 knots. The most modern of them is the "Dinitri Donskoi" (1883), a sheathed vessel, bark-rigged, of 5,882 tons and 16.5 knots speed, which will be familiar to many of our readers as having figured in the Colum bian Naval Review at New York. Our cut is made from a photograph taken as the vessel lay in the North River. The "Vladimir Monarch" (1882), of 6,061 tons and 15.2 knots, carries five 8 -inch and twelve 6 -inch guns the "General Admiral" is armed with six 8 -inch and two 6 -inch, while the remaining two carry four 8 -inch a the main armament.
Protected Cruisers.-It is only during the last two or three years that Russia has paid much attention to the protected cruiser class, in which she has only some half-dozen of over 2,000 tons built or building. One of these, the "Korniloff," 5,000 tons, $17 \cdot 5$ knots, two 8 -inch and fourteen 6 -inch guns, was built in 1887 and refitted in 1895. Three others, the "Bogatyr," "Askold" and "Novik," 6,630 tons, 20 knots, carrying six $5 \cdot 9$-inch and six $4 \cdot 7$-inch rapid-firers, are being built in German yards, while two vessels of 6,500 tons and 23 knots speed are being built in France and the United States, one a Toulon and the other at the Cramps' yard in Phila delphia: The Cramp vessel, which will be named the
"Waryas," like the others of her class, in addition to her "Waryag," like the others of her class, in addition to her of twelve 6 -inch, twelve 3 -inch, and six $17 / 8$-inch rapid fire guns, besides four torpedo tubes. A full descrip tion, with illustrations, of this ship was given in the Scientific American of November 5, 1898. Othe cruisers that can steam above the 15 knots per hour dopted as a limit in these comparative articles are the "Merkuriya," 3,050 tons, 16 knots, carrying six 6 -inch uns, and the "Svietlana." 3.828 tons, launched in 1896 at Havre, a vessel of $20 \cdot 2$ knots, armed with six $\tilde{5} \cdot 9$-inch rapid-fire Canet guns, and ten $1 \cdot 8$-inch, and carrying naximum coal supply of 1,000 tons.
Small Cruisers and Gunboats.-This class in the Russian navy is made up of thirty-two ships of an average dispiacement of 1,250 tons and an average speed of 16.6 knots. The four gunboats of the "Don etz" type (1887) have the following dimensions: Dis lacement, 1,224 tons; speed, $13 \cdot 5$ knots; armament wo 8 inch, one 6 -inch, and seven sinall guns. Ther
are nine gunboats of from 1,200 to 1,300 tons, built of ron and wood between 1878 and 1882, having a speed of 13 knots, and armed either with two 8 -inch or three 6 -inch guns. The most recent vessels in this class are half a dozen gunboats of from 400 to 500 tons, which show speeds of from 20 to 23 knots, and are armed with 1.8 and 14 -inch rapid-fire guns
In concluding our review of the Russian navy, we wish to emphasize the fact that it is essentially a fight ing navy, the bulk of its tonnage being made up of heavily armed and armored ships. High speed is not characteristic feature, and the Russians appear to have been satisfied to sacrifice this quality in favor of armor and guns. As Great Britain has elected to set up the combined strength of France and Russia a the standard which she must at least equal, if not sur of the "Dual Alliance" and the "Mistress of the Seas," as shown by our system of comparison by displacement

| comparative fighting strength. |  |  |  |  |
| :---: | :---: | :---: | :---: | :---: |
|  | areat britain. |  | france and rusbia. |  |
| DESCRIPTION OF TYPE. |  |  |  |  |
| Battleships, 10 years or less,, | 34 | 476,272 | ${ }^{31}$ | 350,79 |
| $\left.{ }_{10}^{10} \begin{array}{c}\text { Battlesbips, } \\ \text { to } \\ \sum 0 \\ \text { Pears. }\end{array}\right\}$ | 11 | 104,214 | ${ }^{14}$ | ${ }^{141.8}$ |
| old ${ }^{\text {Battleghips }}$ or Refled. $\}$ | 9 | 79,848 | 13 | 99.675 |
| Totals........... | 54 | \% ${ }^{3}$, 334 | 58 | 59, 362 |
| $\overline{\text { coast Defense }} \begin{gathered} \text { Vessele. } \end{gathered}$ | 25 | 157,100 | 28 | 91,730 |
| Arnored Cruisers, 9,000 tons and up. | 8 | 108,000 | 11 | 115,753 |
| Armored Cruisers, 7,000 to 9,000 tons., | 2 | 16,800 | 4 | 31,624 |
| Armored Cruisers, Below $\bar{\tau}, 000$ tone. | 7 | 39,200 | 16 | 90,304 |
| Totals,........ | 17 | 164,000 | ${ }^{31}$ | 297,481 |
| Protected Cruisers 10,000 tons and up. | 10 | 116,400 | $\ldots$ | .... |
| Protected Cruisers <br> 7,0010 to 10,000 tons | 11 | 85,550 | 4 | 32,056 |
| Protected Cruisers 4,000 to 7,000 tons | 30 | 150,100 | 17 | 87,717 |
|  | 46 | 134,510 | 22 | 66, |
| Totals | 97 | 486.450 | 43 | 186,211 |
| $\substack{\text { Small Cruisers } \\ \text { and Gunboats }}$ |  | 89,628 | 70 | 77,554 |
| Grand totals | 290 | 1,557,522 | 230 | 1,187,5388 |

Great Britain, evidently, is holding her own with a safe margin to spare, having about twenty-five per cent nore ships and thirty per cent more total displacement than France and Russia combined. To this must be added the incalculable advantage that comes from having ships built upon identical lines, with the same maneuvering qualities as to speed and helm (turning movements), and the same arrangement of batteries If to this be added the gain resulting from the fact that the personnel is of one race and language, the actual superiority must be increased from thirty per ent to fully forty or fifty per cent
Comparing the French and Russian navies, we are inclined to think that the greater homogeneity of the Russian ships, their heavier armaments, the fact that they are, as an average, of later construction, and the more stubborn fighting qualities of the Russian sailor considerably offset the numerical superiority of the French navy. The total numbers and displacement are for the French navy 144 ships and 731,629 tons and or the Russian navy 86 ships and 453,899 tons.

## Character of the Tagales

A writer in the Neuesten Nachrichten, Munich, de scribes the Tagales, the dominant race in the Philip pines, in the main as follows
They are not incapable of adopting civilization in he modern sense, as they are a very mixed race. The admixture of Chinese blood has produced very good results. The number of mestizos whose father was white is also very large, and it is these descendants of the Spaniards who fight the battle of freedom. No re the Tagales themselves without civilization. They have shown much natural strength, have advanced rom their original home in central Luzon to every part of the Philippines and assimilated many Malay tribes. Two enemies they have, which are more dan gerous than either the Spaniard or the Americans. They are indolent and their morals are lax. 'The Spaniards have done much to civilize them, but to this day many return to the life of a hunter after some years' residence in towns and villages. They were nevertheless, in a pretty advanced state of civilization when the Spaniards came. This is easy to see in the gorrotos, a kindred race, which remains heathen to this day. The Igorrotos live in fine villages of well built houses, and their agricultural system is really worthy of admiration. The Tagales themselves are ardent Catholics, but they retain many heathen customs. Their highest aim is to get a son into the church, but they do not observe celibacy very strictly. Mauy of the mestizos, Chinese as well as white, are wealthy men, and as these lead in the movement for independence, it will be difficult to conquer the is lands.-Translation made for 'The Literary Digest

## Collapse of a Grand Stand.

The steel grand stand at Monmouth Park race course was recently destroyed by a storin. It was the larg est struture of its kind in the world. The total lengt of the building was 700 feet and its width was 210 feet the seating capacity was $12.000 ; 1,000$ tons of steel $1,000,000$ feet of lumber, and 500,000 bricks were used in its construction. The cost. including dining rooms, furnishings, etc., was $\$ 180,000$.

A New Form of Photographic Telescope.
Prof. E. C. Pickering, of Harvard, has made a strong plea in favor of certain new methods of conducting astronomic work. A great number of very large telescopes of nearly the same form, he says, have been given to observatories during the last few years. Although such instruments are indispensable, in a limited number of investigations, yet when the latter are divided among so many telescopes the results obtained by each are often disappointing to the donors. These instruments have been erected, with two or three exceptions, in places selected from local or political motives, and without regard to meteorological or astronomical conditions. For this reason, the great observatories of the world are near large cities or universities where the very conditions that have rendered the countries great have rendered them unfit for the most delicate astronomical research. Nine-tenths of these instruments are in the temperate zone in Europe and the United States, while the southern hemisphere has been entirely neglected and many of the most interesting parts of the southern sky have not yet been examined by a modern telescope of the largest size.
This duplication of expensive instruments in unsuit able localities is rendered still more objectionable by another condition. All the telescopes are similar in form, their focal length being from fifteen to eigh teen times the aperture, and, therefore, all are best adapted to the same kind of work. In view of these numerous precedents, it was a bold step to deviate from it. But this step was taken, and taken by a woman, Miss Catherine W. Bruce, of New York, who gave $\$ 50,000$ to the Harvard College Observatory to construct a telescope of 24 inches aperture, in which the focal length should be only six times the aperture. Fortunately, this experiment succeeded, and the Bruce photographic telescope is mounted in Arequipa, Peru, in a climate unsurpassed, so far as is now known, for astronomical work. Its immediate results are charts, each covering a large part of the sky and showing such faint stars that 400,000 appear upon a single plate By its aid, many new stars of the peculiar fifth type have been found in the Large Magellanic Cloud, show ing an additional connection of this object with the Milky Way. A group of forty nebula, hitherto unknown, has been found in another part of the sky The most important work of the Bruce telescope, however, is that every year it sends hundreds of photo graphs to the great storehouse at Cambridge. Besides the immediate discoveries made from these plates they doubtless carry with them many secrets as yet unrevealeci, and many images of objects of the greates interest yet to be discovered. A striking example o this kind is found in the recent discovery of the plane Eros, which, next to the moon, is sometimes our near est neighbor in the heavens. Calculation showed that this planet must have been near the earth, and therefore bright, in 1894. An examination showed that this object, although not discovered until 1898, had not escaped the Harvard telescopes. Two images of it were found upon the Bruce plates, fifteen upon the Draper plates and three upon the Bache plates. It can thus be followed through nearly half a revolution Six images were also obtained in 1896, when it wa more distant and much fainter.
These examples show the advantages of trying new forms of telescopes instead of duplicating those now existing. The Bruce telescope is well adapted to in vestigations in which the focal length is small. It will therefore be interesting to try the effect of a great focal length. It is proposed to build a telescope with an aperture of 12 to 14 inches and a focal length of 135 or 162 feet. This telescope would probably be placed horizontally and the star reflected into it by means of a mirror. The motion of the earth would be counteracted by moving the photographic plate by clock work. It would thus become a large horizontal photo heliograph. This method of mounting a telescope for use on the stars was advocated by the writer in 1881, and has been used here since then with successive telescopes of 2,4 , and 12 inches aperture. The instrument here proposed would be adapted to investigations for which a great focal length would be needed, as the latter would be more than a hundred times the aperture. Several such investigations may be sug gested, any one of which, if successful, would amply justify the construction of such an instrument.
Prof. Pickering says the best instrument now in use for photographing the sun is the horizontal photoheliograph. It is a small instrument of this form Under favorable atmospheric conditions finer details on the sun's surface could be obtained with a large in strument than have yet been photographed. It could also be used in photographing the protuberances, and it should not be forgotten that preparations must be soon made to observe the solar eclipse of May 28, 1900. The new instrument might be useful in photographing the spectrum of the reversing layer and in showing the details of the inner corona. Images of the moon obtained with such a telescope would be more than a foot in diameter, even if printed without enlargement. These would probably surpass the best photographs yet taken. It is possible that good results could be
obtained with Jupiter, Saturn, and perhaps Mars. The planet Eros approaches the earth in 1900. This will be a more favorable time for observation than any ore be made for Careful preparalions east and west of the meridian, since the distance of the sun can probably be determined with more accuracy in this way han by any other method of observation yet attempted. This is one of the greatest problems of as tronomy, although it was supposed to be solved in the eighteenth century, but it will probably be lef nntil the twentieth century for a satisfactory solu tion. It is expected that the positions of the adjacen tars could also be determined with this instrument, with an accuracy approaching that of the heliometer.

## A convict's ingendity

Not infrequently it happens that the inmates of prisons display a degree of ingenuity not always posessed by their more fortunate fellowmen. How dextrous prisoners are, even in the making of trifles, is


## METHOD OF LOCKING THE STOPPER-ARMS.


curious bottles made by a convict.
well exemplified in two little bottles which have been sent to us by an inmate of the State's Prison at Windsor, Vt., who has built up a small trade in selling his products. The small price at which these bottles are sold is hardly proportionate to the time and labor sent in making them.
In these bottles there have been inserted a number of objects of a size and structure which would appa ently preclude their entrance through the bottle-neck. To carve over seventy-five pieces of wood, to put hose pieces into a four-ounce medicine bottle, and to ssume the fasten them together so that they shal is assuredly a task which requires no little skill.
Within one of the two bottles in question a little carpenter's shop has been fitted up. Here may be seen a small shaving-bench with its draw-knife, a gayly olored chopping-block with a latchet half embedded in the wood, and an ax ornamented with glittering tinsel, propped against the bottle-wall. Upon a sawbuck in the upper half of the bottle a motley-colored log, nearly severed by a cross cut saw, is mounted. At its inner end the bottle-stoper is provided with two
projecting arms held in sockets by means of elastic strips of rubber.
Within the second bottle a miniature well, with its windlass and bucket, is arranged; and upon the edge of the well there stands a wooden goblet. In each corner of the bottle a delicately whittled tree has been placed. From tree to tree runs a little chain formed of colored pieces of wood, the cutting of which was no doubt the work of days. The stopper of the bottle is provided with four projecting arms. The manner in which these arms are locked in place is shown in one of our illustrations, and certainly consti tutes one of the most remarkable features of the work. To the inner ends of the arms strings have been at tached and passed up through a central passage running longitudinally through the stopper. By pulling the striugs the arms would naturally be forced agains the stopper ; after having been thus pulled into place the arms were permanently held by gluing or cement ing the strings to the stopper.
One naturally asks, How were all these numerous pieces inserted? The pieces of wood are all smaller than the neck of the bottle, and only the ingenious manner in which they have been combined and fastened together gives to each object its peculiarly large size. The separate pieces were first dipped in glue and then put in place by means of a long and slender pair of wire pliers.
These curious bottles are remarkable for the great patience required in fashioning each piece and for the delicacy of touch and deftness necessary in placing the parts in their proper positions.

March Number of Our Building Edition.
The March number of the Building Edition of the Scientific American is the handsomest number of this journal which has ever appeared, and it is certainly one of the most artistic numbers of any periodi cal which we have ever seen. The cover consists of a beautiful colored plate representing a residence at San Rafael. Cal. The house is an adaptation of the Moorist "mission" style that is coming into great favor, not only in the Southwest, but also in the North. The style is an evolution of the "adobe" and is one of the most picturesque houses imaginable, being located upon a side hill, the mountain in the rear forming an appropriate background. On opening at the first page we find the courtyard of the Mattei Palace, Rome, illustrated by an exquisite half-tone. There are also thirteen pages of engravings of modern residences, including colonial and gambrel-roofed houses, a casino, and a modern stable. The literary matter in the number is of more than usual interest. It includes a critical re view of the exhibition of the Architectural League and it also contains considerable matter valuable to not only builders, but to those interested in the building of a home. Those of our readers who are not ac quainted with the Building Edition should purchase a copy of this unique number, which gives them an admirable idea of the scope of this publication.

## The Current Supplement.

The current Supplement, No. 1210, contains a number of articles of prime importance. "How to Make : Sewing Machine Motor Without Castings" is an article by Cecil P. Poole. This article is accompanied by no less than twenty-five working drawings, which will enable any mechanic of average ability to complete a highly efficient motor for operating sewing machines or light machinery. This is another article in the elec trical series which we are publishing. "Nernst's Electric Light," by James Swinburne, is a very important paper read before the Society of Arts. The Nernst light appears to have an enormous future in store for it. "Trade Suggestions from the United States Consuls" occupies another page and is a new department of the Supplemen'r which will be continued regularly. "Transcaspian Railway" is an illustrated article. "An Abstract of the Report of the Commissioner of Patents Abstract of the Report of the Commissioner of Paten
for the Year 1898 "gives a valuable summary of the work and needs of the office and desired legislation, Dr. Howard's "Economic Status of Insects as a Class, is completed. "Nutrition Investigations at the Uni versity of Tennessee" is an elaborate paper.

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RECENTLY PATENTED INVENTIONS.

## Agricultural Implements.

COFFEE-PULPING MACHINE.--Richard T. Rick ARD, Honokaa, Hamakua, Hawaii. This machine con sists principally of a diagonally-rrooved pulping-rolle mounted to rotate over a segmental bed-plate having
ribs. In the machine there is also included a pair of ribs. In the machine there is also included a pair of
rollers for separating the berry from the pulp, one of the rollers being plain and the other grooved to feed the rollers being plain and the other grooved to feed the
berry bodily forward, at the same time allowing the berry bodily forward, at the same
pulp to pass down betwen the rollers.
SEed-drill. - Robert H. Sleister, Nebrask City. Neb. The device provided in the present inven tion is designed to be attached to drills or other agricul tnral implements as a substitute for the usual seed-planting mechanisms. The device is supported from a draw-bar
To this bar a furrowing device is secured, having a wardly alongside of the disk, and is pivoted at one side of the disk-journal. A cap is carried by the spout, and covers the hub of the disk to form a guard or spand-band therefor. In use the seed will be deposited through the spout, and will fall in the fnrrow made by the furrowin device. The seed
falls back in place.
CUltivator.-John U. G. Morrison and An drew A. Kregnes, Hooker, S. D. The cultivator designed particularly for cultivating corn-lard, and is
broadly characterized by one or more revolving blade cylinders, the cutting edges of which move in the plan of the surface of the ground and pass lightly be
fruit-Grader.-Walter Morley and Alber M. Patrick, Salem, Ore. It is the purpose of this in-
vention to provide a machine which shall grade or select fruit according to its size, and which shall furnish within a comparatively short space a considerable length of reciprocating movement. The screen-trays are carried in a frame and supported one above the other. Link connect the ends of an upper and lower tray, and serve
to move the two trays in opposite directions. The fruit runs from one screes to another, in order that the variou sizes may be separated by the different meshes of the
screens. During this operation the screen-trays will be recipr
fruit.
aUtomatic swinging stacker.- Carroll D. Clipfell, Redwood Falls, Minn. This inventio provides an improvement in straw-stackers attacked to threshing machines of that clase which are swung upon
their pivots so as to deposit the straw in a circle. The stacker comprises a straw-elevator pivoted at its lower
end to swing horizontally; a curved bar carried by the stacker and having teeth upon its upper and lowe edges and about its ends; a shaft having a pinion en ing connection; and fixed vertical guides engaging th swinging end of the shaft and limiting its movement a vertical plane.

## Electrical Apparatus.

TELEPHONE-CALL REGISTER.-BRUNO KRAUBSE a device for registering either the length of time a tel phono-subscriber uses his instrument in actual con versation with other subscribers, or the number of con the central office will not be registered. By means of circuit-closing device operated from the station called up when the receiver is taken from its hook, both sta
tions are connected in such a manner, for a short time, that the current then passing is strong enough to op erare at the call-end a clock or registering apparatus, both togethe
electric switch. - Andrew h. Miller, 3 Bank Block, Denver, Col. The present invention per circuits, and provides a switch by means of which the lamps in two circuits may be readily placed in series o multiple distribution. The switch may be so manipu produce the full power of light in the lamps of the cit cuit, or to divide the current and distribute the voltag When the circuits, thus cansing the lamps to burn low that a saving of seventy-five per cent in current effected. The apparatus is characterized by the simas by the effectiveness of its operation
ELECTRICAL TRANSMISSION OF SOUND. Frank M. Bell, aesignor to J. Dozier Pou, Colum bus, Ga. Connected with a telephone-transmitter is a djustable weights and a movable contact. A paraboli eflector, containing a lamp in circuit with the contact plate in connection with a battery. When the receive set in motion by sound-waves, an up-and-down move ment is imparted to the balance-beam, which moveme becomes that of the resistance. Variation of the resist ance produces variation in the lamp-light. These varia tions in light produce corresponding variations in th conductivity of the selenium plate, which
tranemitted to the line or cable-conductor

## Engineering Improvements.

 Rotary engine.- Robers o. Dobbin, Waterloo hiamber having a rotating disk forming one side thereof he cylinder has fixed abutments projecting inward fron opprsite walis, but reac!!ing only part way to the center. The rotating disk has a flange formed in seg-ments of a width to fit between the abutments, and carries rotary piston-heads forned as short segments imilar in thickness to the flange, and rotatable upon the the same direction.
PUMP.-Adolph Richter, Manhattan, New York the pump-pisto journaled. A stationary rack engages the pinion ootate the shaft. Upon the sbaft, valve-operating projec-
tions are located. As the pump-piston reciprocates, it
imparts a like motion to the slide, and the pinion rolling
upon the stationary rack bar will, in addition to the re ciprocating movement, receive a rotary movement. Th parts are so arranged that, as the piston nears the end of its stroke, an arm will come into contact with one o
the projections above referred to, and will shift the alves by throwing the arm and connected parts.

Mechanical Devices.
MUSIC-LEAF TURNER.-ALfred G. Lamb, Cres-
Iowa. The music-leaf turner is provided with co, Iowa. The music-leaf turner is provided with
mechanism whereby, through the medium of compressed ir, spring-controlled leaf-turning arms may be operate possible to control the compressed air either by pressure of the foot or by pressure of the hand. The device is thoroughly automatic in its action, and its mechanism bicycle-path or sidewalk Leveler and oller. - Samuel P. Hedges, Greenport, N. Y. This machine is designed to be controlled by a single an, and is so constructed that, when the scrapers are to be brought in contact with the ground, the movement of
the controlling-lever will be toward the operator, thus he controlling-lever we operator, thu age at the least expenditure of power. At the fron portion of the machine, shoes are pivoted which tend to support this portion of the machine. These shoes are ately large depressions in the path or sidewalk, enablin the scraper-blades to act evenly upon the ground.

Miscellaneous Inventions.
WRITING-TABLET HOLDER.-RUTHERFORD H axton, Florence, Colo. This paper-pad holder is de igned to be hung vertically on a door or wall, so tha plate, a spring-tongue is secured which is capable of en gaging the stiff back of the paper pad. A clampingrame is mounted to swing toward and from the body plate.

Corset.- Julia C. Mackey, New Castle, Pa. The vided with holding devices, each consisting of a strip o abric secured along its outtr edge to the body portion and also transversely at intervals to form flaps adapted
to be taken hold of by the wearer to draw the busks toether. The corset may hence be closed without danger of injuring the fingers on the sharp edges of the steels dredging-bucket. - Harald J. Kromann anhattan, New York city. This dredging.bucke
especially adapted for dredging sand. The botto of the bucket may be readily opened or closed. Th invention. provides means whereby the bucket may
be dropped perpendicularly, carried over any desired pot where dredging is to be done, and readily incline so that its spout will enter the surface from which ma
terial is to be removed.
barrel--Robert t. hargroves, Churchland, Va conveying garden truck. In carrying out the invention the staves are made wedge-shape and uniform in size, loss of material. Each stave reinforces the other, an affords ample ventilation. The barrel is strongest at its uds, the staves being so formed as to facilitate the fect.
POLISHING-DEVICE.-James Whittenham, Man base and a beveled rocking member pivoted to side anges on the base. The rocking-member and base are provided with surfaces of emery. In operation, one
hand of the operator is to be placed palm down upon the hand of the operator is to be placed palm down upon the
upper surface of the rocking-member. By pressing with the fingers rearwardly of the pivotal point, the member will be rocked. A knife-blade is then inserted and the moved back and forth thereon, after which the blade back.
shears for ripping seams.-Lemuel Merill, Melrose, Mass. One of the shear-members has its nd pointed and its edges sharpened to form a knife about the end of the cutting member to form a shiel herefor. This second member is also provided with ing of the shears by the cut threads sing of the shears by the cut threads. In ripping the cutting member to reciprocate across the notch and slot in order to cut the stitches. The shield prevents th blade's engaging the cloth.
BOLT OR PIPE-EXTRACTOR-ALbert St. Alvin ng, two jaws at one end, a bolt projecting inwardly fro each jaw, and wedge blocks pivoted on the inne sides of the jaws and mounted to slide on the bolt. The jhe wedge-blocks engeing the ofides of the bolt or pipe By depressing the outer end of the lever, the jaw-end will be raised. This will serve first to clamp the block tightly upon the bolt and then to raise the bolt. As the locks will be freed from the bolt and will drop dow blocks will be fre
for a new bite.
packing-Box.-Charles a. Robbins, Manhatta New York city. This invention provides an improv ment in packing-boxes in which each of the parts conordinarily of wood and the lining of pulp. On account of its lightness and strength. the inventor uses jutestrong enough to meet all requirements. The inventor overcomes the difficulty by using open frames provided with double lining. A portion of the lining has its edges bent around members of the frames so as to be clamped
between two frames. A box thus constructed the three desirable features of lightness, strengti, and mpermeability to water
gas-FURNace. - Charles W. Rice, Columbus, oward its upper end, and is surrounded by the main body which communicates therewith at the top only. A
drum is located on top of the main body in contaat
therewith so as to receive heat by transmission. Pipes
connect the drum with the lower part of the main body. A smoke-pipe is connected with the drum. By the use of a deffecto
LEMON-SQUEEZER. - John W. Neal, Kealia, Hawaii. This lemen-squeezer belongs to that class in which two sections are hinged together and provided with a bowl and knife, so that the lemon is forced into the
bowl by the movement of the sections toward each other the knife serving to cut the lemon simultaneously with he squeezing. The novelty of the present invention $r$ emon-rind.
section-Liner--Edward E. Sheldon and Jo eph 'f. Freeman, Rochester, N. Y. This drawing provided with a rod, spring-pressed in one direction The rod can be reciprocated by means of a han perated device. A clutch coacts with the rod and serve engage and disengage the rod, whereby the clutch ay be advanced step by step by the movement of dge connected with the clutch. By means of this de. vice, section-lining, laying off distances and ordinates pacing, obtaining angles, and the like, can be readily ccomplished.
Wagon-starter.- Benjamin J. Syres, Trout ille, Pa. The starter is intended for use in holding a wagon on a hillside, and for storing up energy to aid in tarting the wagon, so that the horses can be stoppe hile ascending a hill and the wagon be held by the dease. The starter includes a pointed rod sliding in with the rear axle and is arranged so that its point will be embedded in the ground. As the weight of the wagon moves back on the rod, the spring will be compressed tarting of the vehicle. 'The device is simple in co struction, easy of application, and,
be readily removed and packed away

## Designs.

NECETIE-FRAME.-William J. Smith, Brooklyn, New York city. The frame consists of a front portion having a hole formed therein, and two arms rising at the
ides of the front. The arms embrace the collar, and sides of the front. The arms embrace the collar, and
the cravat is passed through the hole in the front portion he cravat is passed through the hole in the front portio of the bow after having once been tried.
Note.-Copies of any of these patents will be furn shed by Munn \& Co. for 10 cents each. Please sen the name of th
of this paper.

## NEW BOOKS, ETC

Geological Survey of Canada. An nual
1896.
The portly volume before us is full of valuable in ources of Conada thegenlogical and mineralogical $r$ has a great future before her as regard valuable deposit of minerals, etc., and the survey should be complimented on the valuable report, which shows that not only the practical
glected.

Outlines of lndustrial Chemistry
a Text Book for Students. By Frank Paul Thorp, Ph.D. New York 541. 8vo. Illustrated. Price $\$ 3.50$

We have long waited for a modern book on this su ject give in plain, intelligible scientific, but which wou cesses for making the various chemicals, and inform tion relating to the carrying on of various chemical in English. The need of a thoroughly modern hook in we are ne subject has been very pronounced, and while possibly not ideal, fills nearly have the cook whit then a book of this kind. The author has taken an extremel eterogeneous collection of material and has assorte and comblned it with rare judgment. The result is im mensely satisfactory. We shall
our standard books of reference.
Transactions of the Wagner Fre Institute of Science of Phila 1898. . Philadelphia. Pp. 571-946.

Current Observations of Essential Limited, Distillers of Essential Oils. First
44.

Das Kleine Buch von Der Marine. ber die deutsche Flotte nebst gleichender Darstellung der Seestreitkräfte des Auslandes. Von
Georg Neudeck und Dr. Heinrich Georg Neudeck und Dr. Heinrich
Schröder. With one map and 646 llustrations. Kiel and Leipsic: Lipsius \& Tischer. 1899. Pp. viii,
Germanys navy, although not the largest in the world merce which, in sorze, is exceeceded only by that of England. most minutely, tells of its past achievements and future possibilities. The book is divided into four parts, in
which are respectively discussed the history of the Ger man navy, its organization and personnel, the variouvessels, the naval stations and the Kaiser Wilhelm Canal. An appendix contains a comparison of the na-
vies of the world. The clearness which characterizes the descriptive matter, and the thoroughness with which everything that bears even remotely upon the German navy has been discussed, certainly confirm the statement
found on the title page, that the work is "a handbook of found on the title page, that the work is "a hanna
all that is worth knowing of the German navy."

I .

## Business and $\mathfrak{D e r s o n a l}^{\text {end }}$

line for each insertion ; about eight words to a lin d be received at publication offic ing week's issue.

For logging engines. J. S. Mundy, Ne N. J.
U. S." Metal Polish. Indianapolis. Ṡ Samples fre

Gasoline Brazing Forge. Turner Brass Works. Chicago Machinery designed and constructed. Gear cuttin For Sale.-The patent on Wagon Starter, noticed on The celeirated "Hornsby-Akroyd " Patent Safety ou Engine is built by the De La Vergne Refrigerating $M$ The best book for electricians ", beginners in ele y mail, \$4. Munn \& Co.. publishers, 361 Broadway, N. Y Roche's "New Standard" Flectric Necktie Pin light is a beauty and a wonder. Sent postpaid for $\$ 1.00$.
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marked sent for ar labeled.
mamination should be distinctly
(7605) E. W. B. asks : 1. How can I lates or films ? shutter, must be provided with finder, and be adapted oo taking scenery, groups or single objects. Also what Will be the probable expense of making? A. Several
cameras are described with illustrations in Hopkins' "Experimental Science," price \$4. As to expense, will probably cost you more to make a camera than to buy one, though the materials, except the lens, cost very little. You should buy the best lens you can afford, a rapid rectilinear lens, if it is to do all the sorts of work you mention. 2. What is used to sensitize plates, and gelatine and nitrate of silver. The process is described and illustrated in Scientific American Supplement, Nos. $541,467,647,649,1042$, price 10 cents each. 3. Can you give directions for making the electric house lamp
pictured in the issue of December 17 ? We must refer you to the manufacturers of ther 17? A. We must refer given in the number mentioned. 4. Why does mercury dhere so closely to tio, and not to any other metal ? A. Mercury adheres to most common metals when they are ron and platinum. 5. Can you give complete instructions for making a $1 / 4$ horse power dynamo? A. A quar-
ter horse power dynamo is described in a little book by er horse power dynamo is described in a little book by
Watson, price 50 cents.
(7606) C. F. N. asks: 1. If a solid rod 7 feet from long end and 3 feet from short end, how feet from long end and 3 feet from short end, how
nuch weight must you hang from short end to make it balance? A. A weight equal to $2 / 3$ ?of the weight of the ron har 10 feet long, placed at one end of the bar, will from the same end. 2. An ohm measures resistance but I cannot understand why the more resistance you give a telegraph instrument, the better it works. A. The sounder does not work better becanse of its greater resistance, but because it has a larger number of turns in secifying the amount of wirein it. When the current becomes very weak, as in long telegraph lines, a large magnetism enough to sounder is necessure. For that reason relat
sistance.
(7607) A. B. P. asks: 1. How can I make preparation to keep moth from clothing, something that has no strong odor? A. Lupulin, 1 drachm; snuff, Mix. This is to be used for sprinkling where the moths "flashl. 2. Also please tell me how to make a cheap "flashlight" powder for making photographs. A.
Magnesium, 40 per cent; permanganate of potassium, 40 per cent; peroxide of barium, 20 per cent. Or purchase ounce of magnesium powder and 1 ounce of negative on a dust pan dealers in photographic materials. Place on a dod to measure about $31 /$ inches in diameter. Sprinkle
tened,

$\qquad$



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Stereotypes. method of and apparatus


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urgpeader mounting, A. M. Ziegler
uspenders, A. J. Jackson
 Chaphone spitchboard. J. M. OVersionner
hawin apparatus, stam. G. R. Fliliott


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Tubes, apparatus for unifyng se
ture of, Batcheller \&undlach

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Tunnels, $\mathbf{c}$ nstructing, B. F . Carpenter.

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