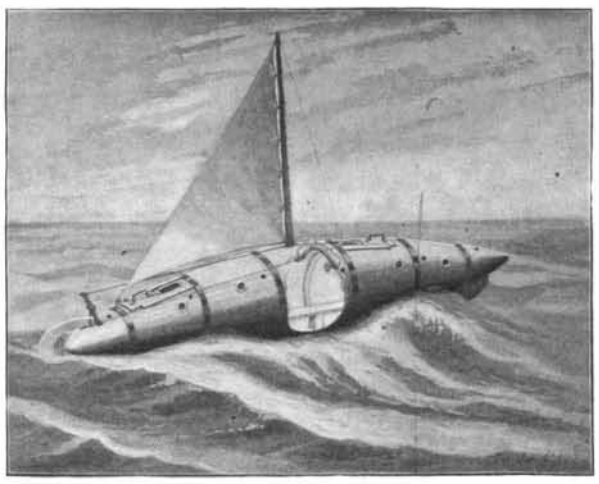
A NEW LIFEBOAT.

The accompanying illustration represents a novel lifeboat which has been devised and patented by James Mitchell, Sr., of Arrow River, Manitoba, Canada. In general form the boat is cigar shaped, tapering from the middle to both ends, and is constructed either of metal or wood. The boat pictured in the engraving is formed of wooden staves, surrounded by hoops and strengthened from within by stout ribs. A large conical block at each end of the boat is provided with a passage or rope guideway, whose ends are at right angles to each other. A rope passes through these guideways, extends through the whole length of the boat and is attached to a ship by the usual means. Within the body of each conical block and intersecting each rope guideway is a recess containing a spring-pressed block. When the rope is removed, the block is automatically forced down so as to prevent the entrance of water. Should it be impossible to lower the boat in the ordinary way by letting out the suspending rope, it may be launched upon an even keel by severing the rope from within.

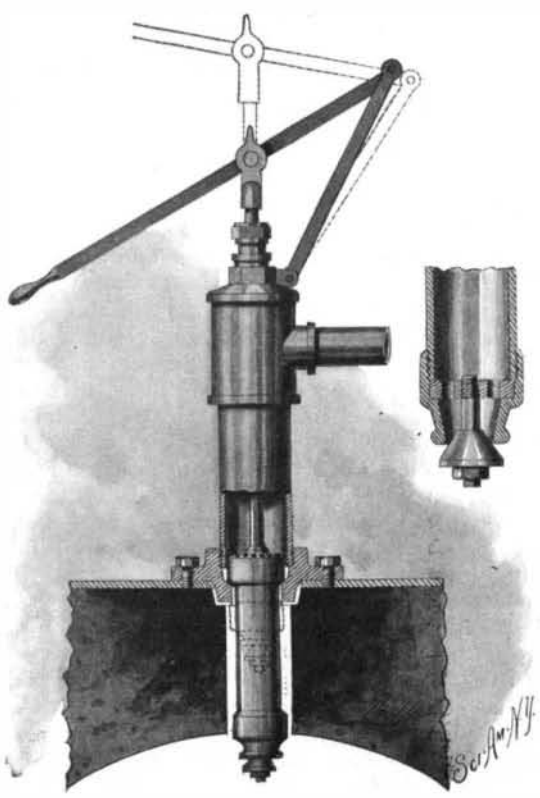


A NEW LIFEBOAT.

Hatchways for the entrance and exit of passengers, a rudder, and steering ropes operated from the hatchways or from within the boat, are all provided. A heavy keel gives the boat stability and rights it, should it be overturned. Ventilating pipes are provided which can be closed by valves to prevent the entrance of water.

A NOVEL SPRAYING DEVICE FOR CARBURETERS.

In using spraying devices for the introduction of oil and hydrocarbons as fuel, it frequently occurs that the intense heat to which the nozzles are subjected causes them to burn out. New nozzles must then be substituted, necessitating the loss of much time and causing considerable expense. To avoid these inconveniences, Mr. George H. Weeks, of No. 412 East One Hundred and Twentieth Street, New York city, has patented a spraying device in which the nozzle is withdrawn from the heated chamber when not in use. Referring to our illustration, it is seen that the spraying device is provided with a protective casing fixed to the walls of the carbureter and screwing into a plate, whose inner surface constitutes a valve-seat. Within the casing a movable cylinder is fitted and provided with a perforated cap, through which oil may pass. The inner edge of the cap forms a valve adapted to engage the valve-seat mentioned previously, so as to prevent the oil from flowing around the cylinder. To the other end of the cylinder another cap is threaded, which forms the head of the nozzle. Into the outer end of this cap an adjustable cone screws, by means of which the size of the spray may be regulated. To the perforated cap upon the inner end of the cylinder a rod is attached which extends through the casing and is pivoted to a lever fulcrumed upon a link. As soon as the spraying is discontinued, the nozzle is withdrawn from the immediate action of the heat merely by operating the lever. In manufacturing illuminating gases, spraying devices of this character would be exceedingly useful, preventing, as they do, the rapid burning out of nozzles and obviating the necessity of frequently substituting new ones for those which have been destroyed.



A SPRAYING DEVICE FOR CARBURETERS.

The Heat of the Incandescent Electric Lamp.

The incandescent electric lamp is essentially a device which transforms electricity partly into light but mostly into heat, says The London Lancet. As is well known, the carbon filament of the lamp is a substance offering great resistance to the passage of the current, and the product of this resistance is light and heat. It is an instance of the translation of one form of energy into another. It may not, however, generally be known that the light produced is but after all only a small percentage of the energy thus manifested—some 5 or 6 per cent only at the most. This fact is very important, bearing in mind a very common notion that the electric incandescent lamp is free from the heat rays. It is true that the lamp when working is not comparable with a flame or naked light, but at the same time the heat evolved is such as may lead to ignition. We are disposed to emphasize this point because the incandescent electric lamp is used for the purposes of illumination and decoration in shops without any regard to the possibility, nay, probability, of fancy goods being fired which happen to be contiguous. Indeed, so firm is the idea that the incandescent electric lamp is free from heat that it is frequently to be found buried in a mass of easily ignited and highly inflammable material. This is a mistake, and care should be exercised with the electric lamp in its application in this connection, but the risk, of course, is not so great as where naked lights are employed. We have found by experiment that on immersing a 16 candle power lamp (100 volts pressure) in half a pint of water, the water boils within an hour and in proportionately less time when a 32 candle power lamp is substituted. If again the lamp be buried in cotton-wool, the wool soon begins to scorch and ultimately to burst into flame. In one experiment which we tried, the bursting into flame of the wool was accompanied by a loud report, due to the implosion of the lamp. It clearly appears from this that the incandescent electric lamp cannot be regarded as an unlikely means of starting a serious fire, and shopkeepers, especially those who exhibit highly inflammable fabrics, should know that there is risk in placing such goods too close to the lamp. The lamp in contact with celluloid fires it in less than five minutes, and therefore the danger is particularly obvious in the case of toy shops, where electric incandescent lamps are often suspended in the midst of toy celluloid balls.

Too Poor to be Economical.

Several leading Americans who have been seeking to place contracts in this country, says the English Iron and Coal Trades Review, both for labor-saving machines and for other American notions of merit, have informed me that they are surprised to find how generally the complaint is made that our manufacturers are too poor to be able to afford the luxury of more economical methods and appliances. In a number of cases this is known to be the case, but it seems to be more largely the fact than most people anticipated. And yet it is not so surprising after all. The majority of the large concerns engaged in the iron and steel industries of this country are limited liability companies, and it rarely happens that limited companies are allowed by their shareholders to provide as large a reserve as they ought to do in order to meet all emergencies. In many cases almost the last sixpence has been paid out in dividends, and repairs and renewals are inadequately provided for. In some industries this might not be a matter of much concern. In the iron and steel industries it counts for a great deal. The truth is that, as history has been lately made in these industries, it has almost been necessary to completely reconstruct mills, forges, and other plant, every ten years, so that any plant kept in use for a longer period has become more or less antiquated. Our American friends appear to have realized this condition more fully than ourselves, and when they find that a plant is no longer up to date they make no fuss about removing and replacing it. It is their readiness in this respect that has brought them to the front; it is our backwardness in the same essential that has left us in many cases lagging behind.

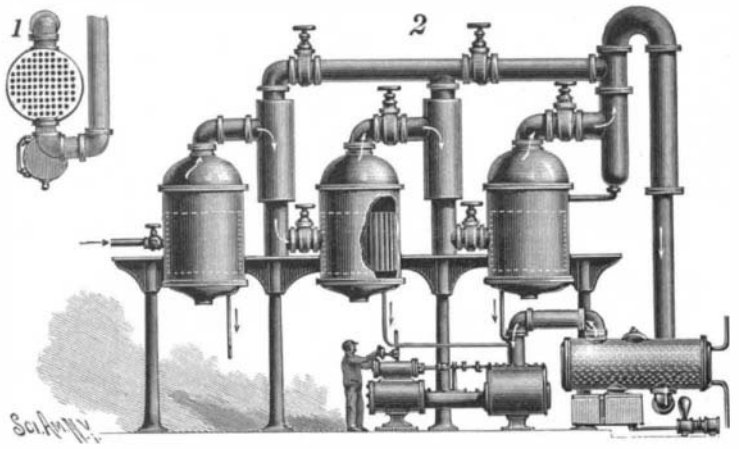
Patterns and Models.

It has been decided by the Board of United States General Appraisers that "dress patterns are not models of invention." A case was brought before the board in which it was claimed that an importation of muslin dress patterns, made up and stiffened to show the effect of the garment, ought to be exempt from duty under the provision of the law bearing upon "models of invention and other improvements in the arts." General Appraiser Wilkinson affirms that, while it may be fairly assumed that a pattern is a model, and that dressmaking is an art, the question to be determined is whether a change of fashion in dress is an invention or improvement in the arts within the contemplation of the statute. In rendering judgment in the case he says:

"There are various devices in wearing apparel that are patented, such as skirt supporters and glove fasteners, and these would be inventions within the meaning of the law; but a change from a tight to a balloon sleeve and from a full to a narrow skirt are not patentable inventions, and only a vivid imagination could discover an improvement in the arts in the continual ebb and flow in the tide of fashion. We find that the goods are not models of inventions or of improvements in the arts."

A SIMPLIFIED VAPOR-CONDENSER FOR VACUUM PANS.

In the apparatus now generally used for condensing the vapors of sugar juices, some loss is occasioned by the vapors coming into contact with the water used for condensation. An improved apparatus for condensing these vapors without loss and without the use of any complex devices has been devised and patented by W. and A. W. Dunn, of Honolulu, Hawaiian Islands. The apparatus is provided with the usual vacuum pans, each connected by a valved pipe to a separator. Each separator is in turn connected with the next vacuum pan; and from the last separator a pipe leads to the bottom of a surface condenser containing a coil of pipe connected at its ends with water supply and water discharge pipes. The condenser is furthermore connected to a vacuum pump which draws the vapors from the vacuum pans and separators down through the condenser and around the coil of pipe. By this arrangement the vapors of sugar are condensed without direct contact with the water, the apparatus differing in this respect from the usual vacuum condensers. The products of condensation flow into a reservoir, from which they are pumped to a tank to be further treated. The drums of the vacuum pans are connected to the pipe of the vacuum pump, so that the discharge from the drums passes through the vacuum pump with the vapors.



DUNN'S VAPOR-CONDENSER FOR VACUUM PANS.

Reasons Why We Underdrain.

It is, explains The Drainage Journal:

To get the excess of water out of the soil.

To prevent the surface washing of the soil.

To save the humus of the soil.

To save the fine particles of the soil.

To save the fertility brought up by the capillary action of the soil.

To save the fertility brought down out of the air by rainfall to the soil.

A drained soil is ready for the plow several days in advance of the soil not drained.

A drained soil is eight or ten degrees warmer and is more easily made ready for the seed.

Is deeper, allowing the feeding roots to penetrate as deep as the tile are laid for food and moisture.

A drained soil is ready to cultivate sooner after a rainfall.

A drained soil is less injuriously affected by wet or dry weather.

Crops on a drained soil have a longer season for maturity.

A well underdrained soil will increase the crop productions from 10 to 50 per cent—sometimes more.

A drained soil is in the best possible condition to grow maximum crops with intelligent husbandry.

Science Notes.

M. Charlois, the French astronomer at the Nice observatory, has discovered two new asteroids. The number of these small planets is now 434, of which 158 have been discovered by Frenchmen, 70 by Americans and 64 by Germans.—La Vie Scientifique.

The projection of lantern slides so that they appear in stereoscopic relief has been made possible by an ingenious device in which a slotted disk rotates rapidly before two lanterns. The views are thus presented on the screen in rapid alternation, while the observer looks through other slots cut on the rim of the disk. In this way the right eye can see only the picture from the right lantern and the left eye that from the lantern on the left; so that, if a sufficiently rapid rotation occurs, there is a stereoscopic effect without any perceptible flicker.

The first volume of the catalogue of the Bibliothèque Nationale, of Paris, France, has just been published. This catalogue contains only printed books. The Bibliothèque Nationale, founded in 1645 with 1820 volumes, now embraces nearly 3,000,000 of them. Among the subjects fully catalogued, the following ones are most prominent. French history, 279,048 volumes; law, 144,868 volumes; plays issued separately, 116,864 volumes; philosophy, 97,456 volumes; catholic theology, 74,322 volumes; French poetry, 68,841 volumes; and history of foreign nations, 61,929 volumes. —Le Droit d'Auteur.

There are a few of the comparatively higher animals which live in hot springs, but these are chiefly mollusks. Until the present year the only instance of the occurrence of the isopad crustacea in warm springs was that of Sphæroma dugesi, found living in this situation in northern Mexico. During the past year, however, Harriet Richardson has described in the "Proceedings" of the United States National Museum another species (S. thermophilum), found by Prof. Cockerell living in a warm spring a few miles west of Socorro, New Mexico. Unfortunately, the temperature of the water is not given.

Maldeney and Thouvenin find that seeds of Convolvulus arvensis, Lepidium sativum and Panicum miliaceum all germinate more rapidly when exposed for a few hours daily to the action of the Roentgen rays. In the experiments, electrical influence was eliminated by using a sheet of aluminum which was connected to the earth as a screen between the lamp and the seeds. No notable rise of temperature, not even sufficient to affect a pair of thermoelectric needles attached to a Thompson's galvanometer, was observed after exposing the earth containing the seeds to the rays for two hours. The influence on germination must therefore be due to the X rays alone.—Comp. Rend., cxxvi., 549.

The carbonic acid spring in Sondra is looked upon as a result of volcanic action, which took place in the region of the Thuringian Forest during the tertiary age. The pressure of 17 atmospheres at the mouth has never diminished and the supply of acid seems to be unlimited. When the opening is closed by means of a system of valves, the gas is used as a source of power for an illuminating plant and for the machinery used in liquefying the acid. The spring yields about 1,000 cubic yards of the gas per hour. As it issues from the earth it contains 99 per cent of carbon dioxide, the remainder being nitrogen, which is removed by passing the mixed gases into water under high pressure, displacing the nitrogen with pure carbonic acid and liberating the purified gas under low pressure. The capacity of liquid carbon dioxide of this plant is over ten tons in twenty-four hours.—Südd. Ap. Ztg.

Prof. C. A. Doremus has lectured before the American Chemical Society on the chemical examination of writing fluids, describing their behavior on heating or on applying reagents. Of the sympathetic inks, the color of which is developed by heat, those containing a cobalt salt become blue, while a nickel salt turns green and onion juice brown. Lead acetate in ink is blackened by hydrogen sulphide, a copper salt gives a brown with potassium ferrocyanide, and a mercuric salt reacts with very dilute potassium iodide solution, forming a red precipitate. Potassium ferrocyanide yields a blue coloration with ferric chloride, tannin a violet black with the same reagent, pyrocatechin turns green with iron salts, and dimethaniline becomes violet in the presence of chromic acid. Among other constituents of inks, eosine produces an orange-yellow color with hydrochloric acid, while corallin turns yellowish with the acid and red with alkaline β naphthol. Amine turns yellow with hydrochloric acid (original color with β naphthol), safranine blue, chrysaniline yellow (purplish-red with β naphthol), carmine has its intensity reduced, and fuchsine is bleached (red with β naphthol). Logwood ink darkens to purple with sodium nitrite, is bleached by hydrochloric acid, and its color is restored by β naphthol. Brazil wood turns darker red with the nitrite, is not affected by the acid, but becomes reddish-purple with β naphthol.—Amer. Drug.

Miscellaneous Notes and Receipts.

Platinizing Fine Copper and Brass Ware.—800 grammes of sal-ammoniac and 10 grammes of platinum-sal-ammoniac are heated to the boiling point with 400 grammes of water in a porcelain dish and the articles to be platinized are placed in it, whereby they soon become covered with a coating of platinum. They are then removed from the liquid, dried and polished with whiting.—Handelszeitung f. d. Gold und Silber Industrie.

Silver-plating Tin.—Prepare a solution of 3 grammes of bismuth subnitrate in 10 c.cm. of nitric acid of 1·4 specific gravity, to which add a solution of 10 grammes of tartar and 40 grammes of hydrochloric acid in 1 liter of water. In the mixture of these solutions immerse the tin articles freed from grease and oxide. The pulverulent bismuth precipitated on the surface is rubbed off, whereupon the objects appear dark steel gray. For silvering prepare a mixture of 10 grammes of silver chloride, 30 grammes of cooking salt, 20 grammes of tartar and 100 grammes of powdered chalk, which is rubbed in a slightly moist state on the bismuth surface of the tin articles, using a flannel rag. The silver separates only in a very thin layer and must be protected against power and light before tarnishing by a coating of preservatives or celluloid varnish.—Zentralzeitung fuer Optik und Mechanik.

Uses of Borax.—We have reported before that an addition of borax to the starch or flour will enhance the adhesive quality of paste fifty per cent; borax also has an antiseptic action, and a slight admixture of it will prevent the paste from souring. For aquarelle painting, a varnish soluble in water may be prepared from five parts of shellac and one part borax, which is to be used for binder instead of glue.

With caseine, which is freshly precipitated from milk by the use of acetic acid, a liquid of thickish consistency is obtained by dissolving same in a concentrated borax solution. The substance possesses great gluing qualities, and, when mixed with lime, furnishes very permanent colors.

Finally, borax plays an important part in soldering, as it removes the oxide generated by the hot soldering tool from the solder, zinc or hard solder, thus assisting the soldering. In smearing up an iron stove with loam, a much more durable material is obtained by mixing four parts of loam with one part borax.—Condensed from the German (Illustrirte Maler Kalender for 1898).

New Ceramic Composition.—This composition mainly consists of asphalt, slate and graphite, to which are added residues of petroleum.

For the manufacture of slabs for paving, proceed as follows: Mix

12	kilos.	of Trinity asphalt (purified).
10	"	" finely powdered slate.
8	"	" graphite.
2·50	"	" petroleum waste.
25	"	" asphalt powder.

These materials are mixed as follows:

The petroleum residue is heated in a kettle to 80° Centigrade, then the graphite is added and all is kneaded until the two substances are intimately mixed.

Now add the pulverized slate and knead without interruption until a homogeneous, dry mass of sandy appearance is obtained.

The purified Trinity asphalt, which has meanwhile been heated in a separate kettle and transformed into the liquid state, is then mixed with the obtained mass in the above described manner and kneaded with it until a substance presenting the appearance of caoutchouc is obtained. To this mass add finally the powdered asphalt and mix intimately by kneading.—Journal des Inventeurs.

Blotting Paper for Cleaning Machinery, etc. — For cleaning machines and parts of engines which are soiled by lubricating materials and dust while in use, fibrous substances, such as tow, woolen refuse, sponge cloths, jute waste, etc., are usually employed. The better varieties of cotton waste are sufficient for the clean scouring of parts of machines, but the cheaper ones are charged with dust, making the use of a sponge cloth necessary, which is specially manufactured for this purpose. Of late the use of blotting paper for scouring purposes has been recommended. Not only can the use of cotton waste be decreased, but also the sponge cloths become entirely superfluous. The workman formerly received on an average 250 grammes of cotton waste, one new sponge cloth and one or two washed ones per week; now he receives 150 grammes of cotton waste and eight to ten sheets of blotting paper. The former cost was 25 pfennigs (6¼ cents); now it is only 10 pfennigs (2½ cents). Hence the paper goes much farther than sponge cloths and woolen refuse, and as it cannot soil the machine with fibers and dust, it is decidedly preferable to cotton waste. Besides, the blotting paper is not so combustible as the other cleaning mediums. Another advantage of the paper over cotton waste is that in case it should get caught while cleaning parts of engines which are in motion, it tears easily and does not draw the hand of the workman into the works.—Journal der Goldschmiedekunst.

Spain's Foreign Trade.

Secretary Wilson, of the Agricultural Department, has authorized the publication of a bulletin on the subject of Spain's foreign trade from 1891 to 1895, inclusive, prepared by Frank H. Hitchcock, the chief of the section of foreign markets. The facts brought out are of particular interest at the present time. Two general matters are treated in detail in the publication, namely, Spanish commerce proper and shipping and navigation. The New York Tribune condenses the report as follows:

It is shown that, of the total tonnage transported to and from Spanish ports during the years 1891 to 1895 inclusive, 57·75 per cent was carried by merchantmen entered and cleared in the trade with the United Kingdom. France ranked second with 12·97 per cent of the total, and the Netherlands, with 8·52 per cent, stood third. The United States, with a record of 3·91 per cent, was the fourth country in importance; Belgium fifth, with 2·35 per cent, and Cuba next, with 2·34 per cent. Of the merchandise carried by vessels entered at Spanish ports during the years 1891 to 1895 inclusive, 56·54 per cent came from the United Kingdom. France furnished 9·43 per cent, Russia 6·80 per cent, and the United States 5·68 per cent. Of the goods carried by vessels cleared during 1891–95, the United Kingdom was the destination of 58·28 per cent. France received 14·48 per cent, the Netherlands 11·33 per cent, the United States 3·15 per cent, and Cuba 2·62 per cent.

Spain's commercial transactions with the rest of the world amount annually to more than $300,000,000. In 1895 the merchandise imports amounted to $161,829,516 and the exports to $155,355,759. The average value for 1891–95 was $315,077,440, as compared with $317,956,123 for the preceding five years. Spain's foreign trade is largely maritime. Of the merchandise imported and exported during 1891–95, only 15·9 per cent was transported by land, while 84·1 per cent was carried in seagoing vessels. During the earlier years of the decade, 1886–95, more than one-half of Spain's maritime commerce was carried by foreign vessels, but since 1891 there has been a change, and the national shipping is now in the ascendency. The imports and exports made under the Spanish flag during 1895 amounted to $146,969,806, and those under flags of other nations to only $115,145,676. Of the foreign commerce of Spain during 1891–95, about 70 per cent was transacted with four countries, namely, France, 31·11 per cent; the United Kingdom, 22·05 per cent; Cuba, 10·20 per cent; and the United States, 6·32 per cent. The total value of the merchandise annually exchanged between Spain and Cuba, Porto Rico, the Philippines, the Canaries and her various minor possessions exceeded $50,000,000.

The United States ranked third among the sources of Spain's import trade during 1891–95, furnishing 10·34 per cent of the value of such imports; Cuba came next with 4·46 per cent, while Porto Rico supplied 2·64 per cent. Of the merchandise exported from Spain during the same time, 34·41 per cent went to France, 23·32 per cent to the United Kingdom, 16·53 per cent to Cuba and 3·47 per cent to Porto Rico, while the United States came eighth in the list of countries to which Spanish exports were consigned. The average yearly value of the goods transported by Spain to and from France in Spanish vessels was $32,655,478, to and from Cuba in Spanish ships $32,064,536, the United Kingdom $27,069,104, Porto Rico $9,499,149, and the United States $9,302,723. Of the merchandise shipped from Spain in Spanish vessels, 36·77 per cent went to Cuba, 27·50 per cent to France, 7·72 per cent to Porto Rico.

Coal, which constitutes the most important item among Spain's non-agricultural imports, is procured chiefly from the United Kingdom, the receipts from the United States amounting to less than 1 per cent of the total. During the calendar year 1895 there were entered and cleared at Spanish ports 36,856 merchant vessels. Of these vessels, 19,169 carried the flag of Spain and 17,687 vessels the flags of other nations. The average yearly tonnage for the five years 1891–95 was 24,374,939, while that for the preceding five years was only 22,499,590. This increase was due to the growth in the tonnage of the Spanish merchantmen.

On December 31, 1895, the latest date for which there are available statistics, the merchant marine of Spain comprised 1,783 vessels, having an aggregate tonnage of 719,572. Compared with the statistics, the figures for 1895 show a slight increase in the size of the fleet and a rather marked one in its tonnage. The steam vessels increased from 431 in 1886 to 523 in 1895. It is shown that, for the five years from 1891 to 1895 inclusive, the Spanish shipping has carried on business somewhat more extensively from the customs districts along the Atlantic than from those on the Mediterranean Sea. The ships entered and cleared on the Atlantic amounted annually to 19,704, as against 15,738 along the Mediterranean.

CLAUS SPRECKELS' great beet sugar factory at Salinas, Cal., now nearing completion, will be the largest plant of its kind in the world. The working capacity will be 3,300 tons in 24 hours, and the daily output of raw sugar will be about 450 tons. The main building is 582 feet long and 102 feet wide.

COMMODORE SCHLEY'S RECONNAISSANCE OF SANTIAGO HARBOR.

Undoubtedly the chief center of interest in the Spanish-American war lies just at present in the harbor of Santiago de Cuba, and, judging from present indications, this is likely to be the seat of the most active and important operations for some time to come. The rumors of last week, to the effect that Admiral Cervera's fleet was "bottled up"—to use the pet phrase of the day—by our fleet were confirmed by an official dispatch from Commodore Schley. The fleet was identified on Sunday, May 29, by the unprotected cruiser "Marblehead," which, acting under the orders of Commodore Schley, ran in close to the Morro Castle, and steamed past the entrance to the harbor in a westerly direction. Her officers had a good view of the interior of the harbor as far as Punta Gorda. They saw four Spanish cruisers and two torpedo boat destroyers, together with the old "Reina Mercedes," lying behind the batteries between Smith Cay and Churruca Point. As soon as she had located the enemy, the "Marblehead" put out to sea and reported to the flagship. With a view of drawing the fire of the fortifications and locating the position of certain masked batteries which had recently been constructed near the entrance, Commodore Schley transferred his flag from the cruiser "Brooklyn" to the battleship "Massachusetts," and taking with him the "New Orleans" and "Iowa," he steamed within range of the enemy's guns.

The blockading fleet at this time consisted of the first-class battleships "Massachusetts" and "Iowa," the second-class battleship "Texas," the armored cruiser "Brooklyn," the protected cruiser "New Orleans," the unprotected cruiser "Marblehead," the gunboat "Castine," the auxiliary cruiser "Harvard," formerly the "Paris," and the converted yacht "Eagle." The "Brooklyn" and the "Texas" were lying several miles offshore taking on coal, and not far from them were the "Harvard," "Marblehead," "Castine" and the "Eagle." The "Massachusetts" led the way toward the forts, followed at about a cable's length by the "New Orleans," and the same distance astern of her was the "Iowa." Across the entrance to the harbor, and about 1,500 yards from its mouth, was Admiral Cervera's flagship, the "Christobal Colon," lying east and west, with her port broadside commanding the entrance. When the "Massachusetts" was about four or five thousand yards from the forts, she opened fire with an 8-inch gun in one of her port turrets and followed it immediately by a shot from one of the forward 13-inch guns. About eight seconds later the 1,100-pound shell struck not far from the bow of the "Christobal Colon." The Spaniards replied from the shore batteries and from the flagship. Three batteries opened fire, one from the west side of the harbor, another from the eastern side and a third from the island in the center. The "New Orleans" now came within range, using her 6-inch guns and smokeless powder.

The "Iowa" reserved its fire until it was directly broadside on the "Christobal Colon," when all four of the 12-inch guns, in the two turrets fore and aft, were turned loose. It seems that during the first round of our ships the fire on both sides was somewhat wild, the range proving difficult to ascertain because of the deceptive glare on the water, and it was not until the ships had turned and were passing in front of the batteries and entrance for the second time that effective work was done. By this time however both combatants had ascertained the distance, and the shooting by our men was remarkably good. The "Iowa" placed one shell directly under the "Christobal Colon" and apparently started a fire on board, which, however, seems to have been quickly extinguished. The "Colon," on the other hand, seems to have achieved some characteristically poor Spanish shooting. The batteries on shore did better work during the second passage of the American ships. Several shells fell dangerously near to the "Iowa" and the "New Orleans" and one near the bow of the "Massachusetts." These shots came from a large battery on the westward side of the harbor, and they were apparently fired from 10 and 12-inch Krupp guns. One large shell exploded directly above the "Iowa," but too high to do any damage to the ship.

After the firing had been in progress for half an hour, two batteries on the eastern side of the harbor were silenced, and a little later the island battery ceased firing. The large western battery and the "Christobal Colon," however, kept up a desultory fire for some twenty minutes after our ships ceased firing. Altogether the battle lasted fifty-five minutes, during which time our three ships passed twice across the line of batteries at the harbor entrance. Only the larger guns on the ships were employed, the "Massachusetts" using four 13-inch and eight 8-inch guns, the "New Orleans" her four 6-inch rapid-fire guns, illustrations of which were given in our issue of May 21, 1898, and the "Iowa" brought to bear four 12-inch and eight 8-inch rifles. The conflict was marked as far as our ships were concerned by a complete absence of casualties, not a single shell or fragment of shell, as far as can be learned, having reached the attacking fleet, for no damage was done to the ships beyond what was due to the concussion of the heavy guns.

Owing to the long range at which the bombardment was carried on, it was impossible to determine with any accuracy the amount of damage inflicted on the forts or on the flagship, but it is certain that the former suffered severely and it is probable that the flagship sustained more or less serious damage. Whenever the large 12 and 13-inch shells landed against the masonry of Morro Castle, it could be seen that huge masses of debris were thrown high in the air, and from the fact that Morro and two other forts were silenced, it seems probable that most of their guns were dismounted or otherwise disabled. The reconnaissance had the desired result of revealing the strength of the defense and locating the position of the masked batteries which it is known had been recently erected.

There can be no question as to the enormous natural strength of the position. The narrow channel and the lofty hills commanding it on either side make it an ideal harbor for defense and an extremely difficult position to reduce from the sea. It is evident that the entrance is commanded by powerful guns of the modern type, and unless the Spaniards have been as criminally negligent at Santiago as they were at Manila, it will be impossible for a hostile fleet to reach the inner harbor without first removing or exploding the mines which have been placed across the channel.

The dispatches mention the fact that the "New Orleans" proved to be very effective in this long range fighting, because her guns were using smokeless powder. Her gunners were able to watch the effect of every shot, and when once they had found the range, they were able to pour in a deadly fire with great rapidity. The Spanish forces appear to be well supplied with the new powder, and its use assists greatly in the concealment of gun positions, the slight haze or mist accompanying its discharge being quickly dissipated. It is safe to say that the complete equipment of our ships with smokeless powder will be one of the many indirect benefits conferred by the present war.

Portrait Statues in Egypt and America.

It is a singular fact, says The American Antiquarian, that from the earliest time there were portraits which accurately represent the forms and faces of individuals. Some of them were kings, others noblemen and a few private persons.

An unknown man of the fourth dynasty wrought out of a block of wood has been preserved. From this we learn the dress, the form and the face of the men who lived in that time, 2000 B. C. The dress was a simple tunic with a cord about the waist, a rude sword suspended from the cord, and a knotted staff is held in the left hand. All of it is very plain and simple, just as we would expect to see at this time.

Later on there are the portraits of the Hyksos kings. These have been described by Dr. A. H. Sayce. They are in great contrast to the statues just mentioned. They represent long, lank, lean faces, just such faces as we would expect to see in the Turanian or Mongolian races, with a long lock of hair falling on the shoulder, resembling the pigtail of the Chinese, but more resembling the scalp locks of the American Indians.

Still later there appears another set of portraits. They seem to belong to a superior race, and yet one which was allied or akin to the first race that reigned during the first four dynasties, who were the pyramid builders but not the builders of the temples. The portraits of the Pharaohs are also given in most books on Egyptology. Among them the most interesting was that of Rameses II. These were tall and stately kings, but they also show something of the royal air. Later on, we find as great a change in the portraits as we do in costumes and in the art and agriculture of Egypt. The faces now resemble the Babylonian and Assyrian kings, as they have heavy beards and full faces, and wear crowns or turbans. The hair falls in heavy folds below the crown. They seem to be well fed and are very complacent, and are in contrast to the warrior kings such as Rameses and others.

The age of Ptolemy brought in more luxury and ease, which are exhibited in the portraits as much as in the surroundings of the kings.

All the way through the history of Egypt there was a line of nobility, notwithstanding the changes and revolutions which occurred. There was evidently a progress in civilization, and this progress had much effect upon individuals, as upon the entire race, and marked its lines in their faces and forms as much as it did in their dress and equipage.

It is very interesting to trace this progress and study the history of Egypt and the East in the light of the portraits which have been preserved.

What shall we say about the early American history, that which preceded the advent of the white men and the date of the discovery? Can we learn anything from the portraits which have been preserved in the land?

We have in the preceding numbers spoken of the portrait columns at Uxmal Palenque, in Central America, and have maintained that they were the portraits of kings and queens. Some have thought differently, for they have held that they represent the divinities and culture, heroes and mere imaginary figures. A few, such as M. Le Plongeon, have held that they were portraits which resembled Egyptian faces, and have imagined from this fact and others a connection between Egypt and America in prehistoric times.

A close study of the portrait columns will reveal the error, for there is no resemblance whatever. There is, however, a lesson to be learned. These portraits are in great contrast to the pictures of the North American Indians, of which Blackhawk was a specimen. They must have belonged to different races, and represent a different line of descent.

"Starboard" and "Port."

The origin of the words "starboard" and "larboard," as used in the nautical vocabulary, has been attributed to the Italian words *questa borda*, meaning "this side," and *quella borda*, "that side," says Cassier's Magazine. Abbreviated, these two phrases appear as *sta borda* and *la borda*, and by corruption of languages were soon rendered "starboard" and "larboard" by British sailors. These two words sound so much alike that frequent errors and accidents occurred, and years ago, therefore, the use of "larboard" was discontinued and "port" was substituted.

A correspondent of this journal has made the point that the former term has been in use in the English language from a remote period, occurring in Anglo-Saxon as "stearboard," and in middle English as "stereboard," while in later times it was written "sterboard," from which it developed into its modern form "starboard." It originally meant, so our correspondent says, the board, or side, of the ship on which the man who steered it was placed. It may be called a native English word as distinguished from one of imported origin, and it possesses a special interest in its indication of the method of propelling and steering in vogue from very early times. The ancient mariner could run before the wind with his single square sail, but he could deviate only a few points on either side. Unless, therefore, the direction of the wind agreed with the course of the vessel, it was necessary for him to be in constant readiness to modify his direction by the help of the oar. The illustrations of early English manuscripts and the later figures of tapestries exemplify the old square rig, with auxiliary oars and steering from the side. In these examples one or more heavy oars are used at the bow and on one side only; while the course is kept by a steersman with a lighter, and often paddle-shaped, oar, worked near the stern, and invariably on the starboard side of the ship. This method of rowing survived until recent times, and was well shown on the coal "keels," which added so picturesque a feature to the navigation of the river Tyne. These vessels were managed by crews consisting of three men and a boy; they had a single square sail, and carried some twenty-odd tons of coal. When unable to run before the wind, resort was had to rowing, and this was done by a single heavy bow oar, worked on the port side by two men and a boy, while the skipper kept the course, rowing in time with a lighter oar, called a "swape," from the stern on the starboard side. The fixed rudder, hinged from the stern post and operated by a tiller, was a later development in ship construction. The Tyne "keel" exemplifies the earlier practice of our ancestors in steering by an oar from the right side of the ship, and from this comes the designation for that side as the "steer-side," or starboard.

The Current Supplement.

The current SUPPLEMENT, No. 1171, contains a large number of articles of more than usual interest, notably "The History of the Stone Arch," by Prof. M. A. Howe. The installment of this important paper is accompanied by fourteen illustrations of ancient and modern stone arches. "The Metals Used by the Great Nations of Antiquity" is an interesting address by Dr. J. H. Gladstone. "American Competition in Europe" is an important consular report by Consul General F. H. Mason at Frankfort, Germany. "The Armies and Navies of the United States and Spain" illustrates the various types of men in the Spanish army and navy, showing their uniforms. "Great Britain's Neutrality" is the subject of a full page engraving showing the formal proclamation of Great Britain's neutrality outside the Royal Exchange, London. "Kites: Their Theory and Practice" by Capt. Baden-Powell is concluded in this number. For other articles of interest the reader is referred to the table of contents, page 370.

GERMAN railway statistics for 1896-97 are published in the Centralblatt der Bauverwaltung for April 6, 1898. The total length of track in operation, in 1897, was 28,626 miles of standard gage and 817·5 miles of narrow gage. During the year there were 487 derailments and 281 collisions; and in these accidents 762 persons were killed and 1,969 wounded. These figures for accidents, which probably include all casualties in switching and coupling cars, show an increase over previous records.