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WRECK OF THE "VIZCAYA," SHOWING OPENING AT THE STARBOARD BOW, CAUSED BY EXPLOSION OF HER OWN TORPEDO


## Srientific gmexican.

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## the pregent status of the vinted states

The Navy Department has just issued a very in structive pamphlet, dated July 1, which gives the lis and stations of the officers as well as the full list of al of the vessels in the navy, including those which are building and those which have been acquired. An examination of the tables shows that we have at presen 301 vessels, of which 236 are available for war pur poses, the rest being unserviceable or under construc tion. The "Registry of the Navy of the United States," which was published on January 1, 1898 , listed
only 141 vessels, of which 109 were available for service, so that in the few wonths which have intervened be tween the destruction of the battleship "Maine" w have built and acquired by purchase 126 vessels, and during the same period we have only lost one-the battleship "Maine." At present, the United States navy has 11 ships which are classed as "first rate," which includes all the battleships, the two armored cruisers, the protected cruisers "Columbia." "Minneapolis, and "Olympia," and the monitor "Puritan." Ther are 18 boats listed as "second rate," incluang pro tected cruisers and monitors. There are 22 "thir rate" vessels, including cruisers, harbor defense ram, monitors, gunboats, and dispatch boats. There are 6 vessels under "fourth rate," including the dynamite cruiser "Vesuvius" and gunboats and cruisers. We have now 36 torpedo boats built and building and authorized, but in some cases the contract for them has not yet been awarded. We have 12 tugs, 6 sailing ships, 5 receiving ships, and 12 vessels whieh are unserviceable. There are 33 vessels under construction exclusive of the torpedo boats, but including the tor pedo boat destroyers. We have 38 auxiliary cruiser "Yd yachts, which include the formidable "Harvard, "Yale," "St. Louis," and "St. Paul." We have 33 steamers and colliers, used for supplying coal and pro visions and for transport steamers, ambulance ship supply ships, repair ship, etc. We have 27 tugs and 15 revenue cutters, as well as 4 lighthouse tenders and Fish Commission vessels, but the latter two classes will not prove of much avail in the present war, although the lighthouse tender "Mangrove" has distinguished herself. It is noticed that the three first-class battleships for which contracts have not been awarded are to be named "Maine," "Missouri," "Ohio." The names of the new 2,700 -ton monitors are to be "Ar kansas," "Connecticut," "Florida," and "Wyoming. The new new torpedo boat destroyers will be named Bainbridge," "Barry," "Chauncey," "Dale," "De catur,"" " Hopkins," "Hull," "L La wrence,", "Macdon ough," "Paul Jones," "Perry," "Preble," "Stewart, "Truxtun," " Whipple," and "Worden."
The following are the names of the new torpedo boats for which contracts have not yet been awarded "Bagley," " Barney," "Biddle," "Blakely," "DeLong, "Nicholson," "O'Brien," "Shubrick,"" "Stockton," Thornton," "Tingey," and "Wilkes."
The list of officers shows that we now have 7 rear admirals on the active list; 10 commodores, 45 cap tains, 85 commanders, 74 lieutenant-commanders, 32 lieutenants of all grades, 170 ensigns, 70 chief engineers 66 passed assistant engineers, 52 assistant engineers, 18 naval constructors, 19 assistant naval constructors, as well as 15 civil engineers. The information which the pamphlet conveys regarding the officers is, of course very slight, but we notice under "Present Duty or Sta tion" Richmond P. Hobson, "prisoner from 'Merri wac." The "Expiration of last cruise or tour of se service " being "May, 1898." Under "Civil Engineers, "Leave of Absence" is placed opposite the name Robert E. Peary.

## LONDON'S FIRE SYSTEM REVOLUTIONIZED

Commodore Wells, R.N., chief officer of the Metro politan Fire Brigade, has seen fit to revolutionize the system of dealing with fires which has been in vogue in London for thirty years past. The old system of fered great opportunities for a fire to attain consider able head way before it could be checked. It is pleas ing to note that the total inadequacy of the old system has been seen at last and steps have been taken to remedy it. For fire purposes London is now divided into five districts, each of which has a superintendent station and local headquarters. Every outlying sta tion is in telephonic connection with its district head quarters. In past years the system has been that on a call being received at any station it is transmitted to the district headquarters and thence to Southwark and directly the actual character of the fire is known the process is repeated. In the event of a very large fire, the authorities at Southwark have directed the attendance of what additional aid may be deemed to be required. The chief officer has now issued an order which announces that each station officer should be acquainted in his particular area with the nature and distribution of the buildings, fire risks, water supply etc. This officer should in ordinary cases arrive firs on the ground, and he is to have charge of the engines ladders, and other appliances, and to send away mes
sages as to the help required.
The fires are divided into three classes: "home calls,"
which include the fires which the station offleer can manage himself ; "district calls," which include all those fires which the nearest engines the superintend ent can send on will be clearly able to manage; and "brigade calls," which include all those fires which will probably require the special attendance of a num ber of men and engines to be detailed from headquarters. As far as it goes, the new system seems to be practical, but at the same time the American system of sending out one or more full sets of fire apparatus with the full complement of men to every fire is fa preferable. Every second counts in a fire, and often not only the safety of those in the building, but thou sands of dollars' worth of property can be saved by the prompt response of a number of men. The trouble and expense involved in getting out the fire apparatus nothing compared with the execution which they can do if they arrive during the incipient stage of the fire.
the cinematograph in medicine and surgery. Latterly several suggestions, from widely different ources, have been made regarding the employment nd possibilities of the cinematograph in medicine and surgery, and while some are impracticable and based pon erroneous knowledge of the needs of the medical rt, others are suggestive of real value
For the study of continuous or prolonged abnorma acts and movements, such as the action of muscles dur ing choreic, strychnine, or tetanic spasms, the modif ations exhibited by certain reflexes, etc., it may be magined the instrument can be made readily avail able; here its limitations are chiefly those bounded by the experience of the operator, or the initial expens entailed by the instrument itself. Again, contrary to eneral opinion, it is not necessary-not even essentia -that all acts should be the result of a single continu ous exposure, for the action of the instrument may a any time be interrupted, for hours or even days if desired, and again set in motion. Thus the cinemato graph may be used for the purpose of recording and studying the development of rapidly growing neo plasms.
Recently, in London, England, Dr. Parchen exhibited ome unique results thus obtained in a case of locomoor ataxia (tabes dorsalis). The inability to stand with the feet together and the eyes closed, and the typica ataxic gait, were demonstrated in a most remarkable way. Equally clearly depicted were the inco-ordinate uovements of a patient suffering from partial paralysis; especially well demonstrated was the peculiar wasting of muscles which it is practically impossible to portra. by means of ordinary photographic processes. Again the wasting of muscles and characteristic gait in a case of hip-joint disease were as clearly, and even more impressively, depicted as though the patient had been under direct observation.
It is probable the cinematograph will prove invaluable to the medical teacher, especially for purposes of linical demonstration and clinical comparison. Pa tients come and go-often are entirely lost sight of o not available at the moment their services are mos desirable-but the recording film is always at hand, since it can be made both permanent and effective. It s a well-known fact in the West-and doubtless also in he East-that it is common for medical schools to etain certain rare and chronic cases as pensioners, merely that they may always be available for purposes of clinical demonstration.
Dr. Fincham, in a communication to The Amateur Photographer (London), points out that the field of the cinematograph, as regards medicine and surgery, is "rich in potentialities;" that just as the discovery of the Roentgen rays first appealed to the wonder-loving public as a scientific curiosity, and now is deemed an essential part of the armamentarium of every hospital, so in the future will this instrument be regarded as a necessity for the pictorial record of suitable cases.
Nevertheless, the cinematograph at present leaves much to be desired as regards accuracy; satisfactory records cannot be had of the finer movements, owing to the flickering of the pictures; but there is little doubt the deficiency will, in the near future, lead to the adoption of mechanical contrivances that will permit of steady impressions. One great advantage offered, even at present, is that films recording unique cases can be made permanent, and so preserved indefinitely : also they can be transmitted easily and safely to all portions of the globe for purposes of illustration and instruction.

## prints and labels.

Prints and labels are interesting, if for no other reaon, because, unlike other subjects of copyright protecCo, they are not under the control of the Librarian of Congress ; but jurisdiction over them is conferred by Section 3 of the Copyright Act of June 18, 1874, upon the Commissioner of Patents.
Since the decision in 1893 in ex parte Heinz Company. 62 O. G., 1064, the right of registering prints and labels has been recognized, and the distinctions between the same have been well defined; but it is believed, from the limited extent to which the power to register prints
is availed of by the public generally, that the right of such registration is not, to any considerable extent, understood, and that the privilege is not to a proper degree appreciated
Prints and labels are alike as to requisites for regis tration: they must both have artistic merit, and a print or label which is merely descriptive in words of the article or the contents of the article to which it is applied or to which it relates, involving nothing beyond the skill of a typesetter, is not proper subject matter for registration. But, if the label or print has artistic merit, it may be registered, if properly applied for This requisite of artistic merit is essential to the regis trability of both prints and labels; but in the respect of use, prints and labels differ.
The Patent Office rule following the statute defines a label as "a device or representation borne by an articl of manufacture or vendible commodity." Note, then, that the label is borne by the article; that is to say, applied to the article. Now, the same rule defines a print as "a device or representation not borne by an article of manufacture or vendible commodity ; but in some fashion pertaining thereto, such, for instance, as a pictorial advertisement thereof." This is the important difference between a label and a print, the former being "borne by an article of manufacture" and the latter " not borne by an article of manufac ture."
If a print "bears a device capable of sequestration as a trade mark," it can be registered as a print without respect to the registration of such device as a trade mark. (Ex parte the United States Playing Card Company, 63 O . G., 206.) This is because a print, not being applied to an article of manufacture, is not in any sense a trade mark.
A label being in its application to the article of merchandise more like a trade mark, it was held, prior to ex parte Mahn, 82 O . G., p. 1210, that if such label bore a device capable of registration as a trade mark, "it could not be registered as a label until after the trade mark was registered." The said decision, in ex parte Mahn, has modified the practice of the Patent Office, the Commissioner of Patents saying: "There is no authority of law for the requirement for the registration of the trade mark matter contained in a label as a condition precedent to the registration of the label." This, of course, is based on the assumption that the label is a proper label for registration, that is, "of artistic merit, indicating pictorially or otherwise the article or the contents of the article to which it is to be applied," as, if the label is simply a trade mark, it can not be registered as a label.
Inasmuch as both prints and labels are registered, if at all, under the copyright law, registration must be effected before the label or print is used or published.
It is evident, therefore, that a print or label to be registered need only, in the case of a label, involve artistic merit and indicate, pictorially or otherwise, the article or the contents of the article to which it is ap-
plied; and in the case of a print, involve artistic merit plied; and in the case of a print, involve artistic merit
and in some fashion pertain to the article of manufacture or vendible commodity, and that registration be effected before publication or use.
Whether registration as a label will protect use as a print, or vice versa, is not settled; but there is no reason why the same device or representation should not be registered to the same applicant, both as a print and as a label, and the slight expense of registration recominends such course.
Prints and labels, when used, should be marked copyrighted," with the date-not "registered."
The very slight expense of applying for copyright of labels and prints is worthy of consideration, especially as the government fee is refunded if registration is refused.
In these times, when there is so much activity in advertising wares, when prints are so commonly used on store counters and walls in such advertising, and when the printers' and lithographers' arts render the production of artistic prints and labels so economical, it seems
advisable to call the attention of the mercantile public to the present practice as to registration, in order that they may secure the protection for their artistic productions afforded by the statute.

## the visit of colonel krag.

Colonel Ole Herman Johannes Krag, chief of ordnance of the Norwegian army and inventor of the Krag-Jorgensen rifle, who recently came to this country on a leave of absence, has returned home. Colonel Krag was deeply impressed with the United States, "F especially with the intelligence of its citizens. "For this reason," he said, "I believe that the United States can, out of such material, equip soldiers to serve behind rifles much more quickly than any other country." The Krag-Jorgensen rifle is fully described in our "Army and Coast Defence" number. The manufacture of this rifle in this country by paying Colonel Krag a royalty of one dollar per rifle. About 75,000 rifles are already in the hands of the military 75,000 rifles are already in the hands of the military
authorities in this country, and the government ar-
senal at Springfield is now turning out the rifles at the rate of 250 a day. In a short time the output will be at the rate of 500 a day, and Congress has been asked
to appropriate $\$ 800,000$ for the expense of manufacturing additional guns. The Norwegian and Danish armies are equipped with this rifle, and France has shown an inclination to adopt it, but hesitates because it is not a French invention.

## the heavens in august.

The long, warm evenings of August, when the at mosphere rests quiet and steady after the fierce heats of midsummer, are a joy to all lovers of the stars. Sitting on lawn or veranda, one can watch, without
chill or disconfort, the merging of twilight into darkness, the gradual withdrawal of the rose and azure and gold tinted curtain that conceals the universe and the slow forthcoming of the stars-at first singly and here and there; then in pairs and sets, which forewarn the experienced star-gazer of the emergence of the con stllations; and, finally, in groups and swarms and tarry clouds, that have been the wonder of all the ges, and are as refreshing to the imagination to-day they were when the shepherds watched them in Chaldea, or the old Greeks saw them overhead as they tramped across the hills of Arcadia to attend the Olym pic games.
Early in the evening, at the beginning of August the brilliant constellation Scorpio is conspicuous just above the horizon in the south. Its chief star Antares. sually described as red, is one of the most interestin in the heavens. In our latitudes a first-rate 4 -inch tele scope, under favorable atmospheric conditions, should easily show the minute green companion of Antares The distance is only about three seconds of arc, and a good magnifying power, say 150 or 200 diameters, should be used. At present the planet Saturn appears as a member of the constellation Scorpio, shining a few de rees north of Antares.
East of Scorpio, where the Milky Way appears very brilliant, is Sagittarius, with the inverted figure of a short-handled dipper visible among its stars. Higher re Ophiuchus and Serpens, with Hercules near the enith. Hercules is flanked on the west by the North ern Crown and on the east by Lyra, whose great blue white gem Vega is one of the chief glories of the summer nights. West of the Northern Crown is Bootes with Arcturus, and east of Lyra is Cygnus, with the striking figure of the Northern Cross. South of Lyra and Cygnus the constellation Aquila attracts the ey by its singular combination of a bright star, Altair
accompanied on two sides, at a distance of a few degrees, by a fainter star.
the planets.
Mercury is an evening star and remains during August in the constellation Leo. On the 9th it is at its greatest eastern elongation and crosses the meridian bout an hour and three-quarters after the sun
Venus is the cynosure of the sunset sky, far mor brilliant than Jupiter, although less than half as brigh as it will be in October. . The fact has recently been pointed out that, for observations of Venus, telescopes of comparatively small aperture are very effective. Daylight observations are best, and amateurs can make them without great inconvenience. It is only neces ary to know nearly the place of Venus in the sky a the time of observation in order to find the planet in full daylight. During August, Venus will cross the meridian not far from a quarter before threeo'clock, or in other words, two hours and three-quarters after the
sun. But it is considerably south of the sun-a fact sun. But it is considerably south of the sun-a fact
that must be properly taken into account in searching or the planet on the meridian. On August 10 Venus will be only five minutes of are north of the celestia equator when crossing the meridian of Washington. It will be easy to find her then, anywhere in the east ern United States, by pointing the telescope, a little before a quarter to three o'clock, toward true south, at n elevation corresponding to the difference betwee he latitude of the place of observation and $90^{\circ}$. Sup pose, for instance, that the lattitude is $40^{\circ}$, then the
elevation of the telescope should be $50^{\circ}$. If the planet is not found directly in the field of view, a little care ful sweeping will be certain to pick it up. A cap with a circular hole about half the aperture of the telescope should be placed over the object glass, unless the tele cope is less than three inches in diameter. Any mark ings seen with certai
Mars is gradually coming more clearly in evidence a a morning star, although still distant and inconspi cuous. It is in Taurus at the opening of the month about $5^{\circ}$ north of Aldebaran, and at the close it will be ound just over the border in Gemini.
Jupiter, in Virgo, moves slowly eastward, passing course of the month. On the 14th Jupiter crosses th meridian at 3 o'clock in the afternoon. Jupiter and Venus approach one another, until, on the evening of the 18 th, they will be only about $2^{\circ}$ apart.
Saturn remains in Ophiuchus, just above Antares in Scorpio, crossing the meridian early in the evening.
ts chief satellite, Titan, is at western elongation at midnight on the 2 d and at eastern elongation in the vening of the 10th, returning to western elongation an hour before midnight on the 18th.
Uranus is in Libra, on the border of Scorpio, a few egrees west of the double star Beta Scorpionis.
Neptune remains near Zeta Tauri
THE MOON.
There are two full moons in August, on the 1st and the 31st. The new moon occurs on the 17th, the first quarter on the 24th, and the last quarter on the 9th.

The moon is nearest the earth on the 28th and far hest from it on the 12th.
The lunar conjunctions with the planets occur as ollows : Mars, 11th; Neptune, 12th; Mercury, 19th; Jupiter, 20th; Venus, 21st; Uranus, 24th; Saturn, 25th. meteors.
The celebrated August meteors appear on the nigh of the 10 th , radiating from the constellation Perseus, which rises in the northeast.

## A NEW CENTER OF THE. PLAGUE

Prof. Koch has announced the results of his investigations on the plague. He declared that the view en tertained some ten years ago that the plague no longer threatened mankind must be abandoned, for there are now no less than four plague centers, the last of which Prof. Koch discovered in the Hinterland of German West Africa. Former outbreaks have been traced to Mesopotamia, where it has never entirely disappeared but in China the plague is endemic, the plague cente being in the Province of Hunan. There is a second plague center in Thibet; the latestoutbreaks in China and India have had their origin there. The third center is in the neighborhood of Mecca, on the west coast of Arabia, and this center is of the greatest possible importance in view of the great number of pilgrims which annually visit the sacred city of Mohammed. Nothing was known of any other plague center until Prof. Koch discovered the fourth was in equatorial Africa. It was found that a devastating disease prevailed at Kissiba. Prof. Koch suspected it was the plague and proceeded from India to West Africa, and was able to diagnose the disease as the bubonic plague. Nine out of ten of those infected died. The disease was communicated to rats and monkeys, and it was found that an outbreak of the plague among rats frequently precedes an epidemic among human beings, and the rat plague may always be regarded as a salutary warning. The old explanation that it was found wherever dirt and social misery prevailed is inadequate. No satisfactory answer has yet been given as to the real origin of the disease.

## DESTRUCTION OF A WAR BALLOON.

The war balloon used in reconnoitering the position at Santiago was destroyed. The balloon was held by eighteen men by a rope which was 1,000 feet long. The men moved about in various parts of the field, carrying the captive balloon with them. A telegraph wire connected the basket of the balloon with the ground, and observations were transmitted to the officers below. The balloon was received by a scathing fire. Three shells from a shrapnel battery tore great holes in it, and the showers of bullets made it resemble a great sieve. The three men who were in the basket at the time the balloon was destroyed escaped with but one slight injury. The balloon was finally landed in the middle of a stream waist deep, just as two regiments of dismounted cavalry were charging a Spanish ambush. The balloon has been an effective adjunct in reconnoitering in the Santiago campaign. It will be remembered that in the siege of Paris the invested Frenchmen sent up many balloons to carry deputies, dispatches, and mail, and Herr Krupp made special cannon to fire upon them. It consisted of a long barrel mounted on a standard so that it could be readily urned in any direction. The standard was secured to a four-wheeled platform wagon.

EFFECT OF $X$ RAYS ON COLORS.
Sir William Crookes has shown that various gems and minerals glow with a beautiful tinted phosphorescence in the cathode rays of his vacuum tubes, and $M$. Leconteur and Mr. A. C. Cossor applied this fact to the examination of precious stones and minerals of uncertain constitution. A large number of gems of various kinds, shown under the rays, were quite altered in color by the phosphorescence. Four large Burmese ubies, for example, weighing twenty-two and a half carats, glowed a fiery red. Singalese rubies were easily told from Siamese by the phosphorescence. Diamonds became a light blue or green; moonstone gleamed like moonlight just after the rays were withdrawn from it; American dolomite was red ; tungstate of calcium, a turquoise blue; sea shells, a rich golden yellow and light blue, and so on. Questionable stones can thus be tested without injury to the gem. Moreover, the method is applicable to toxicology in he case of alkaloids, and will be useful in medical the case of alk
jurisprudence.

## SAN JUAN AND ITS DEFENSES

Every few weeks the theater of aciion of the war changes, and now once more Porto Rico is the objective point of an expedition sent to conquer it. This island is the most productive of all the possessions which Spain has had in the nineteenth century. San Juan, which our fleet bombarded on May 12, is strongly fortified, but at that time Rear Admiral Sampson had no intention of capturing the town. He wished only to draw the fire of the batteries so as to locate them and destroy as many as possible. He was successful in his attempt, and he did not intend to try to land any soldiers or marines. Now, however, a large army will invest the city and will co operate with the fleet in its bombardment.
San Juan, the capital of the island of Porto Rico, lies on the northeast shore of the island and has a population of about 28,000 . The harbor is one of the finest in the West Indies, finest in the West Indies, being large, sheltered, and capable of accommodating any number of the largest ships, having an anchorage of from three to seven fithoms. It bears a very striking likeness to Havana Harbor, to which it is but little inferior. Its entrance toward the north is invitingly open to the vessels of our great republic, being over 2,000 feet wide, and the harbor is defended on the west side by forts erected on two small islands. The city occupies what is generally supposed to be an island, but the city is really built on a coral reef. It is a long, irregular peninsula, and it is connected with the mainland by a short bridge at the eastern end. The town is completely inclosed with massive walls of stone and mortar which rise to a height, in some places, of from 50 to 100 feet. It is a perfect specimen of a walled town with portcullis, moat, gates, and battlements. The fortifications were begun over 250 vears ago, and were still in good condition until they were attacked by Admiral Sampson. Like Havana and Santiago, San Juan has a "Morro" Castle, or citadel (really a round Moorish tower). The walls have many sentry boxes at intervals hanging out over the sea on the grim, gray walls. One can find a counterpart on a small scale in the old fort at St. Augustine, Florida, and they are in every way similar to those at Havana before her walls were torn down. The peninsula on which Morro and the lighthouse stand is thrust out into the sea, one side breasting the thundering surges of the Atlantic Ocean and the other guarding the placid waters of the beautifuland almost landlocked harbor. The fortifications have one advantage over a fleet in being at a considerable elevation, thus enabling them to deliver a plunging fire. In Admiral Sampson's attack on San Juan only one man was killed on the American vessels, and the Admiral's ships did great damage, destroying many of the batteries.
Inside the walls the city is laid off in regular squares, six parallel streets running in the direction of the length of the peninsula and seven at right angles. The houses are closely and compactly built of stone and are usually one or two stories high, stuccoed on the outside and painted in a variety of colors. The upper floors are occupied by the more respectable people, while the ground floors are alinost without exception given up to negroes and the poorer classes. The population
within the walls is estimated at 20,000 , and most of within the walls is estimated at 20,000 , and most of the people live on the ground floors. In one small room, with a flimsy partition, a whole family will re-
side. As may be supposed, these ground floors of the whole town reek with fever, and the conditions are most unsanitary. As Porto Rico is a tropical country, where disease would readily get a foothold, the consequences of such herding may be easily imagined. There is some water supply, but the population de pends also on rain water caught on the flat roofs of the


STREET SCENE, SAN JUAN, PORTO RICO. veritable plague spot. town by itself between the Marina and the wall
tions, no contagious disease, if properly taken care of, could exist, and without them the place would be a

Though the main portion of San Juan is inclosed within the walls, through which entrance is obtained only by well guarded gateways, yet there is a small contains two or three thou sand inhabitants. Here is to be found a public gar den and pleasure space for booths and restaurants, a well as a public cockpit where battles royal are frequently waged. There are also two suburbs, San Turce and Catano, acros the bay, reached by ferry.
The present expedition to San Juan will not be the only one which has been sent to capture the capital. In 1596 it was sacked by Drake and in 1598 by the Duke of Cum berland. In 1615 a Dutch man, Baldwin Heinrich lost his life in an attack on Morro Castle. The attack of the English in 1678 was equally unsuccessful, and Abercrombie in 1797 had to retire after a siege o three days.

## To Beautify Railway

 Stations.Resolutions were adopt ed at the last meeting of the Society for the Pre servation of Histori Places and Objects, and
buildings and conducted to the cistern which occupies the greater part of the courtyard which is an essential part of the Spanish house the world over. There is no sewage except for surface water and sinks, and the risk of contaminating the water in the cisterns by ad jacent vaults is very great. Epidemics are frequent, and the town is alive with vermin, mosquitoes, and dogs.
The streets are wider than in the older part of Ha vana, and will accommodate two carriages abreast. The sidewalks are very narrow, and will only accommodate one person. The pavements are of a composiion manufactured in England. They are unfit for very heavy traffic, but are pleasant and durable when o heavy strain is brought upon them. The street
these resolutions were sent to the presidents of these resolutions were sent to the presidents of
fourteen of the leading railways which lie wholly, or in part, in the State of New York. The resolutions go on to say that most of the railroad sta tions in the State of New York are devoid of scenic at traction and landscape embellishment, and in this respect they are certainly inferior to those in other States, notably Pennsylvania. They make an excellent point of saying that the avenues of steam traffic through the cities and villages of the State are almost always bor dered by unattractive conditions which, unless they ar counteracted by more pleasing surroundings at the stop ping places of trains, create an unfavorable impression of the community in the mind of the traveler. Experi ence has demonstrated that great improvements can ence has demonstrated that great improvements can are vept once a day, by hand, and, strange to be made in the way of trematic arrangent of trees and are very clean. From its topographical situation, the $\mid$ tematic arrangement of trees and shrubs and the be ter disposition of path and drives, and this can be effected at a compara tively small cost. Munici pal authorities are asked to co-operate with the rail road companies in a park like treatment at the cen ters of the passenger traffic

## Speeds per Second

The snail, one-half inch a man walking, 4 feet; a fast runner, 23 feet; a fly 24 feet; a fast skater, 38 feet; a carrier pigeon, $8{ }^{i}$ feet; locomotive-sixty miles an hour - 88 feet swallows, 220 feet; the worst cyclone known, 380 feet; the Krakaton wave -at the volcanic catastro phe of August 27, 1883, in the Sunda Islands - 940 feet; the surface of the globe on sea level at the equator, 1,500 feet; the moon, 3,250 feet; the sun $51 / 2$ miles; the earth, 18 miles: Halley's comet in the perihelion, 235 miles: electric current on tele graph wires, 7,000 miles induction current, 11,040 miles; electric current in copper wire armatures, 21
town should be healthy, but it is not. The soil under the city is clay, mixed with lime, and it is so hard as to be almost like rock. It is, consequently, impervious to water, and furnishes a good natural drainage. The trade winds blow strong and fresh, and through the harbor runs a stream of sea water at a speed of not less than three miles an hour. With these condi-

## THE OLD WALL, SAN JUAN, PORTO RICO.

 00 miles ; light, 180,000 miles: discharge of a Leyde jar through copper wire one-sixteenth of an inch in diameter, $277,100 \mathrm{miles}$, which is said to have been the highest velocity measured.-The Wave.

Therf are more blind people among the Spaniards than any other European race.

## The Megaphone in war

The " megaphone," the modern speaking trumpet, has played an important part in the present war. The navy have been using the megaphone only about a year, and already it has been regarded as a necessary adjunct on every ship. The standard size is about $21 / 2$ feet long, and the large end is about 15 inches in dia meter. It has a light handle and an aluminum mouth piece. The smaller craft only carry one, but the larger vessels have a number. Thus, the flagship "New York" has one on the bridge, one on the signal bridge, and one on the quarter deck. In the old days, the officer of the deck used the speaking trumpet, and they were often as elaborate as those owned by volunteer firemen. On sailing vessels, in a storm, the voice will not carry from the quarter deck to the foremast head, nor can it be heard to windward of a large sail, so that a speaking trumpet is always kept at hand. They were small and convenient, but are inferior to the mod ern megaphone. Every inflection of the voice is mag nified by the megaphone to wonderful degree, and the sounds may be heard at a great distance. The orders to the vessels of the fleet doing blockade duty off the Cuban coast have been issued through megaphones. Torpedo boats and the converted yachts and tugs as signed to special duties receive a large proportion of their orders from the flagship by megaphone, and turned in their first brief reports in the same way

## The Industrial Commission.

Under the provisions of the law creating an indus trial commission Vice-President Hobart has appointed Senators Kyle, Penrose, Mantle, Daniel, and Mallory Speaker Reed has appointed five representatives, Gard ner, Lorimer, Lovering, Livingstone, and Bell. Nine members who shall fairly represent the various indus tries of the United States are yet to be appointed by the President. The idea of the commission is to investigate questions relating to immigration to labor to agriculture, to manufacture, and business. It wil report to Congress and suggest such legislation as the commission may deem best upon these subjects and an attempt will be made to secure uniform legislation by the various States in the Union, in order to harmonize conflicting interests and which will be equitable to the laborer, producer, employer, and consumer. Hearings will be given and the commission has the power to send for witnesses and papers and administer oaths.

## AN IMPROVED OIL-RETAINING BOX.

To provide an oil-retaining box arranged to keep the lubricant in good condition and always in position on the journal or bearing until it has been completely used up, Samuel Salmon, of Drifton, Pa., has invented and patented an arrangement by means of which the desired end in question is attained.
The device is applied to a mining car-wheel, the axle having its journal-bearing revolving in a box in the form of a bushing which is fitted in the hub of the wheel. On the inner end of the hub the enlarged end of the bushing fits and forms the guideway for a closing shield applied to the journal next to the shoulder on the axle. Openings are made in the bushing at the middle portion which register with an annular oil-chamber formed in the hub. The lubricant is thus enabled to pass from the chamber to the jour


## SALMON'S OIL-RETAINING BOX.

nal. On the outer end of the journal a linch-pin is secured, as shown in the sectional view, and lies agains the end of the bushing so as to hold the bearing or journal in proper position. The collar or shoulder on the inner end of the axle, it is to be observed, lies against the outer face of the enlarged end of the bushing.
Since the closing shield lies snugly on the axle, the lubricant is prevented from leaking past the inner end of the journal and, it is claimed, is therefore enabled to be used without waste.

A NOVEL HOUSE-COOLER AND VENTILATOR
A patent has recently been granted to James B. lade, of Riverhead, N. Y., for a device by means of which buildings, ships, mines, and boiler rooms are constantly supplied with fresh air, a free-exit being provided for the foul and vitiated air
The contrivance consists of a tubular casing adapted or insertion in a circular opening in the roof of a building or the deck of a vessel. Inside of the casing a sleeve is so supported as to leave an air-passage be tween the casing and the sleeve. Mounted in the


SLADE'S HOUSE-COOLER AND VENTILATOR.
leeve is a tube provided internally with a spider or rame, and at its upper end with a rotatable ingress ube. This ingress-tube likewise has a spider or frame on which a rod is centrally pivoted. The upper end o the casing is inclosed by a hood formed with a conica end, through which the ingress-tube passes. With the conical end of the hood an egress-tube is connected which communicates with the interior of the hood. These ingress and egress-tubes are curved in opposite directions, and are mounted to swing in such a manne that the ingress-tube shall constantly present its opening to the wind
The ingress-tube continually forces a column of ai downward through the building, and the egress-tube permits all warm or vitiated air to escape. Any vacuum formed by ventilation, it is said, will be im mediately filled by the air pressed into the cold tube entering a room at the bottom. The ventilator at the rear or leeward of the hood constitutes an air-passage crear.

## A Railroad in the Philippines.

The Manila and Dagupan Railway, the only rail way in the Philippine Islands, is running along moothly as if peace prevailed throughout the land ays the Manila correspondent of The Railway Age Ordinarily railroads suffer as much inconvenience and loss in business and damage as any other line of busi ness at times when comparatively small countries are in a state of rebellion. This loss is not only because of demoralization in freight business and from common disinclination of people to travel where the existence of social disorder creates an additional element of risk n traveling on public carriers, but because of destruc tion of railroad property, as a matter of proper war fare and military strategy, as has been the case in Cuba. The Philippine railroad has been remarkably fortunate in the respect of enjoying immunity from in convenience and violence at the hands of the insur gents-so fortunate, indeed, as to agreeably surpris and disappoint the management of that property
The road is of 3 foot 6 inch gage, and runs from Manila, with a population of over 200,000 , in an almos northerly direction, 125 miles, through several large municipalities to Dagupan, a reasonably prosperous seaport of about 30,000 souls. The island of Luzon of which Manila is the capital, has a population of - wout $3,500,000$ nearly half the entire population bo and wenty-one islands that formber ain. The railroad, as might be expected, runs through the most populous section of Luzon
While the railroad is private property and owned and managed by Europeans other than Spaniards, it was thought the insurgents would nevertheless try and prevent its operation, at least spasmodically, inasmuch as it was proving of so great advantage to the government in the effort to quell the revolt. There has, however, been no trouble with the road as yet The forbearance of the rebels has caused no little
surprise among Spanish officials. The insurgents de ailed a passenger train several months ago. Since that time there has been absolutely no violence. The rebel leaders were very much displeased when they learned that some of their subordinates had molested a train, and at once gave orders that the personal and property rights of foreigners other than Spaniards should be respected and that this order was intended to apply particularly to the railroad, which they wel understood was the property of English capitalists. The fact that the railroad company has not since been ubjected to the slightest trouble or inconvenience while the immediate country is involved in very ser ious and formidable revolution, demonstrates thes facts: 1. That the Filippinos are not savages, war ring just for the excitement of the thing. 2. That they are a peaceful and easily governed people, and are regarding with respect the wishes of their recog nized leaders. 3. That they value the good will and sympathy of Europeans who live in the Philippine and will unquestionably see to it that these foreigner are protected to the fullest possible extent.

## Gold Extraction with Potassium Permanganate

A new process for the extraction of gold has been tried with success in the gold districts of New Zea land. The finely powdered auriferous ore is first mixed with common salt and sulphuric acid, and potassium permanganate is then added in solution. Hydrochloric acid is formed by the action of the sulphuric acid on the salt, and from this chlorine is liberated by the per manganate. The chlorine then combines in the nas cent state with the gold, forming soluble gold chloride The new method is said to have many advantages ove the cyanide and amalgamation processes. The chemi cals used are harmless, non-poisonous, and cheap, and the extraction of gold from the ore is nearly complete A particular advantage lies in the fact that the proA particular advantage lies in the fact that the pro-
cess can be applied to ores containing copper for which cess can be applied to ores containing copper for which
the cyanide process cannot be used. A gold mine at the cyanide process cannot be used. A gold mine at
Mount Morgan, New Queensland, obtained by the per Mount Morgan, New Queensland, obtained by the per
manganate process 95 per cent of the gold presen manganate process 95 per cent of the gold pre pro
from ore yielding only 20 per cent by the cyanide pro ess. The ore contained also copper, iron, antimony and manganese.-Sudd. Ap. Ztg

## A NEW FLUE-CLEANER

In an invention patented by Charles H. Carrico, of Salt Lake City, Utah, novel means are provided for blowing out chimneys, smokestacks and other flues, the device employed being of that type in which a steam pipe is passed into the flue and held by a stopper which loses the flue and prevents the reaction of the stean while cleaning out the soot or other foreign matter Of the accompanying illustrations, Fig. 1 shows the flue-cleaner in operation; Figs. 2 and 3 are modifica tions of the steam-pipe used. The stopper is circula in form, is made preferably of wood, and is adapted to fit in one end of a flue, as shown in Fig. 1. Through the central portion of the stopper an opening is made into which the steam-pipe is inserted. A rubber gas ket encircles the pipe and bears against a shoulder ormed on the body-portion of the stopper. A hollow crew-plug embraces the pipe and presses against the gasket to hold the steam-pipe in place and to effect an


## CARRICO'S FLUE-CLEANER.

hermetic connection between the pipe and the stopper On the periphery of the stopper near the inner end, roove is formed, into which is fitted an elastic ex pansible tube. When by means of a valve this tube is inflated, the opening of the flue is hermetically sealed. When the jet of steam is exerting its utmost force in blowing out the flue, the stopper will still be held in position by the elastic expansible tube. The modifications shown in Figs. 2 and 3 are designed to produce a lateral jet of steam in flues when other forms of nozzles would not be serviceable.

The care of Troops in the Tropics. Allusion has heretofore been made in these columns to the adverse criticisms passed upon the War Department in reference to its care of our troops. Doubtless there are, or were, shortcomings, to be credited largely to hurried mobilization and the necessity for creating resources that before were non-existent; but such are sure, in great measure at least, to regulate themselves in consonance with the knowledge derived from experi ace. Experience, however, is of ten a costly means of acquiring knowledge; and now the invasion of Cuba is fait accompli, coupled with the fact that its climatic conditions and surroundings are quite different from anything hitherto experienced by either our regulars or volunteers, some of the late lessons taught our Anglo-Saxon brethren across the water in their occupation of tropical regions may acquire new values and afford new opportunities for application.
Formerly, the west coast of Africa excepted, the West Indian stations of the British army were regarded as the most malignant and deadly within the limits of the empire. To-day all occupied by white troops are remarkable for their cleanly, healthy, and salubrious character. Much the same may be said of the stations in the Orient, those of Central India more particularly, which region has a certain similitude to Guba as regards topography; both lie between the 20th parallel of latitude and the Tropic of Cancer, and both alike present successive areas of low and alluvial soil, tableland, and hill country.
It has been declared that most of the ills of the soldier are of his own making; but, however true this may be, it in no way excuses military executives for shortcomings, and, notoriously, these very shortcomings in many instances have slain more men than either miasm or bullets.
The routine assignment of the regiments in the British service constitutes no small factor in acclimatization. Except in dire emergency, this is progres sive: The regiments that embark at Southampton proceed to Gibraltar, Malta, and Cyprus, and from thence after a time are distributed to the Far East The return is a reversal of the outgoing, the regiments
being, however, differently distributed; and next they or a portion thereof, are forwarded to Jamaica, Barbadoes, Trinidad, and St. Lucia; a few, perhaps, reach Halifax before returning to England. Black troopsthe West India regiments-are exclusively employed as garrisons at Demerara, Honduras, and on the African
West Coast, and not infrequently in Bermuda, and occasionally at St. Lucia.
During the latter part of the last century and the early years of the present one, the death rate among the white troops in the two Indies was appalling. During a service of five years, certain regiments 1,000 strong lost all their original members; and one regi ment, 860 strong, stationed at Apostle's Point-some times termed " Angel's" Point-at the entrance to Port Royal, Jamaica, lost more than one-third its strength in less than twelve months. The average mortality in Central India from 1838 to 1856 was $79 \cdot 20$ per thousand, and in the West Indies nearly or quite as great, though accurate statistics are not obtainable. In 1860 the mortality in India had fallen to $31 \cdot 27$, and in 1888 was
but 15.73 ; in the West Indies for 1878 it was $16 \cdot 18$ which fell to $3 \cdot 44$ in 1888. From the latter figures, it which fell to $3 \cdot 44$ in 1888 . From the latter figures, it
would appear the Antilles are more healthy to Europewould appear the Antilles are more healthy to Europe-
ans than India, and this is true; but it must also be remembered the stations in the former are few, and being no longer of strategetical importance, are located
in the most salubrious situations. The conditions in in the most salubrious situations. The conditions in
the East are widely different: Regiments are obliged to do tours of duty in low-lying miasmatic districts, as well as in the more salubrious tablelands and hills, such being due to "exigencies of the service;" further in India the population is so dense as to induce un sanitary surroundings that, by reason of an universal fatalistic belief and religious prejudices, are difficult if not impossible of eradication.

Long continued high temperatures; alternations of great atmospheric dryness and moisture ; rapidly mov-
ing, perhaps dry and hot, air-all are common conditions in the tropics; and when to these is added the development of malaria, it is evident those accustomed to a temperate climate cannot support such surroundings without material detriment to health, except most extraordinary measures for protection are taken. Fo
these reasons, if no other, the sanitary and hygienic these reasons, if no other, the sanitary and hygienic
conditions governing the soldier require careful but firm enforcement.

The tablelands and hills, being less malarious, and affording a more pure supply of air, should in so far as possible be selected for camps; further, in these situations liver maladies are uncommon, and intestinal fluxes neither so frequent nor violent. British military authorities lay great stress on the foregoing, and camps and barracks are located, in as far as opportunities permit, in consonance therewith.
Formerly the barracks employed for troops in the tropics were exact prototypes of the quadrangular structures that obtained in England-crowded, ill ven-
tilated, stuffy, and hot; notoriously, at one time, the tilated, stuffy, and hot; notoriously, at one time, the
convict barracks at Bermuda were far superior to the
quarters provided for the troops. To-day, the tropical barracks are large, commodious, two-storied buildings, elevated on arches of masonry several feet above the ground, and the walls exposed to the sun shadowed by wide verandas; there is also a double roof, with severa feet of intervening space and permitting free circulation of air. Only one-half company is allowed in any one building, and only 16 to 20 men may occupy the same room, and to each is secured not less than 90 feet of superficial space and 1,800 feet of cubic space; besides thorough cross ventilation is provided for. Again, in tropical barracks no room is less than 24 feet wide and 20 feet between floors and ceilings. In some por tions of India the barracks fairly deserve the titles of "palaces" - notably those at Allahabad - bestowed upon them by the natives, and they also afford ample evidence of the desire of the authorities to properly care for and conserve the health of "the nation' defenders."

## Whers

When ordered for tropical service, the English soldier is given an entire new outfit of clothing. Drill trousers and eotton jackets are the rule, perhaps also an extra tunic of scarlet serge. In India complete suits of khaki (a native gray or dust-colored cloth) are commonly worn, the regulation uniform being donned only when the conditions of climate and temperature demand. Many of the officers wear tunics of grass-cloth. The use of the kammerband, or wide flannel bandage, over the abdomen (preferably next to the skin) is general, and in fact of ten enforced, as constituting a wise precaution against the intestinal fluxes that are so prevalent and against a chilling that predisposes to malarial attacks. For central African service a brown drill uniform, similar to that adopted by the United States for the campaign in Cuba, is served out-a uni form that originated with the Cape. Mounted Rifles; but the felt hat and leggins were speedily abandoned
as unsuitable and cumbersome, and replaced by ankle as unsuitable and cumbersome, and replaced by ankle bamboo helmet, which is light, comfortable, durable, and every way effective, is covered with cloth and provided with a puggery; the "Tuson" consists of two bodies, one within the other, forming a complete air chamber, not only in the crown, but in the brim as well. Manifestly, the head covering of the soldier in the tropics should present the least possible surface to the wind, should not embody a single half-ounce of superfluous weight (hence should not be permeable to water), offer the greatest facilities for coolness, and yet not be cumbersome-conditions that cannot be filled by a structure of felt. Leggins, if of leather, and not of good quality, lose their suppleness and press on the ankles and instep; so also do those of cloth, in less degree, when they have been wet a few times and become saturated with dust-they only possess the advantage that at the end of a march they can be a nce removed and cleaned, a bit of care that cannot ften be inculcated or enforced
Ankle boots with good serviceable tongues, and made to either lace or buckle, are now exclusively used fficers; they can be made to fasten the bottoms of th trousers-purposely made short-to the ankles in a way to exclude dust. English regulation boots are made on the principles laid down by Camper, Meyer, and thers, and they are had in thirty-two sizes-eight in ength and four in breadth-with very low, broad heels. The inner line is straight, so as not to push
outward ithe great toe in any degree, and there is a bulging over the root of the same toe to allow for easy play of the joint; across the tread and toes it is very broad, so that lateral expansion may not be impeded. Great care is taken in the inspection of boots, which are of the very best quality and made in a specified way. The size is proved by standard measure, the excellence of the leather and quality of the sewing by selecting $t$ random a certain number of each lot and cutting them up, when the slightest defect in one entails re jection of all. It is required there be not less than eight stitches to the inch, and even the number of strands, their thickness, and the waxing are carefully
set forth in the specifications. Practically the same inspection governs the acceptance of clothing, which is always of the very best quality and altered by the company or regimental tailors to accurately fit the in dividual, as much care being taken in this regard as f preparing a suit for a Regent Street dandy. It is the attention to even the more minute details of uni form that has given Tommy Atkins his reputation for martness and neatness.
The daily ration of the British soldier in the tropics consists primarily of 24 ounces of fresh meat, 16 ounce each of bread and potatoes, 4 ounces of rice, 2.5 sugar, .71
tea, and 0.66
salt, besides pepper, vinegar, beer
tc. If salt meat is served, the less, but salt meats are abjured as much as possible, ince scurvy is more prevalent in the tropics than else where and, moreover, more fatal. Fresh vegetables are largely substituted for part of the potatoes and all the rice ration; lime juice is frequently served; and a onvenient canteen at which all articles are sold a absolute cost price is always available, and even ar
ranged for on a march. Experience has proved tha
the use of alcoholic beverages is to be condemned in the hot climates and that even wines must be employed with moderation; but light wines, such as clarets, in reasonable quantity, diluted with water, are beneficial rather than otherwise; but as the private soldier cannot indulge in wine, he is provided with a light beer, but never in amounts exceeding one quart daily. The native liquors of both the East and West Indies are all vile, often drugged, and usually mixed with cayenne or other hot or pungent substances. The cheap rum (caña-" nigger rum ") of the Antilles, derived from sugar and cane waste, is especially pernicious.
The United States Army Numbers 227,000 Men. A statement prepared in the office of the Adjutant General shows that the total strength of the army, regular and volunteer, to July 19, is 227,000-44,000 regulars and 183,000 volunteers. Under the second call for volunteers there are 15,000 vacancies, while the regular army is about 18,000 men short of the number authorized by law. Under the second call the various States and Territories were to furnish 37,566 men to fill vacancies in existing regiments, so as to raise them to their maximum strength. For this purpose 27,519 men have been enlisted, leaving the several volunteer regi ments 10,000 short.
The statement shows that twenty-five out of the thirty-three States called on to furnish additional vol unteers have failed to recruit the required number up to this time. In some cases, however, notably those o Illinois, Iowa, Maryland, Ohio, and Pennsylvania, the recruiting is nearly to the limit prescribed. The South ern States have not responded in as gratifying a man ner as was hoped. North Carolina has shown prac tically no interest in responding to the second call, as only 55 enlistments, or 7 per cent, have been made to fill the quota of 783 required. Other States that are far behind in response to the second call are Alabama, with not quite 40 per cent of enlistments: Colorado, 32 per cent; Georgia, 36 per cent; Louisiana, 23 per cent ; Maine, 45 per cent ; Massachusetts, 36 per cent Mississippi, 33 per cent; Nebraska, 27 per cent; Ten nessee, 33 per cent ; Virginia, 32 per cent. These States have exceeded their quotas: Indiana, Minnesota, New Jersey, Missouri, New York, West Virginia, and Wis consin.
The following table shows the quota of each State under the second call and the number of enlistments :

| State. | Number Required. | Number Enlisted. |
| :---: | :---: | :---: |
| Alabama.. | 675 | 259 |
| Arkansas. | 600 | 379 |
| Colorad | 00 | 96 |
| California. | 1,016 | 624 |
| Connecticu | 435 | 331 |
| Georgia. | 704 | 255 |
| Iniois. | 2,280 |  |
| Indiana.. | 1,304 | 1,334 |
| Iowa... | 1,968 | 1,549 |
| Kansas.... | 938 | 613 |
| Kentucky. | 938 |  |
| Louisiana. | 600 | 142 |
| Maine.... | 380 | 159 |
| Massachusetts. | 1,536 | 541 |
| Michigan. | 1,200 | 878 |
| Minneesota. | 900 | ${ }^{961}$ |
| Mibsisipipl | +1,500 | 1,567 |
| Misbour. | 1,502 | ${ }^{1,567}$ |
| New Hampshire. | 300 | 206 |
| New Jersey.. | 900 | 928 |
|  | 8,704 | 2,733 |
| North Carolina. |  |  |
| Oregon | ${ }_{3} 3800$ | 163 |
| Pennsylvania.. | 4,163 | ,123 |
| Rhode Island. | 300 |  |
| Texas. | 1.128 | 505 |
| Tennessee. | 900 | 300 |
| Vert Virginia. | 900 300 | $\stackrel{2915}{315}$ |
| Wisconsin.. | 900 | 924 |

## Naval Smokeless Powder Factory

Plans have been perfected by Captain Charles O'Neil, Chief of the Bureau of Ordnance of the Navy Department, for the erection of a factory which will be in operation within a year and which will be capable of turning out at least one thousand pounds of smokeless powder per day. The superintendent of the Indian Head proving ground is clearing up a plot of the land everal thousands of acres in extent, which is on th government reservation at Indian Head and which borders on an estuary of the Potomac River, which is deep enough for vessels of fourteen feet draught. The powdermade at the Dupont Powder Works and the California Powder Works is satisfactory, but Captain $O^{\prime}$ 'Neil believes it would be wise for the government to have a plant of its own, which would be independent of strikes and shut-downs, which are liable to occur in actories which are run for commercial purposes. The establishment of a smokeless powder factory was au thorized by Congress in the last naval appropriation bill, which guaranteed $\$ 93,927$ for the construction of the buildings and the purchase of machinery. The government will buy the materials for the twenty buildings required and the structure will be put up by government employes. The plans are being prepared in the Ordnance Bureau and at the Washington navy ard. The powder factory will be connected with the proving ground by trolley railway and it will be sup clied with everything which will tend to make it safe and convenient.

Coatings for Submarine Parts of Vessels. According to Hummel, the necessity of special paints to cover the parts of vessels below the water dates back to the introduction of iron and steel into ship building. Wooden ships were protected from becom ing covered with seaweeds and crustaceous animals by a copper or copper and zinc sheathing. The same remedy has been tried for iron vessels; but the copper sheathing is only employed if the ships cannot be docked and subjected to a cleansing of the submarine portions for years. As regards painting the vessels with red lead or iron minium, white lead or zinc white, these mediums are absolutely ineffective to prevent growth of organisms, nor do they prevent the rusting of the iron. Priming the steel vessels with lead minium has also been given up, since one has become convinced that lead preparations are converted into lead chloride under the influence of sea water, which is said to form iron chloride and lead in contact with iron. The lead metal precipitate calls forth a strong galvanic current and causes further corrosion.
Hummel enumerates the following fundamental conditions for the usefulness of the coatings: (1) The com positions should protect the ship's hull from corrosion (2) should form a smooth surface so as to decrease the friction ; and (3) should dry quickly, so that the cleans ing of the submarine parts and a double coating can be accomplished in one day. In the case of new steel vessels, the armor plate is usually covered with a skin which must be removed by immersing in diluted hydrochloric acid; otherwise this layer will drop off and take the paint above it along, the bared spots being subject to quick rusting. New vessels should be repainted at least every six months, until there is absolute certainty that the paint has a firm foundation. The composi tion of the paints varies. MacInnes used for priming a lake containing iron oxide, over which was applied a warmed mixture of copper, etc. Gisbourne mixed quicksilver with chalk, thus preparing a thick, slowdrying oil paint which was used over a lead minium coat. As an important progress in the protection of vessels must be regarded a solution of shellac in spirit introduced by Heinrich Rahtjen. This solution was mixed with iron oxide, adding some linseed oil for elasticity. The first coat of paint served for insulation, and was supplemented by a second one from the same materials, with the addition of arsenic and quicksilver. Such paints excel in permanency, because the salt contained in sea water has little action on shellac; from the quicksilver contained in the second coating mercuric chloride is slowly formed by the action of the sea water, which has a destructive influence on the organisms. Rahtjen's paints dry quickly, so that two or three coats can be put on in one day. It is impossible, however, to introduce large quantities of mercury into the paint, as the shellac solution itself would be destroyed thereby. Besides, the solubility of shellac is very slight, so that the effectiveness of the paint decreases as the time passes on. For poisoning substances, zinc white and copper are likewise to be considered, and other antiseptic remedies, such as hydrazine, etc., have been tried; copper and mercury were found to be the most effective. Copper is highly eligible on account of its cheapness, but it does not seem recommendable on account of the fact that, when the insulating layer becomes defective, large quantities of copper may bring about a corrosion of the iron.
Among the organisms growing on the hulls of vessels the seaweeds are less dangerous; they usually only grow at the water line, because light is necessary for their development. The movement of the vessel is mainly impeded by crustaceous animals adhering to it. These organisms, however, as a rule, only swim about during the first stages of their development. Thus the poisons in the paint have the mission to kill off the germs clinging to the vessel. During navigation the paint layer is so much softened by friction and the action of the sea water that the sea salts can enter into decomposition with the poisons in the coating. An antiseptic solution results on the surface which destroys the organisms touching it: In tropical waters the multiplication of life is so great in some seasons that the antiseptic agent on the surface seems to be soon exhausted and the paint can no longer prevent the growth. The quantity of organisms clinging to the vessel is larger during the sojourn in the harbor than during navigation. The effectiveness of the protective paints used, therefore, is chiefly dependent upon the length of time during the standstill of the vessel that these paints can give off an efficacious antiseptic substance. In port, however, the surface of the vessel is not subject to any friction; hence the antiseptic agents are already exhausted after a few weeks, and only become effective again when, during the renewed motion of the vessel, the exhausted particles are removed by friction, a new poison-saturated surface being exposed. According to the existing conditions, a newly painted ship may be more subject to become covered with growth than one covered with old coats of paint. It is of advantage to know that long exposure of the fresh coats to the air will materially decrease the efficaciousness of the paint composition. For the illustration of the value of the popular
marine paints, W. P. Wierchowski has compiled the following table, based upon the experiments with the Black Sea fleet :

| Compositions. | Quantity used square fathom. | Cost. Rubles. | Weight of he adhering growth per pounds. |
| :---: | :---: | :---: | :---: |
| Leoni, Nos. 1 and $2 . \ldots \ldots .$. | 7.0 | 2.551/2 | ${ }_{3}^{3 .} 704$ |
| Rubjon, Nos. 1 and $2 . . . . . .1$ | 6.18 <br> 7 | ${ }_{3} \cdot 72$ | ${ }_{5}^{3.453}$ |
| Perreti, Nos. 1 and 2........ | 7.86 | 290 | 4.358 |
| Holzapfel. Nos. 1 and 2. .. | $7 \cdot 25$ | 2. ${ }^{\text {a }}$ | ${ }^{3.168}$ |
| Murreo, Nos. 1 and $2 . . .$. | 9.93 | 5.12 | 3.775 |
| Sopston (Holzapfel)........ | 5.25 6.0 | 0.79 1.80 | 5.455 4.82 |
| Urban, No. 2............... | 10.5 | $5 \cdot 77$ | 2.82 |
| Meninge (minium)......... | 6.5 | $0 \cdot 70$ | $8 \cdot 02$ |

(Zap. imp. russk. techn. obschtsch, 1897. 31, numb. 6-7, 45.)
In spite of its eminent importance and the many propositions of remedies, the problem of an effective protection of the submarine parts of vessels from rust and growth still awaits its solution. Therefore the Russian Technical Naval Committee thought it wise to offer a large award for a suitable composition.Chemiker Zeitung.
the first spanish flag captured at manila Mr. Walter L. Beasley, of Chicago, Ill.. sends a pho Mr. Walter L. Beasley, of Chicago, Il., sends a pho-
tograph of the first Spanish flag captured at Manila, which is of historic interest. He says it was captured at Cavite, Manila, and was sent to United States Sena tor Mason, of Illinois, by the crew of the "Olympia." The flag is 10 by 14 feet, and is rent by bursting shells


## the first spanish flag captured at manila

and rifle bullets from the American squadron. The following letter accompanied the flag

United States Flagship "Olympia," Cavite,
Philippine Islands, May 12, 1898
To the Honorable W. E. Mason, Senator, Illinois, United States of America.
Sir : Please accept the accompanying Spanish flag in the name of the ship's company of the United States flagship "Olympia."
This flag was taken (after the destruction of the Spanish fleet) from the forts and arsenal at Cavite after the bombardment and surrender-Manila Bay, May 1, 1898.

This is sent as a token of our esteem for your patriotic utterances in Congress with regard to the "Maine" disaster, and which sentiments find a ready echo in the heart of every bluejacket serving under the starspangled banner. Very respectfully,

Your obedient servant,
J. S. Eckstrom, Chief Master at Arms.

Signed for the ship's company,
W. W. Creagh, Chief Yeoman.

## The Hellgramite.

The superintendent of small parks of the city of New York professes-so says The Times-to have nade the discovery that the hellgramite, or "dobson," so well and favorably known as a "killing bait" for black bass, is not a specific form per se, but merely the larva of a form of butterfly. This certainly is interesting, if true. The superintendent is said to have discovered, on June 9, that a hellgramite in his possession turned white and immersed itself in mud; two days later it assumed a darker hue and gave evidence of wing development ; June 25, the shell (cocoon) burst, and a butterfly escaped therefrom and was captured.
More information on this subject is desirable.

## Corsets in Russia.

Bogroljewow, the newly appointed Russian minister of public instruction, has begun the duties of his office by issuing a drastic order to the effect that corsets must not be worn by young women attending high schools, universities, and music and art schools: they are to be encouraged to wear the national costume. The minister says that he has spent much time in visiting girls' schools, and has made the discovery that the corset as an article of dress is distinctly prejudicial to the health and physical development of the wearers.

Sclence Notes.
Every ton of Atlantic water when evaporated yields 81 pounds of salt; a ton of Pacific water, 79 pounds; Arctic and Antarctic waters yield 85 pounds to the ton; and Dead Sea water, 187 pounds.
C. MacMillan discusses the ecological significance of the orientation of the plant egg, and concludes that the phenomenon is at bottom one of adaptation. Three principal types of egg orientation are recognized : the primitive or bryophytic, characteristic also of Equisetum and Angiopteris; the semi-inverted, characteristic of Isoetes and the leptosporangiate ferns; and the inverted, characteristic of Lycopodinae and Spermatophyta.-Bot. Gazette, xxv., 301.
M. A. Mouneyrat has found that a mixture of acetylene and chlorine, exposed to diffused light, always combines to form acetylene tetrachloride without explosion, in the absence of free oxygen or any gas that might produce oxygen. If, however, such a gas be present, an explosion occurs, which the author attributes to the formation of acetylene monochloride, which takes fire directly it comes in contact with air. -Bulletin de la Soc. Chim. de Paris.

We learn from The British Medical Journal that the monument to Pasteur, which is to be erected in Paris in the space in front of the Pantheon, is now almost completed. M. Falguière, the sculptor, has introduced certain modifications into his original design, in which Pasteur was simply represented as overcoming Death, which was in the act of flipht. Now a group of a mother with her child, thanking Pasteur, has been added on the right, while behind the central figure Fame is shown crowning him with laurels. The international subscription to the memorial amounts to nearly $\$ 65,000$.
An argillaceous earth named "tfol," which contains free gelatinous silica, is largely used in Northern Africa by the Arabs as a substitute for soap in washing linen. Lahache finds that it has great capabilities of absorbing oil, one part of this substance completely absorbing five parts of heavy tar oil. When the compound is mixed with water a perfect emulsion is formed, which does not adhere to the sides of the vessel. It is proposed to employ this earth for the purpose of emulsifying heavy tar oil for disinfecting purposes. For this purpose the tfol is first mixed with an equal weight of water, and then intimately incorporated with weight of water, and then make a paste.-Chem. Trade
sufficient heavy tar oil to make Jour.
It may be always worth while, says "M.D., Lond.," in The Lancet, to take note of even a minor accident to the eye, more especially when this may as easily be a serious one as it is preventable. Within my own experience I have more than once met with cases in which more or less damage has resulted to the eyeball or external canthus by the dragging up against it of the bar which, projecting backward from the frame of the ordinary pince-nez, serves to keep them folded. Of course one is aware that this accident must be more likely to occur when a cord is worn as usual, and also that it cannot happen with some forms of pince-nez; but it seems to me a pity that the more common form of glasses worn should not be rendered incapable of inflicting such an injury by this bar being placed in front of the folder instead of at the back, where, I take it, it would be quite as efficient. The simplicity of the mode in which the injury may occur and of its remedy may justify this note.
Further evidence of the existence of man before the glacial period in England has come to light, says The Independent. In his address before the Geological Society, of London, Dr. Hicks states that the evidence which has been obtained from bone-bearing caverns at high elevations in the glaciated regions in England shows conclusively that the remains of the extinct mammalia found in them must have been introduced before any of the glacial deposits now in or upon them could have been laid down, therefore either before or so earlydin the glacial period that there could not have been at the time any considerable amount of snow on the neighboring mountains, or glaciers even in the higher valleys. From caverns, he says, in glaciated areas in North and South Wales, where paleolithic implements have been found in association with remains of extinct mammals, facts have been obtained which make it certain that the implements were those of man living at the same period as the extinct animals in those areas, and therefore of pre-glacial age. It has also been shown that as the cold increased, the higher valleys became filled with glaciers, and the caverns became uninhabitable. Afterward, as the snow-line and glaciers descended lower and lower, some of the caverns were subject to inundations, which not only disturbed and rearranged the deposits previously in them, but wholly or partially filled them up with local materials. In one valley in North Wales the local glaciers gradually united with those from the western and northern areas, and a mixed material was distributed over the region to a height of over 600 feet, burying the bone caves beneath it. These caves were inhabited by hyenas.

## SIMPLE SECTION LINER.

This device consists simply of an irregular, octagon shaped block, to be used in connection with an ordinary draughtsman's triangle. It is slightly thicker than the triangle for which it is intended, and it is formed with reference to the triangle with which it is to be used.
The block is first cut square and a little larger than the inside opening of the triangle, as shown in the engraving. The corners are then cut down to such a distance that when the sides, $a, b$, of the block exactly coincide with the inside edges, $A$ and $B$ of the triangle the faces, $c$ of the block and $C$ of the triangle will be the same distance apart as the lines in the required section. As there are four corners, four different distances may be obtained.
To use this device, the triangle is placed against the $T$-square in the regular way, and the block is placed in the center opening of the triangle. After drawing a line, the block is pushed back with the little finger while the triangle is being held with the other hand; then, by rest ing the little finger on the block, it may be held firmly while the other hand pushes the triangle back. Then the next line is drawn and the operation repeated for each succeeding line.

Edwin J. Newton

## Vestadium.

Vestadium is the name of a recently discovered white metallic alloy of a beautiful appearance and great strength, says the Werkstatt. It seems to meet with as quick and general an accept ance as was the case with aluminum. It is said to b firmer and much more practical than any other known metal of equal specific gravity. It is claimed to be composed chiefly of an aluminum alloy, and only weighs one-third as much as aluminum of the same size. Furthermore, it is said not to rust, to withstand sulphuric acid, to take a fine polish, never to tarnish, and once polished, never to require cleaning.-Deutsche Maler Zeitung.

## Groundless Fear of Lightning.

A current news item gives the result of an investiga tion carried out by Dr. G. Stanley Hall, president of Clark University, on the things that most excite fear in people. Of the 298 classes of objects of fear to which 1,707 persons confessed, thunder and lightning lead all the rest, although in certain localities, as, for instance, those subject to cyclones, etc., the fear of the latter predominates. It may be accepted as probably true that thunderstorms constitute the most pronounced source of fear with the majority of people, due, no doubt, to the always impressive and not infrequently overpowering nature of the phenomenon. But is ther any justification in fact for this fear so far as fatal re sults are concerned?
We believe there is not, but, on the contrary, that many other causes which barely have a place in Dr. Hall's list are infinitely more entitled to the distinction as fear producers than lightning. As proof of this we may cite statistics of the United States Weathe Bureau. These show that for the show years 1800-93 four deaths from the deaths from lightning num bered 784, or an average of 196 a year. Again, H . F. Kretzer, of $\mathbf{S t}$. Louis, found from the record of nearly 200 newspapers that for papers that for 1883-88 there were 1,030 deaths waus 1,030 deaths caus ed by lightning, or an average of
206 a year. We 206 a year. We doubt whether, of the number of deaths classed as "accidental" in the whole United States, any nited States, any one group can show so small a num-
ber. In New York city alone over 200 people are drowned every year, while nearly 150 are burned or scalded to death and close on to 500 persons meet their end by falls of one kind or another. Comparing the record of 200 lightning fatalities for the whole country with the above records for New York city, with its total of nearly 1,500 accidental deaths for every year,
it will be seen how groundless is the popular fear of lightning. It is a survival, an inherited superstition. But there is another point in connection with this matter which ought to be particularly comforting to city dwellers, albeit country dwellers may not be affected in like manner, and that is, that statistics show that the risk of lightning is five times greater in the country than in the city. The cause of this im-


NEWTON'S SECTION LINER
ful. The conveyance of infection by infected rats in grain-bags is suuch more probable, as dead rats have been found among the piles of imported bags. As nearly every house in an Indian town is honeycombed by rat runs, and as the disease is very virulent in this species of animal, it is reasonable to assume that it is by their means that the disease is extensively if no chiefly spread. It is very certain that contagion from the sick to the healthy only accounts fo a small proportion of cases. There is some evidence to show, however, that the so-called pneumonic form is more infectious than any other

The number of cases reported in Calcutta is gradually increasing, but the great exodus of people and perhaps the hot season may have combined to postpone its spread; the people are now be ginning to get over their fright and are said to be returning, and are also learn ing to see that the sanitary measure adopted when a case of plague is discov ered are not so dreadful as they sup posed. In Bombay the plague is almost extinguished and the average weekly mortality is nearly reached. In Karach it is also very rapidly diminishing, the majority of the cases which are now occurring being found in the outlying camps. There is very little elsewhere. The Lancet (London)

## Coronium in the Earth.

Prof. Nasini, of Padua, Italy, has communicated to the French Academy the results of his investigation of gases issu ing from the earth in volcanic districts Among these gases he found coronium,
munity for city dwellers is not far to seek. It is doubtless due to the predominance of metal roofs, the well grounded water pipes in houses, and probably as much as anything to the protective network of overhead electric wires of all kinds. The popular belief that a stroke of lightning is invariably fatal is also not borne out by facts. Indeed, one record specially de voted to this feature shows that of 212 persons struck only 74 were killed. Taking it all in all, there seems to be no more groundless popular fear than that o lightning. Indeed, if one can go by statistics, the risk of meeting death by a horse kick in New York is ove 50 per cent greater than that of death by lightning.
Yet with all the weight of statistics against its dead liness, lightning will probably continue to scare people as heretofore. Perhaps, after all, there may be a more direct cause than the mere psychological one usually ascribed to it, and that is the fact that many people of nervous temperament are affected hours before the approach of a thunderstorm and thus rendered particularly powerless to stand the strain which more or less affects the most phlegmatic natures during a disurbance in the heavens.

Rats and the Plague in India.
The evidence for the part played by the rat in the propagation of plague is gradually accumulating. At Karachi it has been a comparatively common obser vation for the occurrence of a case of plague to be pre ceded a few days by the finding of dead rats; this which has hitherto only been known hypothetically as a constituent of the sinn. Coronium seems to have a vapor density far smaller than that of hydrogen. Prof Nasini's investigations suggest the probability of th presence of other new elements.
Prof. Schuster, from an examination of the spec rum of "metargon," is inclined to doubt that it is a new element. He thinks it is a mixture of the compo nents of the atmosphere which solidifies at the tempera ture at which air liquefies.

## THE REMAINS OF CERVERA'S FLEET

Now that the smoke has cleared away from the nava battle off Santiago, the official report of the action by Admiral Sampson is being impatiently awaited.
Besides the torpedo boat destroyers "Furor" and "Pluton," Admiral Cervera's fleet was made up of fou wift armored cruisers of modern design, viz., the "Almirante Oquendo," "Infanta Maria Theresa." "Viz "ay" and "Cristobal Colon" The first three ar "位" " " 1891 sister ships," launched aty in 1896, and prior The "Colon" was built in Italy in 1896, and prior t her purchase by the Spanish government was known a the "Giuseppe Garibaldi II."
The "Oquendo," "Maria Theresa," and "Vizcaya" were known as 7,000 -ton ships ; were 340 feet over all, 65 feet beam, 21.5 draught, 13,000 horse power, and sup posed to be capable of a $20-\mathrm{knot}$ speed. They wer alike protected by steel waterline armor belts 55 fee wide and 10 to 12 inches thick, and each also carried

"CRISTOBAL COLON" ON HER STARBOARD BEAMS-END.
was particularly noticed in the first two or three cases of the present outbreak. The finding of dead or dying ats has now become the signal to clear out of any dwelling. Mice and cats have also been found to suffer rom plague. Although so much attention is given to the disinfection of clothing, the evidence that the con tagion is ever conveyed by this means is very doubt-
two turrets o
$10 \cdot 5$-inch steel the gun mount of the broadsid armament wer protected by $5 \cdot 5$ inch steel, and th deck platforms by 3 inches of iron Also heavy arma ments were car ried, each mount ing two 11 -inch breech-loading rifles in turrets, besides small bat teries, and ten $5 \cdot 5$ inch broadsid Hontoria gunsthese latter, in the "Vizcaya," had been replaced by rapid-firers. Each vessel was als provided with si provided with
The "Cristob
The "Cristobal
Colon" is 328 feet long, 59.75 beam, 24 feet draught, 14,000 horse pow er , and, it is said, has made a speed of 20 knots. She is accredited with two 10 -inch breech-loading rifles mounted in turrets, ten 6 -inch rapid-firers, six $4 \cdot 7$-inch, ten $2 \cdot 2$-inch, ten $1 \cdot 4$-inch, and two machine guns, besides four torpedo tubes. and he armor consists of a 6 -inch waterline belt of Harvey
ized steel, 6 inches of steel on the gun posi tions, and a $1 \cdot 5$-inch steel deck.
The accompanying illustrations, from photographs made hastily with a large sized camera held in the hands by Mr. John C. Hemment on the morning of July 4, less than twenty-four hours after the conflict, show very vividly the effect of the heat caused by the fires started by the explosion of shells and ammunition on the decks. Each of the vessels was painted black, yet Each of the vessels was painted black, yet
it is noticeable after the battle the ironwork it is noticeable after the battle the ironwork
above the protected main deck is white, with irregular shaped spots here and there, while below the main deck just above the water the original black color is preserved. This is accounted for by the great heat blistering or burning off the second coat of black paint on the thin metal composing the upper works, leaving the primary coat intact. But the thick armor below this deck prevented the heat from radiating so quickly, therefore there was no burning of the paint. The different views show the similar positions of the wrecked ships.
The "Infanta Maria Theresa," which led the line in the attempt to escape from Santiago, is stranded some five miles west of the entrance to west of the entrance to hull is practically intact, hull is practically intact, woodwork on the main deck have been swept away by fire or shot; she was struck thirty-three times above the waterline. The very first projectile practically disabled her, as it destroyed the fire mains, making it impossible to making it impossible to extinguish the flames in
the after part of the ship, that were started by the explosion of a second shot in the admiral's cabin. A third projectile cut the main steam pipe on the port side, thereby rendering the port engines useless: and the steam killed all who were in this room a A mass of blackened, battered, twisted ironwork,
one military mast cut down


THE "VIZCAYA" (ALSO "OQUENDO" AND " MARIA THERESA") BEFORE THE ENGAGEMENT.


Photograph by J. C. Hemment.
STARBOARD DECE OF "MARIA THERESA" (MIDSHIP) SHOWING TOTAC DEBTRUCTION OF WOODWORE.
and lying athwartships, the last vestiges of woodwork consumed, this once handsome ship looks like a rough, battered, empty shell of iron.
Her frame and deck beains and most of the plates of the hull are left intact, however, and it is hoped she will be saved to become an ornament to our navy. Her after military mast, which still stands, is the only mast in the fleet that survived the battle. A glance at the illustration evidences how completely the fire did its deadiy work, even the deck having been eaten away as the fire progressed.
A mile west of the "Maria Theresa" lies the "Almirante Oquendo" with broken back and a fearfully battered hull. Being the second to leave the harbor, she was much exposed, which accounts for her serious punishment ; she was hulled above the waterline no less than 66 times. Our illustration exhibits her starboard quarter and the destruction by fire of everything combustible, leaving a mass of whitish-gray ashes all over the blistered sides and arinored deck. One of the first shots that struck exploded the torpedoes in the after torpedo compartment and set the ship on fire ; and as he headed toward the beach, shell after shell beach, shell after shell One big hole amidships was One big hole amidships was
caused by a 13 -inch shell caused by a 13 -inch shell
fired by the "Texas; " an:! near this is another notab! injury, in that a project ile ranged downward from the gun deck, penetrating several bulkheads, exploding only when arrested by the armor belt at the starboard side. One can look clear through the ship along its course. There is abundant evidence that several other large shells exploded within the hull, causing great devastation and presumably an armor piercing shot struck one of the Hontoria guns, as it exhibits a groove an inch deep cut cleanly along its deep cut cleanly alme At the time this
length. length. At the time this photograph was taken the
fire was still raging at the

bow, as will be seen from the great cloud of smoke rising therefrom.
The "Vizcaya" managed to get considerably further to the westward than the "Theresa" or "Oquendo," as she lies beached about fifteen miles from Morro; and though only hulled twenty-four times, she is, never theless, a complete wreck. The illustration exhibits a starboard broadside view, and the large hole in the bow was caused by a shell striking from the port side and exploding the torpedoes in the forward torpedo compartment; the effect is hardly appreciable when the injury is viewed from the exterior, since no idea can be had of the broken and shattered forefoot beneath the waterline, or of the explosive force that extended so far aft as to blow the forward military mast out of the ship. The rolling back of the hull plates proves conclusively the outward character of the explosion, so different from that of the " Maine," which was upward It strengthens the belief that the latter was certainly wrecked by external mines.
One 13 -inch shell struck the port armor nearly amidships, tearing out half the side : and another sho of lesser size entered well aft in the cabin, and passed through, tearing off plates on the starboard quarter These wounds do not show in the photograph, as the are located on the port side.
The "Cristobal Colon," owing perhaps to better man agement and greater speed, and the fact that she was shielded by other vessels of the fleet, was struck only eight times, and succeeded in running forty-eight miles down the coast before she was beached, the purpose then being manifestly to keep her from falling into the hands of the foe. She lies on her starboard beam ends, her port battery pointing to the zenith, and before grounding all her sea-cocks and Kingston valves were opened, dead-lights smashed, ports and torpedo tubes cleared-in fact, every effort was made to afford ready ingress to water. Fortunately she lies in only four fath oms of water, and there is some hope that she will ulti mately be raised. Evidently she largely escaped the havoc wrought in other ships owing to her belt of Harveyized steel armor, which kept out the shots from small and secondary batteries. Only two serious hits
are apparent, one from a 13 -inch, the other from a $9-$ are apparent, one from a 13 -inch, the other from a $9-$
inch shell. A second 13 inch missile exploded on her armor without material injury, and the nose of a small er projectile is lodged in her bow armor. Our view of her was taken some distance away, but it will be ob served that her stern swung around toward the shor as she sank, leaving her battle or port side upwar (her secondary battery guns pointing upward) and he port propeller out of water. The shore all along is quite precipitous, which accounts for her strange prox imity thereto
As soon as official information, following careful ex amination by experts, is received, it is hoped that some definite knowledge may be reached bearing on that all-important question of armor plate and the destruc tive force of the modern projectile.
The great destruction wrought by fire, not only in this engagement, but in the action of the Yalu, emphasizes more than ever the imperative necessity of stripping our warships of all inflammable material As we saw in last week's issue, this has been carried out to some extent in the reconstructed "Newark" and "Chicago," by removing wooden partitions and substituting corrugated iron between the staterooms,
and by removing all woodwork from proximity to the and by removing all woodwork from proximity to th guns.
We shall take up the lessons taught by the engagement at greater length in an early issue.

## The Current Supplement.

The current Supplement, No. 1178, contains a number of articles of great interest. "The Opposing Leaders in the Philippines" is illustrated by a group showing Aguinaldo and the chiefs of the revolt in these islands. "Porto Rico: Its Natural History and Products," is a timely article in view of the expedition which is now being made to conquer it. "The Preparation of Meat Extracts" is an important article on a subject of which there is little literature. "The Art of Taxidermy : Mounting Large Animals," is an illustrated review of Mr. John Rowley's new book. "The "Telectroscope' and the Problem of Electrical Vision "describes an alleged invention for transmitting visual images invented by Szczepanik. There are many other articles of considerable interest which will be found listed in the Table of Contents on page 66.

Lynde Bradley, of Milwaukee, hasdevised plans for the use of the X-ray on board of war vessels and on the field. Mr. Bradley says that while it would be a simple matter to bring the X-ray into use on a warship, considerable difficulty would be attached to the introduction of the apparatus on the field. A small outfit would have to be mounted on wheels for field use. The apparatus would, however, be much lighter and more portable than may be imagined, and his field apparatus could be finished in a week. The great help that the X-ray would be to surgeons lies in the quick a fracture, or other serious injury.-West. Elect.

## The Trans-Siberian Rallway and Siberian

The director of that stupendous enterprise, th Trans-Siberian Railway, announces the whole line wil be opened to traffic early in 1904. It will then be pos sible for the "globe trotter" to circle the earth in thirty days or less. At present the great bridge, which, when completed, will be one of the most notable in the world, and more than seven miles long, across the Yenisei, is well under construction. Next month, it is xpected, trains will run through from Moscow to Irkutsk, when a big scheme of colonization, already fully arranged for, will be begun. Two hundred thousand families, or, approximately, one million indi viduals, will be transported by the Russian govern ment, free of all expense, from the famine districts in European Russia to the fertile valleys of the Angara Vitim, and Upper Lena, and the districts about Lake Baikal, where each head of a household will receive a grant of about fifty acres of land along with the neces grant of about fifty acres of land along with the necesory seed and agricultural implements; also|the mean
of sustenance, housing, and clothing for one year This undoubtedly is the greatest colonization scheme the world has ever known.

Railways and the Telegraph in Spain.
Both the railway and telegraph systems of Spain are in a very unsatisfactory condition and give rise to many complaints, especially among foreigners, and they ar both examples of the pernicious methods which run all
through Spanish affairs. The railway system of Spain comprises about 7,500 miles of road, built partly from private capital and partly from the proceeds of govern ment subsidies, which, up to the present time, amount to more than $\$ 200,000,000$. Most of the roads were con structed under the supervision of the French and Eng ish engineers and the securities have been very gradu ally absorbed by French investors.
The speed of the trains is very low. The expres trains run on only a few of the lines and even the "train de luxe," which run only first class carriages, with the ares raised by 50 per cent, seldom run faster than wenty-five miles an hour, while the ordinary train never attain a speed of more than fifteen miles an hou and are often behind time, specially in the southern part of Spain. Tourists usually select the first class carriages, which are fitted up like those in France, but they are by no means as comfortable and clean as they should be, and on the main roads they are often over crowded. The number of seats is six or eight, and some of these are often occupied by the conductors of the train and even railway laborers, who scramble into the train between stations, much to the disgust of the passengers. Every train is supposed to have a first class compartment reserved for ladies and another for those who do not smoke, but the latter injunction is seldom heeded by the Spanish travelers; but this is an evil which is by no means limited to Spain, for in Holland it is almost impossible to prevent travelers from moking in every compartment. The second class carriages on the Spanish railways have narrow and uncomfortable seats for ten persons and are generally dirty and neglected. The third class carriages are, of course, impossible for foreigners, and they have some times seats on the roof which are used exclusively by he lower classes.
In winter the carriages are heated by foot warmers. At nearly all railway junctions there are restaurants, but those who prefer to eat in a more leisurely manner nay provide themselves with food to consume in the railway carriage, but in this case the Spanish custom demands the formality of asking your fellow passenger to share the meal with you.
At the larger stations the luggage office closes a quarter of an hour before the departure of the train; so this necessitates the traveler being on hand much, before the proper time. In some cases there are no waiting rooms, and where there are, passengers are not allowed to enter either the waiting rooms or platforms unless they have their railway tickets. The railway officials have not seen fit to pay much attention to issuing return tickets, which are such a source of revenue in Italy and other countries. Such tickets are only available for one or two days and are issued on a few lines only, and the reduction in the fare is generally insignificant. Circular tour tickets are not unknown, but these tickets for combined tours in France and Spain have been discontinued, owing to the unstability of Spanish currency.
If the traveler has trouble with the railroads, he will have much more with the telegraph offices. Our conception of a telegram is a message which is sent on at once by wire, but the Spaniards divide their telegrams into two divisions, urgent telegrams, for which are paid thrice the regular rate, and those which are sent in the ordinary way. The smaller railway stations have private telegraph offices and the rates are higher than the regular telegraph offices. The rate for a domestic telegram is one peseta (twenty cents) for fifteen words, and each additional word is charged at one-tenth of this sum. - Messages in the same province have lower rates. Telegrams may be sent to foreign countries, but an additional fee is paid on each foreign dispatch, and it
is advisable to take a receipt, which is charged for.
Telegrams are paid for with postage stamps, but noney is accepted at the railway offices.

## Typhoid and Ice Cream.

Not in all ice cream, but in some forms of this seduc tive and frigid congelation, lurks an element of dange -one predisposing to disease and fatality. The fact that cheap ices are continually hawked about the streets by the dirtiest of all dirty itinerants is itself sufficient evidence, aside from the fact that medical practitioners have given voice to frequent and oft-repeated warnings Boards of health have fulminated against the evil, and then have forgotten it all ; charity organizations and societies designed for the protection and uplifting of the more indigent and least cared for of the human race have decried the iniquitous traffic ; nevertheless, it still continues to flourish. Since the revelations of Doctor Campbell Munro in 1893, who traced an extended epi demic of typhoid fever in Renfrewshire, Scotland, directly to the sale of cheap and uncleanly ice creams, not a year has passed without similar epidemics, from not a year has passed without similar epidemics, from
like cause, being discovered in America and Great Britain. The report of Doctor Munro shows that the Britain. The report of Doctor Munro shows that the
ice cream was prepared on premises where was an un ce cream was prepared on premises where was an un who, for a considerable part of the time she was ill had been in inmediate contact with the business.
Several epidemics due to ices have been reported in Michigan, Wisconsin, Illinois, and seven middle and southwestern States. Mr. Harris, the medical officer of health for Islington District, London, England, caused samples of the ices sold upon the streets to be examined by Doctor Klein, the well known pathologist, who found all were swarming with pathogenic bacteria; and Mr. Harris' own investigations of the premises where the stuff was manufactured were equally startling: He found most of the ice cream vended by cheap peddlers was unfit for use; the methods of manufacture were of the filthiest, including the blowing of eggs, foul utensils employed, utter disregard of any measures looking to cleanliness, storing in evil-smelling rooms (also employed as sleeping apartments) and the use of stale and half-spoiled eggs and milk.
In most of the cities in the United States precisely the same conditions obtain. The itinerant cheap ice cream trade is almost wholly in the hands of the lowest grade of Italians, Polish Hebrews, and Armenians, among whom anything approaching sanitation, or even ordinary cleanliness, is unknown. Doubtless boards of health, in most instances, have the power to deal with this unrighteous traffic, but, either through ignorance or a supposed trivial character, it is generally ignored.
Typhoid is a filth disease, communicated almost al-ways-if not invariably-through the fæcal excretion; this should be remembered. But it is not typhoid alone that is to be dreaded, for many of the contagious and infectious diseases may be disseminated in the same way; further, the stale milk and eggs are very provocative of forms of ptomaine poisoning that in its milder forms is assumed to be "bowel complaints" dependent on temperature changes, but in its more virulent phases leads to suspicions of mineral toxics employed for purposes of suicide or assassination. Many puzzling cases, especially among children, leading to fatality, d

## anit

Little fear may be had regarding the wares of the reputable confectioner or caterer, however. The very character of his trade, the standing of his customers, ete., are such he cannot afford to conduct his business on any but the most sanitary and cleanly basis.

## Government Ambulances.

In our last issue we described one type of government ambulance. We now understand that an Indiana firm of carriage and wagon makers has received orders for 500 Rucker ambulances since the outbreak of hostilities, and up to the present time they have shipped 316, and 50 are to be delivered weekly, until the order is filled. Under the front end of the wagon, and extending the full width of it, is a water tank $16 \times 19$ inches. The inside of the wagon is fitted to accommodate six persons. Two litters are made to fit in the bottom and they may be taken out when not in use. Two litters are also suspended from the top, leaving room for two wounded soldiers to be placed above their companions at the bottom of the ambulance. The ambulances are finished in natural wood. The same company also received orders for 1,000 army wagons: 500 of them have been delivered and the remaining 500 are being made.

The Hawa
Now that the United States has annexed the Hawaiian Islands, intense interest is being manifested in the commerce of these islands. We shall, of course, now reap trade advantages as the result of their union with the United States; but it is a satisfaction to know that last year the people of Hawaii bought nearly $\$ 8,000,000$ worth of goods from all parts of the world and over 75 per cent of these goods came from the United States.

## PUEBLO ARTS AND INDUSTRIES.-III. by cosmos mindeleff.

Although blanket and textile weaving is the art product which has made the Pueblo Indians most widely known, the allied or antecedent arts of basketry and pottery have equally developed. The con ditions under which
these people live are so these people live are so
simple and their methods are so primitive that the connection be tween the three indus tries is still apparent, even to the casual investigator. The elaborate blankets are a development from the simple baskets, and the fine pottery, easily the best made by any tribe in the United States, are little more than baskets of clay.
Of all the Pueblo tribes, the Mokis, or Hopi tribe, in Western Arizona, excel in mak ing baskets. They have them of all kinds, varie ties, and sizes, from the roughly made panniers of twigs designed to carry heavy loads upon the back to the fine plaques so closely wove plaques that they will hold water, and ranging through all degrees of
ornament. The introornament. The intro
duction of beasts of bur duction of beasts of bur den, horses and burros,
 occurred at a much later present day much of the carrying is done on the backs tration shows the regular water jar in various stages of men. As the villages are located on the tops of the of manufacture. mesas, 500 or 600 feet above the valleys where the cultivated fields lie, all the products, as well as wood and water, must be carried up to them. Constant practice has made the people perfect in the carrying of loads, and long strings of women can be seen any morning winding their way up the devious and difficult trails to the mesa summit, each loaded with a water jar filled from the wells below ; while at the harvest season it is or more watermelons in a huge pannier on his back, upon itself like a rope. The base or commencement slowly toiling up the trail. One would think that of the coil is placed in one of the flat baskets befor such work would produce great muscular development, but it does not. The average In dian has no apparent chest muscles, and many a man climbs the trails to the villages loaded with over 200 pounds of field produce, and does it without distress, notwithstanding that he has no visible calve he has no visible calve to his legs. A whit man would break down at once under such work, but the natives are apparently inured to it.

Food products of all kinds are stored in the houses in baskets, most of which are bowl-lik or tray-like in form, like or tray-like in form, lik the examples shown in the illustration. These
are usually made of the are usually made of the
split leaves of the yucsplit leaves of the yuc-
ca, which are flexible but very tough, and in use last for many years. In making the basket the work is commenced in the center, as in th in the center, as in the example shown on th left of the woman in the illustration, and the ends of the split leaves are turned over to form the finished edge, as in the finished specimen shown on the right. The pleats form a design like that seen in the picture. They are the everyday working baskets of the people and are seldom ornamented in any other way.
Notwithstanding the pre-eminence of the Pueblo
ments can be picked up. When the clay has been put


HOPI BASKET MAKER.
ery few pots are lost in burnin
What the ancient practice was in burning pottery has not yet been determined. At the present day compacted sheep dung is the material used, and this is taken from the corrals where the sheep are placed every night. In course of time a well compacted layer of the material is formed in the corrals. This is taken out, dried, and stored for future use. When the vessels are ready to burn, they are stacked up in some place, away from the village, well sheltered from the wind, and the dung is placed ielow and around them. It burns slowly, with a steady heat, and the fire is carefully attended by the old women, who spread windward side, unti pleted.
In the Indian system of belief, animate spirits inhabit inanimate ob jects, and, in the manufacture of such objects. the idiosyncrasies of till spirits must be cousidered. Thus, in burning pottery, certain things must be done, or the process will result in failure. Prac tically, every jar or bowl which is decorated has a line about its neck or mouth. But this line must never be complete; it must be broken somewhere to permit the egress of the spirit of the pot. I this is not done, the spirit, in struggling to escape during the burn ing, will rend the piece to fragments. Similarly in the coiled baskets, the end of the coil must be left unfinished, or serious trouble will re sult.

When a pot is no longer wanted for use as, for example, when it is placed upon a grave it is "killed" by punch ing a hole in the bot tom. The variety and detail of this belief is described, and the pot remains in this basket until it is almost inflnite, and can only be alluded to here. dry enough to handle. In some antique specimens of pottery obtained from ruins which were inhabited at finest specimens of aboriginal pottery so far found, the

In Brussels, Belgium, the payment of a special fee of 3 cents secures immediate delivery of a letter, postal, or parcel by a bicycle postman.-Uhland's Wochenschrift.

## Gold Beating

Imagine a $5 / 8$ inch cube of pure gold that could rest on one's thumb nail being hammered and expanded until it would cover the floor of a room 12 feet square, or an area of 144 square feet-or a mite of the precious metal of the size of a pin's head being flattened and extended to 25 square inches-and some idea may be gained of the wonderful ductility of this most beauti ful and costly of all the metals. Few, perhaps none of the arts have come down to us from mediæval periods with so little change as that of gold beating. Three thousand years ago it was practiced in al essentials as it is to-day, for the coffins of Egyptian mummies are ornamented with gold leaf as thin and fragile as that of modern days. Machinery has never been able to successfully supplant the time-honored process of hand work.

It is supposed by some that an alloy of the baser metals is essential to a great reduction of gold, but this is not so. On the contrary, alloys tend to lessen its malleability. Hence, as gold leaf is sold by superficia measurement rather than by weight, there would be little or no advantage in using an alloy simply on the score of economy ; but it imparts to the metal greater rigidness and lessens the liability to adhesion to the leaves of parchment or paper between which it is beaten. The alloy is also essential in giving a desired color. Taking 1,000 as the standard of purity, the gold used in the beater's art is from 960 to 985 , or about $221 / 2$ carats, 24 carats being taken as the standard of purity.
The alloys used are silver and copper, in varying proportions, according to the color desired : for red gold, copper is freely used as an alloy; for pale yellow, a small quantity of silver, etc. The workman having decided on the color desired, places the gold with it alloy, together with a small quantity of borax and sometimes corrosive sublimate, in a small crucible and fuses the mass, subjecting it to greater heat than is tenuity. When sufficiently heated it is poured into small cast iron mould coated with what is technically termed " brime," being usually burnt talc, which pre vents the gold from adhering to the mould when re moved. This ingot is usually 1 inch wide, 5 inches long, and $\frac{3}{16}$ of an inch in thickness and weighs about 50 pennyweights, or $21 / 2$ oz. Troy. In some establish ments in this country the ingots weigh 55 penny weights. The ingot is next annealed by being ham mered on an anvil and then placed in a coal fire and brought to a red heat and allowed to cool, after which the laminating process follows, which consists in pass ing the gold through steel rollers several times, the rolls being gradually brought closer together to reduce the thickness of the metal until the little ingot is transformed into a ribbon from 7 to 8 yards in length, the width remaining 1 inch, as at first. The workman then, with his shears, cuts the ribbon into little sections 1 inch square.
These pieces are next placed between small sheets of very tough paper, manufactured chiefly in France and Germany. These sheets or leaves are $31 / 2$ inches square and from 180 to 200 in number. The package is known to the trade as a "kutch." The small pieces of gold are placed exactly in the center of the paper, so that the edges form a vertical line. This is essential to a uniform expansion of the metal in the process of beat ing. Next, a "band" or case of tough parchment open on two sides, is drawn over the packet and an other case over this, covering the two edges left ex posed. An anvil of marble or granite, 9 inches square,
with its base resting on a foundation, sunk 2 feet in the ground to secure firmness, is employed in the beat ing process. The face of this anvil is surrounded by a hard wood table with raised edges on three sides, while in front, next to the workman, is a leather apron with an expanded pocket for catching waste particles of gold. The hammer used has a circular and slightly convex face, 4 inches in diameter, and in the first or "kutch" process its weight is 18 pounds. The blows, which fall with absolute regularity, are first directed to the center of the packet and then with lessened forc toward the edges, until, on removing the bands, the little films of gold are found to have reached the edges of the "kutch," when the beating is discontinued. This process occupies about one-half an hour. The next operation is called "skewing," that is, the gold lear means of delicate wood pincers, wood being used be cause gold in this reduced state would adhere to metal Each gold leaf is next divided into four equal parts, being cut by a tiny cane or bamboo appliance, having sharpened edges, called a "wagon." These subdivided pieces of gold are next placed between the leaves of a shoder," similar in construction to the "kutch," excep that the leaves composing it are vellum instead of paper; it is also somewhat larger, being 4 inche square and $3 / 4$ of an inch thick. It will be noted that now the original leaves of gold, say 180 in number have been increased by cutting to four times that number, or 720 .
The filling of a "shoder" requires one hour. Then th
beating is continued with a hammer of lighter weight usually about 12 pounds, for two hours. The sheets of paper and vellum, between which the gold is placed are invariably coated evenly with the finest talc, or some similar material, to prevent the adhesion of the metal. During the beating process the workman changes the hammer from one hand to the other, and shifts the packet, but never varies the regularity and precision of the stroke. He also frequently "riffles" the leaf during the process, that is, he removes the bands or cases and bends and manipulates the package to prevent the gold from sticking to the sheets with which they are in contact. When the gold in this oper tion has been expanded to the edges of the "shoder" it is again subdivided, each leaf being cut into four parts, being now sixteen times thinner than it was in the first process ; in other words, instead of the origina 180 leaves of gold, there are now 2,880 , but trimming and imperfect leaves reduces the final output of th "beating" to 2,000 . These reduced pieces are placed between the leaves of moulds similar to the "kutch" and "shoder," except that the sheets are made of a skin of reat tenacity, fine texture, and perfectly smooth sur ace. These skins are made from the large intestine of he ox: They are stripped off in lengths of 2 or 3 fee and treated to an alkali solution to free from grease then thoroughly cleaned, and doubled by placing th wo mucous surfaces together, which causes them to unite, after which they are treated to various chemica applications to increase the toughness and the bette adapt to the purpose intended. This is the most expen sive part of the gold beater's art, as no less than 350 to 00 oxen must be slaughtered in order to obtain enough kins for one mould. A mould can only be used for bout 200 beatings, after which the skins are used for he "shoder," which does not require a membrane of such perfect texture. These moulds are more expensive
than the gold they contain, each mould costing not less than $\$ 45$. The contents of one "shoder," when di ided as indicated, will fill three moulds.
The gold leaf having been placed in the center of the mould, as in the former operations, it is beaten for fou hours with a 7 -pound hammer; also during this proces is is frequently annealed without removing it from the mould. When the final beating is completed, the gold is reduced to about $\frac{1}{2} \frac{1}{0000}$ of an inch in thickness, or at least 1,000 times thinner than ordinary printed paper-truly a marvelous result. The above is abou the standard thickness of gold leaf employed for de corative purposes; for dentistry it is much thick and without alloy.
Following the final beating of the gold is anothe peration called "booking," done by girls, as thei ingers are supposed to be more deft and delicate than those of boys. In some establishments the leaf fo booking" is sent to the homes of the girls, where the work is done, but this is not general. The finished eaf is taken with the slender wood pliers and placed between leaves of tissue paper coated with red chal applied by a soft brush ; the chalk prevents adhesion Gold leaves to the number 25 constitute what is techni cally called a "book," and 20 books make a "package" that is, 500 leaves. The standard weight of a book is exactly $5_{{ }_{1}^{1} 0}{ }^{3}$ grains of gold. Thus the original ingot weigh ing say 50 pennyweights ( $2 \frac{1}{2}$ oz. Troy) has been manipu ated for thirty hours, or three working days, and the inal product is 80 books of 25 leaves each, with a rebat the workman of the leaf trimmings, more or less, a cording to his expertness, for which "scrap" or trim nings he receives credit at the rate of $\$ 1$ per penny weight if in excess of a specified amount, and with debit in a like sum if there is a shortage. The standar or a "beating" is 80 books. The most skilled work
man rarely produces more than 160 books (two beat ngs) per week.
As gold leaf is not sold by weight, it is to the interes of both employer and employe to carry the expansion of the gold to the greatest limit, and now and then workman becomes quite proficient in this direction but the compensation at best is small, $\$ 3.20$ per beatin being the present standard of wages in the Unite States. This would only yield the best workmen $\$ 6.40$ per week, which, of course, would be supplemented by the credit for scrap returned; but $\$ 15$ per week is under stood to be about the maximum compensation, whil many workmen less proficient eke out scarcely mor than $\$ 1.50$ per day
The business in the United States is confined chiefly to New York and Philadelphia, there being some 20 or 25 establishments in the two cities, employing some 200 workmen. While London, Paris, and Florence are im portant centers of the industry, Germany is the chie competitor. The most relentless foe to the gold beater' product is a cheap and spurious substitute known as "Dutch metal," which is imported in great quantities which, however, contains no gold, being composed chiefly of copper subjected to a treatment whic ives it great brilliancy and a resemblance to genuin gold leaf; this inferior metal is used for stamping books, gilding picture frames, wall paper, interior house decoration and many other purposes for which genuin cold leaf was formerly employed, and the only apology
metal in the United States is about $\$ 1.25$ per package 20 books of 500 leaves), while that of genuine gold leaf $\$ 7$ for the same quantity.
It would seem in a country like this, where the pro duct of gold mines has reached such enormous propor tons, the business of converting it into articles of sta pe commercial value would take foremost rank; bu such is not the case, because we have not yet practi cally solved the problem of cheap labor.
The art of gold beating requires years of apprentice ship; it also requires intelligence, skill, and deftnes in the use and care of tools. The tools must be fre rom moisture and of uniform temperature to insur success in the varied manipulations of the precious metal with which they come in contact. It is hoped the day is not distant when the gold beater's pro ession will receive the recognition it seems to so justly merit.

## Sain's Loss of Empire

On his accession to the Spanish throne in 1556 Philip II. found himself ruler of the greatest empire the world had seen since Rome was at the zenith of it power. Its navies were famous for their greatness and hey ruled the ocean, its armies were famous for thei prowess, she swayed the destinies of Europe, had pos essions in all the continents, and may be said to hav owned the Americas, North and South. Samuel John on, writing as recently as 1740 , when complaining of the poor people's hardships, said

## Are there no regions yet unclaimed by Spain Quick, let us rise, those happy lands explore, And bear oppressions' insolence no more.

The Spanish empire was the result of marriages, conquest, and discoveries; its decline and fall may b ascribed to the ruthless character of the Spanish people When Columbus discovered San IDomingo, it had population of $2,000,000$; in 1530 this population had dwindled to 350,000 . Cortez in Mexico and Pizarro in Peru were ideal Spanish conquerors.
In the latter part of Philip's reign [he died in 1598] Spain lost all, or nearly all, of her dependencies in north Africa, and early in the next reign, Burgundy Naples, Sicily, and then Milan. In 1609 the Nether lands were lost ; in 1628, Malacca, Ceylon, Java, and other islands; in 1640, Portugal; in 1648 all claims wer renounced to Holland, Brabant and parts of Flanders in 1649 were lost Maestricht, Hertogenbosch, Breda Bergen-op-Zoom, and many other fortresses in the Low Countries, in which year the crown tacitly surrendered supremacy on the seas to northern Europe; in 1659 Rousillon and Cardague were ceded to France, mak ing the Pyrenees the boundary between the two coun ties; in 1668 to 1672 , the last of Flanders was given up in 1704, Gibraltar was lost ; in 1791, the Nootka Sound settlements; in 1794, San Domingo; in 1800, Louisiana in 1802, Trinidad; in 1819, Florida; from 1810-21 were lost, Mexico, Venezuela, Colombia, Ecuador, Peru, Bolivia, Chile, Argentina, Banda-Oriental, Paraguay Patagonia, Guatemala, Honduras, Nicaragua, Sa Salvador, Haiti, and numerous islands pertaining to the American continents, all the possessions in the Western Hemisphere, in fact, save Porto Rico and Cuba, which already apparently are as good as lost The future of Spanish Morocco, and of the Philippine Caroline, Sulu, Ladrone and Canary groups has yet to be settled.-Memphis Commercial.

## The Launch of Our First Torpedo Boat

The torpedo boat destroyer " Farragut" waslaunched at the yards of the Union Iron Works, San Francisco, on July 16. This is our first vessel of the type, which is considered so valuable by foreign navies and which proved so worthless to the Spaniards. The "Farragut" was authorized by the act of 1896 , and it is built on the lines of the British torpedo destroyer "Desper ate," but, in building the vessel in America, the British boat has been enlarged and improved upon. The ves sel is 210 feet long; beam, 20 feet; draught, 6 feet 3 inches. The displacement of the "Farragut" is 273 tons, and, like the "Desperate," it is classed as a 30knotter. The coal capacity of the "Farragut" is about 80 tons. She is built of the best nickel steel, and is unarmored. She has a battery of 6 -pounders The contract price of the "Farragut" was $\$ 227,500$. Great Britain has six vessels almost like the "Desper ate." The engines of the "Farragut" are of the verti cal expansion type, operating twin screws.

Rearming of the "St. Louis."
The converted auxiliary cruiser "St. Louis" is now furnished with four 5 -inch guns. These are installed one amidships forward, one amidships aft, and one on each side. The forward and aft guns are stationed so that their range of fire will extend through an arc of 270 degrees each. By this arrangement the " st . Louis" now has as formidable a broadside fire as the "St. Paul," "Yale." or "Harvard," each of which has six 5 -inch guns distributed along its sides. In addition to her 5 -inch guns, the "St. Louis" still retains her secondary battery of eight 6-pounders.

## RECENTLY PATENTED INVENTIONS

## Bicycle Appliances.

bicycle - Holder.- Charles B. Durfer an Frank M. Williass, Belleville, N. Y. The purpose of this invention is to provide a bicycle-holder which saal
be simple, inexpensive, and compact. According to th invention, a vertical sapport is recessed to receive th tread of the wheels. To this support an arm is piv A recessed block pivotally mounted, is adjustably secured to the arm, whereby, when the latter is swung outwardly from the support, the recessed block can be engaged with the floor
bicycle-Stand.-Jobn F. Bengert, Brooklyn, N Y. To provide a stand which can be permanently carried on the bicycle frame without interfering with the action o floor of a building and which elther on a road or on the floor of a building and which enables the bicycle to be devised a support consisting of a bracket attachment for the bicycle frame, a sleeve or socket held to rock upo the bracket attachment and a standard having end move ment in the sleeve or socket and provided with a foot,
By the arrangement described, the standard may be placed at an inclination to hold the frame in an upright position when the rider has dismounted, or the standar so that ite wheels will clear the ground or floor

Electrical Inventions.
ELECTRIC-RAILWAY. - William W. Doty, Ne York citr, James A. McKnight, Mount Vernon, N Y this invention is to propel cars and trains while main taining a steady current for running the cars properly without danger of deadly overhead or rail current In addition to a feed wire, there are also emploged a sectional working conductor and a series of circuit controllers, one for each section of the working con ductor. Each of these circuit-controllers comprise
a switch made with a conducting and a non-conducting section, an elictric actuating.device electricall ing section, an elsctric actuating.device electrically
connected to the working conductor section belonging to that controller and two circuit-closers controlled by the switch, so arranged that only one of them can engag the non-eonducting portion of the switch at a time. One circuit-closer operates when the electric actuating-device is energized to connect the feed-wire with the working conductor section belonging to the same controller. The other circuit-closer operates when the electric actuating
device is de-energized to connect the feed-wire with the workin
electric cut-out.-Harry A. Lewis, Norris own, Pa. This invention provides an electric cut-out designed for use in a ine-wire to relieve a buildin from danger of a strong or excessively charged current produced by lightning or other causes. the apparatu breaking the carrent automatically and diverting the a current from the building. The cut-out is provided with a thermostat comprising a tube flxed at one end, a wire coil in the tube, a rod held to press the coil agains the tube to heat the latter, and intermediate mechanism for connecting the tube with the circuit-breaker. srong or excessively charged current heats the tube an ases it act on the creang device.
FUSE-HOLDER, CIRCUIT-BREAKER, AND hin Ning-Arrester.-Harry a. Lewis. Nor nistown, Pa. To provide an improved fuse-holder, cir uit breaker, and lightning-arrester arranged to prote instruments and buildings from the effects of high-volt evised means whereby the current is either passed into the earth or let out by a return wire. The device comprises a stationary contact adapted for connection with an electric circnit, a movable arm likwise adapted fo mection with the circuit, a stationary insulating-block from the station movable contact and separating released by a high.tension discharge for holding the ovable contact normally stationary. This contact, hen released, is arranged to move flrst into engagement with the stationary contact, and then away therefrom.
insulator.-Charles L. Wingard, Walla Walla, Wash. This insulator is constructed has itsedges provided with interlocking shoulders, and ha a head provided with a notch leading to the bore thereof hrough which notch the conductor may be passed. Th nsulator may be applied after the wiring is done, or may be first put in place and the wire then run through
it, as may be most convenient. When once in place, the insulator cannot be removed accidentally.

Mechanical Devices.
Stencil-making maciine.-Julius SternELD, New York city. The purpose of this invention pronde a madila puncturing paper accurately outlines of monograms. The machine is arraned to permit the operator to form any desired number of stencils at the same time, and comprises a depending bearing mounted to turn a counterbalanced arm pivted in the bearing, and a casing provided with a rod projecting from its upper face and with a tube projecting rounted, on the shaft of casing a cone-pulley ecured, to which a needle-carrying rod is connected projecting out throngh the tube. On the counterbalanced arm are pulleys and below it, a driven puliey is mounted Tightening-pulleys are carried by the support of the ELEVATOR FOR GRANULAR MATERIAL. Apostolos Marangos, Marseilles, France. To pro or lonaw or he type used on hoats or ponoon or loading or unloading ships, this inventor has devise he float on which it is placed To mast, a boom mozably connected. A hanger is suspended from the boom to swing about a horizontal axis. In the hanger
below this axis and extending crosswise thereof, a hori
zontal shaft is journaled. On the horizontal shaft an zontal shaft is journaled. On the horizontal shat an
elevator is freely suspended, comprising a vertical screw haft and a casing surrounding the shaft engaging gea
wheels located on the horizontal shaft and vertical shaft pulley is mounted on the horizontal shaft and is con nected to rotate with the gear-wheel thereon. Pulley re also mounted to roxate about the suopenion-axis the han
leys.
rotary engine.-Samuel t. Wilson, Charle n, W. Va. This rotary engine comprises a cylinde and forming an annular cylinder open at one end abutment projecting from the casing-head and cylindrical piston rotating concentrically with the cyliner and having a flange at its end of greater diamete han the body and projecting longitudinally into the nular cylinder. This flange has a slot extending cross its face. A piston-head fits the slot and cylinde ange is a stem attached to the head. A cam-ring sur ounds the piston, and lugs attached to the stem engag the cam-ring to reciprocate the piston head when passes the abutment.

## Railway Appliances.

PNEUMATIC RAILWAY-SIGNAL. - Lewis S Brown, Columbus, O. This invention is an improve rising an air-pumping apparatus operated by the pass ge of the car-wheels and a distant air-motor operate ir-compressing or pumping device actuated by the assing of the train, leads an air-supply pipe. A re
action wheel composed of hollow arms, having tange tial operings at their outer ends and having a hollow xis connected with the air-supply pipe, is also pro rojecting lugs or arms. A bell surrounds the disk, an spring-controlled striker is partly interposed in the paths of he lu
sound the bell.
aUTOMATIC APPARATUS FOR PREVENTING ollisions. - Johannes Vermerren, Hellerup lisions between trains, and consists of mechanism be ween the rails which is set in action by the train when rawn up at a statiou or stopping piace. This mechan sm actuates an appliance arranged at a distance fro he stopping place in such a manner that the applianc quently arrive at that point and thus stops it, independ ntly of the engine driver and irrespective of any signa being at "danger" or at "safety." The appiance question is placed at such a height from the track tha it can engage with an arm extending from the side he locomotive arriving at that point and thereby actuat the brakes. The appliance is brought into operative
position by means of the mechanism at the stopping place, which is actuated by an entering train.

## Miscellaneous Inventions

adjustable spring-bearing.-Nicolas Du-AL-PiHET, Paris, France. as bicycles, and bas double springs or cushions be ween each member of the fork and the wheel-axle, on spring of each set being a compression spring and th ther an expansion spring. Both springs are located in
paper plant-box. - Jobeph t. Craw, Jerse ity, N. J. The purpose of this invention is to provid paper plant. box in which seedlings may be grown an
poung plants reared. The paper-box is made from blank comprising a series of panels of the shape parallelogram, one of the end panels being provided with a side flap. All of the panels are provided with rectangular flaps at their lower edges, each of the batto aps being provided with a diagonal slot to receive a flap when forming the box. Boxes of this square form hav closely packed economizing space, since they may rame, each box ftting directly against its neighbo
CORNICE-LADDER.-James W. Anderson, Phila elrohia, Pa . To provide a ladder especially adapted to be hang from a cornice, which ladder shall be durable us new iasily applied, this inventor has devised var one side of the ladder, a horizontal platform is secure Two fender-rails are located respectively at each The fender-rails extend laterally beyond the side of the ladder opposite the side having the platform. A guar rail is secured to and extends transversely across the ender-rails, and has its ends projecting beyond BUUDING.TRUSS - WHuAM A Borina,
BUILDING-TRUSS. - William A. Boring, New truss for use in spaces which will not receive an ther form of truss of equal bearing capacity in propor ion to its weight, and which possesses great late structure supported by the truss. The trues comprises wo base-chords, an apex-chord, struts extended from he base-chords to the apex-chord and a center-beam extended longitudinally of the truss, at its base. From about the center of the struts to this beam, knees extend From absut the center of each strut to the base-chor the struts in three directions.

## Designs.

JAR. - John Schirs, Anderson, Ind. The leading eature of this design is the sectional conflguration o the mouth of the jar, with an external outward flare in
an upward direction and with an inner flared portion uniting with the rounded inner surface. The jar-body with the ornamented cylindrical neck
Note.-Copies of any of these patents will be furnhe name of the patentee, title of the invention, and date of this paper.

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marked or labeled.
(7468) S. R. M. asks: Which of two glass bails, No. 1 and 2 , exactly the same size, weight an naterial and condit:ons, would be the most likely break were they brought together at different speeds, No. apeed to be the sames A. The two glass balls will be subject to an equal breaking force at moment of collision. This is in accordance with Newton's third law of mo tion. Action and reaction are equal. Or, as it is stated more fully in Kent's "Pocket Book," "If a force act to change the state of a body with respect to rest or motlon he body will offer a resistance equal and airectly op posed to the force." The answer then is, Both will
break if the force of the blow is sufficient to break either. Yet it is a common belief among sailors that in a collision the vessel which is going faster is injured less than the one that is moving slower. This notion does not seem oo be supported by the result of the recent collision of the "Bourgogne " and the "Cromartyshire." The ball No. 2, moving twice as fast as No. 1, will have four time as heavy a blow ing it. But ball No. 1 cannot receive the full energy of No. 2 , any more than an egg can receive and use up the full energy of the blow of a sledge. After the sledge has demolished the egg, it will deal a heavy blow to the surface upon which the egg lies; so ball No. 2 can over ome the energy of No. 1, and its fragments will move n in the same direction as before the colision with fourth having been used in stopping No. 1. No. 2 can onls spend against No. 1 as much energy as No. 1 possesses and No. 1 can use against No. 2 the same amount of nergy. Now if this will break one of the balls, it will reak both of them, since, by the conditions of the problem, they are equally strong. This was well underported hy Plato, as asking: "Is not the atriker ported hy Plato, as asking: "Is not the
with the same blow as he who is struck ?"
(7464) J. W. E. says : How far can one of our large battleships be seen wth aid of glass? In looking through glasses? A. The distance at sea at which a vessel may be seen with a glass depends upon the height of the vessel's upper works, as well as the height of the observer above the sea. When the heights of放 vessels are from 25 to 30 feet, their upper works may eseen at 13 miles. From a masthead 100 feet above he sea t.e upper works of vessels may be seen 20 miles in clear weather. The smoke of stean
position from 25 to 30 miles distance.

INDEX OF INVENTIONS
For which Letters Patent of the United States were Granted JULY 19, 1898,

AND EACH BEARING THAT DATE. [See note at end of list about copies of these patents]

607.509
607,691
607,675






607,501
60,733
60,762
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