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The Editor is always glad to receive for examination illustrated articles on subjects of timely interest. If the photographs are *sharp*, the articles *short*, and the facts *authentic*, the contributions will receive special attention. Accepted articles will be paid for at regular space rates.


## THE SPEED TRIALS OF THE "ARROW."

Although, as we have shown elsewhere in this issue, there is no reason seriously to doubt the accuracy either of the course or of the timing in the recent speed trials of the steam yacht "Arrow," it is greatly to be regretted that the trials were so limited in duration and that advantage was not taken of this opportunity to secure most valuable data regarding a very remarkable craft. As we understand it, there was no intention of making more than a single run over the official course, not even a pound of coal being allowed to remain on board beyond what was sufficient for the run. Consequently the trial was purely spectacular, and possesses no practical value. When we consider that the "Arrow," in spite of the blundering by which her steam was allowed to run down over the latter part of the course, came so near to achieving her designed speed of forty knots an hour, we cannot but feel that it is a pity that the vessel was not sent over the course for several consecutive runs, and given an opportunity to prove whether she was capable of a sustained burst of speed on a continuous run of five or six miles. Her trial would thus have taken rank, as a test of speed, with the trials of the torpedo boat destroyers, among which vessels she should rightly be classed.

Indeed, it cannot be looked upon as anything but a distinct loss to the scientific world that the trials of the "Arrow" were not carried out in the scientific manner which characterized the trials of her predecessor, the "Ellide." In the case of that vessel a most careful test was made of the performance of the engines and boilers during various runs, from a moderate speed up to her highest speed of over thirty-four knots an hour. Indicator cards were taken and a thorough analysis of the performance of the engines was made. In the case of the "Arrow," on the other hand, except for the care with which the time was taken, the trial seems to have been carried out in a very amateurish way. Not a single indicator card was taken, and a fine opportunity was lost for securing data which would have been of the greatest interest to the engineering world. It is sincerely to be hoped that the owner of the vessel will decide to have a test of this kind made before placing her out of commission.

## THE IRRIGATION OF THE NILE VALLEY.

The latter months of this year will prove a red-letter day in the annals of modern Egypt, for before the year is closed the huge irrigation works on the Nile will be completed and opened for use. The ceremony of inauguration promises to be as important as that which attended the opening of the Suez canal. Whatever may be said politically concerning the English occupation of Egypt, there is no denying that, judged from the commercial and industrial point of view, England has achieved a notable success in her attempt to improve the arable conditions of the land and the social conditions of the Egyptian people. The vast irrigation works have occupied about four years in construction and have been pushed forward with such rapidity that they have been completed several months before the contracted time.

The Nile reservoir at Assouan has a total capacity of over 1,000,000,000 tons of water. It is scarcely possible to realize what this huge storage of water for irrigation purposes signifies to Egypt. Two years ago, when the Nile was below the average in summer discharge, it was decreed in Upper Egypt that between the middle of April and the middle of July the primitive "lifting machines" in vogue, which include the shadoof, or bucket and pole system, and the sakieh, or oxen-driven chain of buckets, should be worked not more than from five to eleven consecutive days, and should stop the following nine to thirteen days; and the order in which the different districts were to receive a supply was carefully specified, so that, as far as possible, every crop should get watered once in about three weeks. When it is remembered that a single watering of an acre of land means, where shadoofs are concerned, raising by manual power about 400 tons of water to varying heights up to 25 feet, and that four or five waterings are required to raise a summer crop, it will be seen what a vast amount of human labor is saved throughout the world by the providential circumstance that in ordinary cases water falls from the clouds, and has not, as in Egypt, to be dragged up from channels and wells. Shadoof work, under average conditions, involves one man's labor for at least one hundred days for each acre of summer crop; so that even at 10 cents per day for labor the extra cost of cultivation due to the absence of rain would amount to $10 per acre.

The great Nile reservoir and dam at Assouan, the barrage at Assiout, and various supplementary works in the way of distributing canals and regulators, are designed with the object of mitigating the evils due to the drought of summer by supplying in summer a large volume of water at a higher level in the canals, so that not only more land may be irrigated, but the labor of lifting water be saved.

The barrages are already supplying a comprehensive demonstration of what benefit they will bestow upon the country. This year the Nile is abnormally low, and the prospects of the country would be very grave were it not for the existence of the dams, which have saved the situation. The Assiout dam is acting splendidly and has raised the level of the water in the Ibrahimich canal 58 inches and practically saved Middle Egypt. The revenue derived from the benefit already bestowed this year by this dam will go a long way toward defraying its cost.

## SOFT COAL FOR DOMESTIC USE.

In view of the fact that although autumn is upon us, the strike in the anthracite coal region is still in force, the householder is confronted with the problem as to whether he will pay ten or twelve dollars a ton for anthracite coal, or find some substitute for use in the cooking range and the heating furnace. The inconvenience caused by the coal strike was felt by all classes of the community, but it is upon the people of moderate means and upon the poor that the burden will fall with greatest weight; for to them the price of anthracite coal will be positively prohibitive.

At the same time it is possible to overestimate the difficulty of the situation; for although anthracite is the ideal fuel for cooking and heating purposes, it is not by any means the only one available. This has been proved by the enormous demand for gas stoves which has occurred during the past few weeks; and those householders who make a practice of substituting gas stoves for coal ranges during the summer months will undoubtedly continue to use gas as long as the present high prices for coal continue. Indeed, there are many who prefer to use this fuel throughout the whole year, claiming that it compares favorably in cost for cooking purposes with anthracite coal. Another substitute that is available is the coal-oil stove, which has been perfected to a point at which it may be used both for cooking and heating at a cost which is considerably less than that of anthracite coal or gas; while careful attention to the question of combustion has enabled the makers to put upon the market oil stoves which will do their work without producing unpleasant odors in the house.

Wood is, of course, too expensive a fuel, at least in the large cities, to be suggested as an alternative, even at the prevailing high price of anthracite; nor are the grates of the ordinary kitchen stove, or basement heater, altogether suited to the use of wood, although it could be burned in them at the cost of close attention. In such houses as have open fireplaces wood fuel can, of course, be used to great advantage, and in localities where wood fuel can be delivered at a reasonable figure, there is certain to be a marked increase in the sales of cord-wood. Indeed, we think that those farmers and owners of wood land that are advantageously placed as regards transportation, would find it to their interest to make arrangements for the delivery of cord-wood in the nearest towns and cities during the coming winter months.

Although electricity has been applied with a measure of success to the work of heating and cooking, it is not likely that there will be an appreciable increase in its use for these purposes, the cost being too high for the limited means of the average householder.

Although the fuels that we have mentioned will all be used to a greater or less extent, it is to soft or bituminous coal that the public will have to turn during the winter months as the cheapest and most satisfactory substitute for anthracite. After careful inquiry among the coal dealers and general coal interests, we are satisfied that when the public begins to buy soft coal, as it will have to do before very long, the dealers will be able to supply all that is needed at a cost not to exceed, even in the suburbs, $5 or $6 a ton. We are assured by one of the largest dealers that there is no doubt that, even if the strike should continue for several months longer, it would be possible for householders to obtain an abundance of bituminous coal at the price named and probably for something less. Nor is there any quality in soft coal which renders it unfit for domestic use. Indeed, as a matter of fact, practically no other fuel is used, or has been used, for domestic purposes in Great Britain, and while the cooking ranges differ somewhat in design from those used in this country for anthracite coal, it will be quite possible for the householder, by using a little judgment, to burn soft coal to advantage in the ordinary American cooking stove. The most important fact to remember is that the great quantities of gas thrown off when soft coal is first ignited render it necessary to supply considerably more air above the bed of fuel than is the case with anthracite coal. Thus, in replenishing the kitchen stove, it will not do to fill the grate entirely full of fresh fuel, since this would result in the rapid lowering of the oven temperature, which would not be restored until the mass had become ignited and the gases had been somewhat burned off. It will be found that the best method is to feed small quantities of fuel to the fire at frequent intervals, keeping the lower drafts closed more than they would be in burning anthracite coal, and keeping the upper draft constantly open. For use in the heating furnace, soft coal will be found to give good results when once the proper manipulation of the furnace has been learned. It should be understood at the outset that more constant attention will be necessary, for the reason that soft coal burns more quickly and will not remain incandescent for so long a time as anthracite coal. During the daytime the attendant will have no difficulty in keeping a steady fire if he is careful to feed the furnace frequently; to keep the bottom drafts but slightly open; and to give a liberal feed of air through the air inlet in the furnace door. Owing to the rapidity of combustion of bituminous coal it will not be possible to bank up the furnace for the night and leave it with a certainty that there will be a live fire remaining in the morning; but this difficulty can be overcome if a ton of anthracite is laid in with the winter's supply of soft coal, and the anthracite used only for banking up the fire over night. A ton of anthracite used for this purpose should suffice to tide the household over the period of high prices.

There is one feature connected with the use of soft coal, however, which, unless it be carefully safeguarded, may introduce an element of danger. We refer to the heavy deposit of soot in the flues which will occur when soft coal is used. This soot, unless it is swept out at stated intervals, will accumulate, and being inflammable would be liable to ignite and produce a fierce fire in the chimney, with a consequent risk to the dwelling. It sometimes happens that the ends of rafters or beams are, by careless or ignorant construction, allowed to project into the chimney flues. These might become ignited and carry fire to the interior of the house. There is further danger that the shower of sparks from a burning chimney would ignite the shingle roof of the suburban cottage. These risks may be obviated by sweeping the chimney, say once in two months. The "chimney sweep" is an important personage in the old countries, and it would be a curious incidental development of the strike if he should make his appearance, even temporarily, in this country.

For a more extended discussion of the possibilities of soft coal as a domestic fuel, reference is made to a lengthy article in the current issue of the SUPPLEMENT.

## DISTRIBUTION OF INDUSTRIES.

The Census Bureau has issued a bulletin on the localization of industries, which shows that, measured by the value of products, more than 85 per cent of the collar and cuff manufacture is carried on in Troy, N. Y.; more than 64 per cent of the oyster canning industry in Baltimore; more than 54 per cent of the manufacture of gloves in the adjoining cities of Gloversville and Johnstown, N. Y.; more than 48 per cent of the coke manufacture in the Connellsville district, Pennsylvania; more than 47 per cent of the manufacture of brassware in Waterbury, Conn.; more than 45 per cent of the manufacture of carpets in Philadelphia; more than 45 per cent of the manufacture of jewelry in Providence, R. I., and the adjoining towns of Attleboro and North Attleboro, Mass.; more than 36 per cent of the silverware manufacture in Providence, R. I.; more than 35 per cent of the slaughtering and meat packing industry in Chicago; more than 32 per cent of the manufacture of plated and britannia ware in Meriden, Conn.; more than 24 per cent of the agricultural implement industry in Chicago, and more than 24 per cent of the silk industry in Paterson, N. J.

The number of wage earners engaged in slaughtering and meat packing in South Omaha, Neb., constitute 90 per cent of the total number employed in all industries in the city.

The iron and steel industry form 89 per cent of all

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the industries in McKeesport, Penn.; the pottery industry, 87 per cent in East Liverpool, Ohio; the fur hat industry, 86 per cent in Bethel, Conn.; the glass industry, 81 per cent in Tarentum, Penn.; the cotton goods industry, 80 per cent in Fall River, Mass.; the boot and shoe indusry, 77 per cent in Brockton, Mass.; the silk manufacture, 76 per cent in West Hoboken, N. J.; glove manufacture, 75 per cent in Gloversville, N. Y.; jewelry manufacture, 72 per cent in North Attleboro, Mass., and the collar and cuff industry, 69 per cent in Troy, N. Y.

### "ALL THE WORLD'S FIGHTING SHIPS."*

Although the English correspondents of American daily journals have argued that while popular enthusiasm over the various postponed functions connected with the late coronation was not aroused to any great extent, they have noted that there was one feature—the great review at Spithead—which awakened the most widespread and enthusiastic interest. British enthusiasm over the navy is natural; but although naval matters may less vitally affect their integrity and mean less to some other nations, there is no question that throughout the world there is evidence of an increasing desire to obtain something more than a superficial knowledge of ships, guns and armor. In this age of encyclopedias and text books, it is surprising, perhaps, that there are not more works devoted to the illustration and description of naval matters in general; on the other hand, if such works are few, those that exist are of high character and are generally marked by more or less official recognition.

Unquestionably the best work on the subject is F. T. Jane's "All the World's Fighting Ships," a book which has grown steadily in quality and reputation, and is to-day the best-known work of the kind among the navies of the world. In the latest edition of this work, just to hand, the best features of the previous editions have been retained and amplified, while the editor has not hesitated to use the pruning knife freely where experience has shown that certain features might with advantage be eliminated. It is not often that there is crowded within the limits of 380 pages such a vast amount of detailed information as is found in this book; although if we consider the ambitious nature of the work, the wide extent of the ground covered, it is a matter for surprise that the book is not even more bulky than it is. Thus the author undertakes to give a photograph, an outboard profile, and a deck plan, with the armored portion shown in shading, of one vessel of every class of warship in the world. On the plans are marked the size and position of every gun carried by the vessel, and the thickness and distribution of the armor. In addition to this, around each cut is a tabulated description of the armament, which gives the mark, the caliber and length of each gun, the thickness of armor on every armored portion of the vessel, a description of the style, size, and horse power of the engine and boilers; the dimensions, displacement, speed and coal supply of the vessel, and her complement. Moreover, if occasion calls for it, there is a foot-note below each cut giving particulars as to the performance, sea-speed, maneuvering qualities, etc., of each class that is illustrated.

A feature peculiar of this work which has met with great favor among naval men, is the placing beside the cut and diagram of each ship, of a silhouette of the vessel. Although in the case of any particular class of battleships or cruisers, there will be no important differences in the main features, such as the guns, smokestacks and masts, there may yet be differences of detail which will be sufficient to distinguish one vessel from another. These slight differences, such as in the height of the smokestacks, or the arrangement of steam pipes and ventilating cowls, are clearly shown in the silhouette, and since a warship that is distant more than three or four miles presents nothing more than a silhouette appearance, it can be seen how great is the value of this system of identification as provided in the work under review.

An important and welcome feature in the present edition is the elimination from it of all vessels that have no practical fighting value, such as vessels used for police duties only, training ships and obsolete battleships and cruisers. With this material cleared out of the way, it becomes possible to make a positive estimate of the fighting value of individual ships, of fleets, and of navies as a whole. This Mr. Jane has done in "All the World's Fighting Ships." He adopts a system of notation under which he gives certain values to the different offensive and defensive qualities, and by a summation of these he is able to classify every ship according to its fighting value. The qualities which are regarded in computing these values are gun power and armor protection, bulk and age (which affect endurance under fire), speed and handiness, seaworthiness and coal endurance. In making the classification it was realized by the author that the time had come for dropping once and for all the old hard-and-fast lines of demarkation between cruiser and battleship—an arbitrary distinction, which might give to an old or poorly-designed battleship a fictitious value, and might depreciate the relative fighting efficiency of another and better ship, merely because she bore the name of cruiser. Classes I. and II. contain the ships, whether battleships or cruisers, which, in active warfare will "lie in the line." Class III. contains the remaining ships of serious utility, while the other classes contain ships of only limited and restricted uses, from big, modern protected and belted cruisers and old battleships with unprotected guns, down to the miscellaneous smaller vessels. Another modifying factor in determining values is the present practice of estimating ships by displacement and age on the basis that 10 years of age knocks off from one-quarter to one-fifth of the value of displacement, 14,000 tons of 1892 being worth about 11,000 tons of to-day.

Naturally the description and illustration of practically every one of the world's fighting ships occupies the greater portion (some three hundred pages) of this book. Part II. contains a series of articles, by leading naval authorities of the world, on some of the burning questions of naval construction, material, and personnel. Among these writers are included such authorities as Col. Cuniberti, Chief Constructor of the Italian Navy, and Admiral Hopkins, Lord of the Admiralty of England. For many readers, the most interesting pages will be those containing comparative tables showing the relative strength of the navies of the world. The comparison of classes I., II. and III., in which the fighting values of the ships are determined by points, includes the best types of battleships and armored cruisers, and places England first with 45.6 points; France second with 16.2 points; Russia third with 14.4 points; Japan fourth with 10.4 points; Germany fifth with 8.8 points; and the United States sixth with 8.2 points. The above comparison takes account only of ships that are actually completed. The comparison, by points, of battleships and armored cruisers now under construction shows the United States to be first with 14.6 points; France second with 11.2 points; England third with 8.2 points; Germany fourth with 7.2 points; Russia fifth with 6.2 points, and Japan last with no ships of this class under construction. When these vessels that are building have been all completed, or say in 1905, the relative strength of the navies will show up very differently. The United States will have moved up from sixth to third position; England coming first with 53.8 points; France second with 27.4 points; United States third with 22.8 points, Russia fourth with 20.4 points; Germany fifth with 16 points, and Japan sixth with 10.4 points. We should here add that this very flattering estimate of the growing strength of our navy is based upon the expectation that the construction of our ships will proceed much faster than it has hitherto done.

It is impossible in concluding our review of this most valuable book, to do more than mention the many subjects which are treated in the second part. Of the various articles the one of most interest is that on Battleship Design by Col. Cuniberti, whose battleship "Victorio Emanuele" is regarded in many quarters as the permanent type of the future battleship. This vessel, by the way, which has the unprecedented battleship sea speed of 22 knots, carries two 12-inch guns, twelve 8-inch guns and twelve 4-inch guns, on the moderate displacement of 12,625 tons. Following Cuniberti's article are lengthy chapters on the Progress of Reconstruction, on the Advantage of Intermediates. (that is, battleships midway in size and power between the 18,000-ton battleship and the 10,000-ton cruiser) by Admiral Hopkins, who evidently considers the "Victorio Emanuele" to be the ideal intermediate craft. The Naval Maneuvers are treated exhaustively by contributors of various nationalities. There is a chapter on Trials and Experiments, in which the latest achievements in guns and armor are chronicled with elaborate diagrams and half-tone engravings; while under the head of Marine Engineering the question of the proper naval boiler is discussed at length by the aid of diagrams and half-tone plates.

Altogether the present edition of "All the World's Fighting Ships" may be taken as the best work of its kind offered to the public, an opinion which is indorsed by the fact that the book has received official recognition in the leading navies of the world.

*"All the World's Fighting Ships." By Fred T. Jane. New York. 1902. Published by Munn & Co.

### INTERNATIONAL MINING CONGRESS—BUTTE MEETING.

The meeting of the International Mining Congress at Butte, Mont., September 5, is conceded to have been the largest and most important gathering of the kind ever held in America, or perhaps anywhere else. It was, moreover, strictly an American gathering, the single Mexican present not warranting the title "international," which has now, after a heated contest, been dropped, and the name of the association changed to "American Mining Congress."

A notable feature of the meeting was the magnificent exhibition of minerals at Columbia Gardens in Butte under the direction of Mr. J. R. Wharton.

The Kearns bill, which would limit the number of mining claims to a single one for every locator, and would also limit mining to the region underlying the superficial area, thus cutting off extra-lateral mining, was condemned by an almost unanimous vote.

Resolutions were adopted favoring the creation of a new cabinet office, that of Secretary of Mining, and strenuous efforts will be made to secure legislation of Congress to this effect.

Mr. E. L. Shafner, of Cleveland, O., presided. The opening day was taken up with addresses of welcome from Gov. Toole and ex-Gov. Richards, of Montana; Gov. Hunt, of Idaho; Mayor Davey, of Butte, and others, and the response and address of President Shafner, the burden of whose remarks was a plea for the creation of the proposed cabinet office of Secretary of Mining.

Several interesting and instructive papers were presented on the subsequent days of the meeting, of which that of Waldemar Lindgren, of the United States Geological Survey, on "The Gold Production of North America; Its Geological Derivation and Probable Future," seems exceptionally valuable.

Prof. Lindgren said that practically the whole of the gold output is derived from fissure veins or from deposits which are closely related to fissure veins. Gold-bearing fissure veins are in most cases accompanied by placers which are only the result of nature's crushing, concentrating and refining; and these placers may be of different ages according to the date of formation of the vein. Fissure veins are formed chiefly by ascending hot water; from which we conclude that gold has been brought up from lower levels of the earth's crust.

The conditions for the formation of auriferous fissure veins seem to be most favorable when extensive eruption of surface lavas and intrusive granites and porphyries have taken place.

As a last chapter in the eruptive activity the hot springs bring up their load of precious metals and deposit them in the fissures in the earth's crust which they follow as the easiest paths.

The gold product of North America, most of which is from the Cordilleran range, is divided among primary veins of pre-Cambrian, Cretaceous and post-Miocene age. In fact from the beginning of the Trias down to the present time great eruptions have followed each other on the Pacific coast, each of which was probably accompanied by gold deposition. In the Rocky Mountain region the igneous rocks began to break out at the close of the Cretaceous, and continued till recently. Even now gold veins are forming in Montana and Nevada.

The oldest gold deposition is, however, the pre-Cambrian of the Appalachian chain, extending from Georgia up to Canada. These are placers and gold-quartz veins with free gold and auriferous sulphides, and much of the gold can usually be extracted by amalgamation. The most important deposits of this age are in the Black Hills of South Dakota.

The Mesozoic age was remarkable for the great eruptions in the Pacific region, the great gold belt of North America. From Lower California to Nome the veins are accompanied by great development of placers.

The deposits of the Cordilleran region are also Mesozoic, and are of gold quartz, sulphides, etc., but not placers.

The tertiary gold veins are usually of post-Miocene age and are found cutting heavy andesite flows, more rarely rhyolite and basalt in regions of intense volcanic activity.

These are called prophylitic veins because of the peculiar alteration of adjoining rocks.

They are often very rich, the word *bonanza* having been coined to express this idea. The gold is so finely distributed as rarely to form rich placers.

These differ from the older formations in having been formed near the surface.

They are most extensively developed in Mexico; but are found in Arizona, New Mexico, California, Nevada, Idaho, Colorado, Utah, and sporadically in some other States, and in southeastern Alaska, but none have been found in British Columbia or Northwest Territory.

The estimates of output from these several formations are:

| | Total up to 1900. | 1900. |
|---|---|---|
| Pre-Cambrian ..... | $144,000,000 | $41,000,000 |
| Cretaceous (Pacific)... | 1,400,000,000 | 50,000,000 |
| Cretaceous (Central)... | 310,000,000 | 18,000,000 |
| Tertiary, prophylitic... | 537,000,000 | 18,000,000 |
| | $2,391,000,000 | $127,000,000 |

I. H. Richards, formerly Mayor of Boise, Idaho, and Judge of the Circuit Court, was elected president, and Deadwood, So. Dak., was selected as the place of the next meeting, to be held in September, 1903, the exact date to be hereafter fixed.

A collection of precious stones shown at the Pan-American Exposition by George F. Kunz and purchased by J. Pierpont Morgan has been presented by the latter to the Jardin des Plantes at Paris.

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