SCIENTIFIC AMERICAN

ESTABLISHED 1845

MUNN & CO., - - Editors and Proprietors

Published Weekly at

No. 361 Broadway, New York

TERMS TO SUBSCRIBERS

One copy, one year for the United States, Canada, or Mexico $3.00
One copy, one year, to any foreign country, postage prepaid, £0 16s. 5d. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845)	$3.00 a year
Scientific American Supplement (Established 1876)	5.00 "
American Homes and Gardens	3.00 "
Scientific American Export Edition (Established 1878)	3.00 "

The combined subscription rates and rates to foreign countries will be furnished upon application.

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MUNN & CO., 361 Broadway, New York.

NEW YORK, SATURDAY, JANUARY 6, 1906.

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 PASSING OF THE "OREGON."

And now it is the "Oregon" that has to go the way of all battleships, and pass from the first to the second line of defense, to do duty in home waters. This announcement will occasion not a little sentimental regret among the American people, who will ever bear in mind the long voyage of this battleship from the Pacific coast to Cuba, and the brilliant part which she played in the chase of the Spanish squadron on its flight from Santiago harbor. It seems but a few years ago that the ships of this class ("Oregon," "Indiana," and "Massachusetts") were heralded as the most powerfully armed and armored battleships afloat. The claim was well made; for not even the big British ships of that day could match the combination of four 13-inch and eight 8-inch guns and 18-inch face-hardened armor found in the "Oregon" class. Yet these vessels possessed inherent defects as naval design and construction advanced, which were bound to tell against them. Chief among these was the fact that their displacement of something over 10,000 tons was altogether too small to effectively carry such a powerful aggregation of offensive and defensive elements. For in order to float such guns and armor at all, it was necessary to keep down speed, coal supply, and the supply of ammunition, to a point which was bound ultimately to render these ships unable to remain in our first line of defense. The trend of later battleship design is in the direction of giving a ship high freeboard, large displacement, and a generous supply of ammunition and coal, and the increased displacement of about sixty per cent of such a vessel as the battleship "Connecticut" over the "Oregon" has been given mainly to these features. The main battery of the "Connecticut" in numbers and weight is no greater than that of the "Oregon," consisting of four 12's and eight 8's as against four 13's and eight 8's. In the secondary battery there is an increase from four 6-inch to twelve 7-inch guns. The vastly greater power of the broadside is mainly due to the great increase in velocity, range, rapidity of fire, and energy of the guns. The length of the ships has gone up from 348 to 450 feet; the breadth from 69 1-3 to 76 2-3 feet, while the depth, on the other hand, has been reduced from 28 to 26¾ feet, a most important advantage for the later ships. Displacement has increased from 10,288 tons to 16,000 tons, and the speed has risen from 16 knots to 18. The normal coal supply has risen from 400 tons to 2,000; and although the "Oregon" is credited with a bunker capacity of 1,450 tons as against 2,200 tons for the "Connecticut," she cannot take on that amount without practically submerging the whole of her water-line armor. In the second line of defense, however, for service in home waters, the "Oregon" still has a useful life of many years' service before her, and in the naval annals of the country she is destined to be placed high on the roll of honor.

WEALTH OF OUR FARMS.

In view of the vast increase that has taken place during the past decade in the number and wealth of our industrial establishments and in the value of our manufactured products, it will be surprising to many people to learn that our farms still greatly exceed in value and as a source of revenue every other source of wealth, not even excluding our great manufacturing enterprises. The wealth production of the farms of the United States reached in 1905 the highest amount ever attained in this or any other country, the total figure being nearly six and one-half billion dollars. Four of the crops reached new records as to value, namely, corn, hay, wheat, and rice. Corn exceeds previous yields both in amount and in price, and hay, wheat, and rice reached new figures as to value only. The general average of production was high in the case of every crop, and the prices ran higher still. The Secretary of Agriculture estimates that in addition to the enormous yield of wealth, the farms of the country have themselves increased in value during the past five years by over six billions of dollars; and he puts the matter dramatically when he states that with every going down of the sun during the past five years, there has been registered an increase of three million four hundred thousand dollars in the value of the farms of the country. An analysis of the principal crops for the year shows that corn reached its highest production with 2,708,000,000 bushels, a clear gain of 42,000,000 bushels over the very profitable year of 1899. The hay crop is valued at 605 million dollars; cotton at 575 millions; wheat at 525 millions; oats, 282 millions; potatoes, 138 millions; barley, 58 millions, and tobacco at 52 million dollars. Very remarkable is the increase of 54 million dollars in the value of dairy products, which reached the total valuation of 665 million dollars. The farmer's hen, says the Secretary, is becoming a worthy companion to the cow, the annual production of eggs being now 20 billions. Poultry products have climbed to a value of over half a billion dollars, so that poultry competes with wheat for precedence. The total value of horses is estimated at $1,200,000,000. There are over 17½ million milch cows, valued at nearly half a billion dollars. During the year farm produce to the value of 827 million dollars was exported. During the last sixteen years the domestic exports of farm products have amounted to 12 billion dollars, or one billion dollars more than enough to buy all the railroads of the country at their commercial valuation. Clear evidence of the prosperity of the farmer is seen in the fact that under a recent amendment of the national banking law, allowing the establishment of banks with a capitalization of less than $50,000, there have been 1,754 such banks established in the last year, nearly every one of which, says the Secretary, is located in a rural community and the capital furnished by farmers. For the first time in the financial history of the South, the deposits in that region exceed one billion dollars. Should there be no relapse from his present position as a wealth producer, three years hence the farmer will find that the farming element, which forms thirty-five per cent of the population, has produced an amount of wealth within the preceding ten years equal to one-half of the entire national wealth produced in three centuries.

SINGLE-PHASE LOCOMOTIVES ON DIRECT-CURRENT TRACKS.

The announcement that the New York, New Haven and Hartford Railroad intended to operate single-phase locomotives over the direct-current section of the New York Central lines, which lead into the new terminal station, elicited a strong protest from Mr. Sprague, the inventor of the multiple system of control. He expressed regret that the company had not adopted a system more in harmony with that which was being laid out at such vast expense by the New York Central, and his letter suggested that there would be certain difficulties of operation attending the introduction of the single-phase locomotive into the new terminal. In the course of a reply by the vice-president of the New Haven road, it is stated that the new electric engines ordered by his company are of the interchangeable type, and that they are expressly designed to operate under all practical conditions within wide limits. They will be able to use both alternating and direct, high-tension or low-tension alternating current, to take current from the third rail or from overhead conductors at heights varying between 14 feet and 22 feet; and to operate with equal facility on either or both of the two track levels at the Grand Central station.

It is stated by this official that on sections equipped for direct current the single-phase locomotives will operate in every respect as direct-current engines of high commercial efficiency, and on sections equipped for alternating current, they will show still higher efficiency. The public is assured that the adoption of this most flexible type of engine by the New Haven Company will introduce no new features or difficulties in the track equipment or operation of the Grand Central terminal, and will not entail upon the New York Central the necessity for the expenditure of an additional dollar nor the transposition of a wire.

Now, the above is all very good as far as it goes, which is not very far. If the event prove to be as good as the prediction, both the New Haven Company and the traveling public will be subjects for congratulation. The latter, and especially those New York commuters whose rare good fortune it has been to use the New Haven line, may be pardoned for their solicitude lest that company, in any steps that they might be taking that would affect their suburban service, were actuated more by considerations of their own profit than of the convenience of the traveling public.

WATER POWER AT HIGH PRESSURE.

One cubic foot of water per second, falling 1,000 feet, develops more than 11 horse-power.

This striking fact may well call attention to the great, undeveloped water powers in all of the mountainous sections of the United States. Hundreds of such powers now go to waste almost unnoticed, because of the common idea that a large volume of water is necessary where much energy is to be developed. As a matter of fact, many an unpretentious mountain brook expends enough power in grinding its rocky bed to turn the wheels of a great city.

Proof of this is easily reached by considering the figures for rainfall, runoff, and elevation that apply to large parts of the country. Take, for illustration, an annual fall of rain and snow that amounts to 36 inches of water on a level, and is generally reached in the higher parts of the New England, Middle, and Southern States. With this rainfall each square mile of territory receives 83,635,200 cubic feet of water annually. This water must either soak into the ground and reappear elsewhere in springs, or evaporate, or else run off over the surface of the ground, and a part moves in each of these ways. That portion which runs off over the surface is available for power production. If a quantity of water represented by a depth of one foot on a level runs off over the surface of the ground, each square mile furnishes 27,874,400 cubic feet annually. This volume of water develops some 86,700 horse-power hours, if allowed to fall 1,000 feet. On the assumption that the flow of water will be regulated, and used during only 3,000 hours per year, the runoff of a depth of one foot from one square mile will generate 28.9 gross horse-power during 300 days of ten hours each, under the conditions named. With any variation of the water head from 1,000 feet, the power will, of course, vary in like proportion. That is, a fall of 500 feet would develop 14.4 horse-power during 3,000 hours with the volume of water named, and a fall of 2,000 feet would yield 57.8 horse-power. So too the number of horse-power hours will vary directly with the total quantity of water available. The ratio of the volume of water passing down the bed of a stream to the volume that annually falls on its drainage area, known as the percentage of runoff, is very irregular in different cases, and ranges from less than one-tenth to fully seven-tenths. For many of the streams in the mountainous parts of the States along the Atlantic coast a runoff of 50 per cent is not too high. With an annual precipitation of 36 inches of water on a level, a runoff of 50 per cent gives a stream of 41,817,600 cubic feet of water per year from each square mile of its drainage area, or a discharge of 3.87 cubic feet per second during 3,000 hours. This rainfall and runoff combined with a fall of 1,000 feet thus yield about 129,900 horse-power hours for each square mile of drainage area. If this amount of energy is used at a uniform rate during 3,000 hours, it develops 43.3 horse-power. From these figures it may be seen that a small drainage area will often supply enough water to develop a very large power, if a head of 1,000 or more feet can be obtained. A small mountain stream will often have between one and two miles of drainage area per mile of length, even where located in a very narrow valley, so that the runoff from twenty to fifty square miles is available within a few miles of its source. With a drainage area of fifty square miles, the runoff on the basis of the above moderate assumptions would develop 2,165 gross horse-power during 3,000 hours per year, or 6,495,000 horse-power hours.

In order to make this energy available for useful work, there must in every case be a large storage capacity, because the fall of water is very irregular from day to day and month to month. Small streams in mountainous country often show maximum discharge rates that are twenty to fifty times as great as the minimum, and this great variation in the discharge gives such streams small value for power production, before a relatively large storage capacity is provided. Take, for illustration, the case assumed above, with a drainage area of fifty square miles and an annual runoff represented by a depth of 18 inches of water on a level over this drainage area. With most of the annual rainfall concentrated in the smaller part of the year, it might be desirable to provide a storage capacity for one foot depth of water on a level over the entire drainage area. This would mean the storage of fifty times 27,878,400 cubic feet of water, or 1,393,920,000 cubic feet. With an average depth of 20 feet in this reservoir, its area would be 2.5 square miles, or one-twentieth of the drainage area. Such a reservoir might involve only a moderate investment in a hilly country with deep valleys.

California and the entire Rocky Mountain region afford the best opportunities for the development of water power under high heads, because of the great changes in elevation there, and numerous examples of such powers are to be found in these sections. One such is the hydro-electric plant on Bear Creek that delivers energy to the 33,000-volt transmission that