

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, 291cs. 5c. 4.00

THE SCIENTIFIC AMERICAN PUBLICATIONS.

Scientific American (Established 1845).....\$3.00 a year.
 Scientific American Supplement (Established 1876)..... 5.00
 Scientific American Building Edition (Established 1885)..... 2.50
 Scientific American Expert Edition (Established 1878)..... 3.00

The combined subscription rates and rates to foreign countries will be furnished upon application.
 Remit by postal or express money order, or by bank draft or check.
 MUNN & CO., 361 Broadway, corner Franklin Street, New York.

NEW YORK, SATURDAY, SEPTEMBER 3, 1898.

TURN ON THE LIGHT.

Three weeks ago we felt it incumbent upon us to protest against the wanton waste of life which was taking place as the result of the criminal incompetency of the War Department. Events that have transpired in the interim have merely served to strengthen our conviction that a shameful wrong has been done in the wholesale and altogether unnecessary sacrifice of the lives of hundreds, if not thousands, of our soldiers. The disgraceful inefficiency of Siboney and Santiago has now been repeated at Montauk; and the men who fought so bravely, even if unfed and unattended at the front, are now coming home, many of them to die—to die, not of disease, but as the attendant physician of poor young Tiffany said, of "starvation," "due to the fact that" they "did not have food that was suitable to the condition of a convalescent."

One of the most heartless and inexcusable blunders of the department has been that of permitting so-called convalescents to set out alone for their far distant homes, when the veriest tyro in nursing might know that they should have been the subjects of careful nourishment in a sick ward. That this has been done and is being done the people of the United States have painful evidence before their eyes in the emaciated and pallid forms, that may too easily and too often be seen dragging their way to the terminal stations of this and other great cities. Many a young life that Spanish bullets and Cuban fevers could not quench has succumbed to neglect, due to the shameful mismanagement of certain branches of the department over which Secretary Alger presides.

And the pity of it all is that the people of the United States, who are only too eager to assist the returning troops, are helpless in the matter. Where anxious relatives and friends are only able to find the particular objects of their search after disease or neglect has done its fatal work, the public stands in helpless indignation, and asks itself how much longer such ghastly comedies as that which recently prevailed at Montauk Point are going to last.

One thing is certain—there is a growing feeling throughout the country that the time is ripe for an official investigation. A great wrong has been done, the responsibility for which rests directly upon the shoulders of Secretary Alger, or upon one or more of the heads of departments that serve under him. If at the first, instead of showing such feverish haste to whitewash his department, the Secretary had instituted a *bona fide* investigation, he would have perhaps escaped the public resentment which is now unmistakably aroused.

The time is certainly ripe for our President to order an investigation of the whole conduct of the war as far as it came under Mr. Alger's administration. Nothing short of this will satisfy the country or serve to vindicate those officials in the War Department who have performed their duties with zeal and efficiency. The firmness, tact, and dignity with which President McKinley has handled the affairs of his high office during the war have won for him the confidence and supreme respect of the whole nation. Hitherto he has maintained a severe silence regarding an episode of the war which must surely be causing him as much grief and indignation as it does every other wellwisher of his country. The scandal, however, has now grown too big to be overlooked, and the country is naturally awaiting some action on the part of the President looking to a searching and exhaustive inquiry.

THE SHIP AND THE MAN.

In its issue of August 12, The London Engineer reprints in full our article of July 16 on American and Spanish warships, and states that "in all essentials it is very nearly agreed with the author." Although our contemporary now admits "the superiority of the United States fleet over the Spanish, not only in bulk, but, as it proved, in each fighting element," it questions whether we would consider the destruction of Cervera's fleet as "any measure of the relative strength of the two navies." By this we understand

our contemporary to mean that the superiority of our personnel over that of Cervera's fleet was so great that we must attribute our easy victory mainly to that, and not to the relative superiority of our ships.

Of the truth of this statement there can be little doubt. The victory was won by the man in the engine room and on the gun platform, and had our ships carried thinner armor and lighter guns than they did, the victory would have come just as surely, though perhaps not quite so soon. It is our opinion that, had the conditions been reversed—had we been escaping from Santiago Harbor in the Spanish cruisers and had the Spanish crews manned our more powerful blockading battleships, all the cruisers and possibly the destroyers themselves would have escaped.

The Spanish war was the navy's opportunity, and right nobly has it responded. Officers and men alike have vindicated themselves against the altogether unjust aspersions that have been cast by European critics upon the professional ability of the one and the courage and discipline of the other.

The impression had gone abroad that the crews of American warships were made up of men of many nationalities, who possessed little or no enthusiasm for the flag, and in the confusion of a sea fight would scarcely be amenable to discipline. The last census of the navy, however, shows that our crews are essentially American and native born—the exceptions being very few—and the various events of the war have proved that in discipline, cool daring, and steadiness under fire, the American seaman of to-day leaves nothing to be desired. In the aftermath of the struggle facts are coming to light that are eloquent in testimony to the splendid enthusiasm of the rank and file of the navy. An officer of the "Oregon" informs us that when it was seen that the Spanish ships were actually coming out of the harbor, the crew exhibited an almost boyish delight as they rushed cheering to their stations, and the enthusiasm was only heightened as the storm of Spanish shells began to fly over the vessel and lash the water around her. Capt. Evans, of the "Iowa," informs us that nothing could be finer than the contrast between the almost savage intensity of the men at the guns during the fight and their womanly tenderness in rescuing and nursing the Spanish wounded and dying after the surrender. The change of spirit was instant and spontaneous, and the work of rescue from the burningships, full as they were of exploding ammunition, was attended with only less risk than the running fight of an hour before.

The people of the United States needed no assurances that the line and staff of its navy was thoroughly efficient, and hence the swift, well conceived, and successfully executed operations of the war, while they have excited unbounded enthusiasm, have evoked no surprise. As showing the forethought, good judgment, and untiring watchfulness of the naval officers, we have only to refer to the remarkable trip of the "Oregon" for 15,000 miles, the conclusion of which found her in such excellent condition that she was able to undergo the trying ordeal of forced draft for a three hours' chase and overhaul four of the fastest armored cruisers afloat. Just here it will be in place to mention that when Capt. Clark had received warning that Cervera's fleet was at sea, he called his officers together and outlined his plan of action should he happen to fall in with the enemy. He calculated that the four cruisers, on account of foul bottoms and poor engineering, would have lost four knots of their speed and would be good for only 16 knots an hour (a prediction, by the way, that proved to be remarkably correct). He knew that in her superb condition the "Oregon" under forced draft was capable of 17 knots an hour, and on sighting the Spanish fleet it was his intention to steam seaward at full speed and string the Spanish line out in pursuit.

With a slight advantage in speed he could choose and maintain his position; and if the destroyers advanced to the attack, he was confident of sinking them with his powerful battery of twenty-six 6 and 1-pounder rapid-fire guns. The "Oregon" was then to drop back and take on each cruiser in succession, and the men at the 8 and 13-inch guns were trusted to sink them as they drew within range. So confident were the line and staff of the issue that there was considerable disappointment over the non-appearance of the enemy as the cruise drew to a close. The subsequent behavior of the "Oregon" at Santiago gives reason to believe that the confidence of the officers of the ship was not misplaced.

THE RAILWAYS OF THE UNITED STATES.

The summaries which will shortly appear in the Tenth Statistical Report of the Interstate Commerce Commission furnish, as usual, some extremely interesting reading. Although the gross earnings of the railroads of the United States for the last year reported upon show a considerable decrease, there is some satisfaction to be derived from the fact that the total mileage of roads that are in charge of receivers is steadily decreasing. On June 30, 1897, there were 128 roads, operating a mileage of 17,862 miles, in the hands of receivers. As compared with the previous year, ending June 30, 1896, this was a decrease of 12,613 miles. Dur-

ing 1897, 51 roads were removed from the control of receivers and 28 roads were placed under their management.

The total mileage on June 30, 1897, was 184,428 miles, an increase over the previous year of 1,652 miles. The greatest increase took place in California, where 219 miles of road were opened; Arkansas came next with 192 miles; Louisiana added 161 miles, and Michigan 123 miles. The aggregate length of railway mileage, including all tracks, was 243,444 miles, or enough to girdle the earth at the equator ten times!

The operation of this vast system called for the services of 35,986 locomotives, of which 10,017 were passenger and 20,398 freight engines, while it required the services of over 5,000 switching engines for yard and station work. The total number of cars in service was 1,297,480, of which 33,626 were required for passenger, 1,221,730 for freight, and 42,124 for the special service of the railroad companies. Each passenger locomotive hauled on an average 48,861 passengers, and each freight locomotive handled 36,362 tons of freight. All these figures show a decrease on those of the preceding year.

We are pleased to note that the number of locomotives and cars fitted with automatic couplers is increasing, but the increase is not so rapid as the large list of casualties to employes suggests that it ought to be.

To keep the vast machinery of our railroads in operation demands the service of an army of 823,476 employes. The report will show that 31,871 employes are engaged in general administration; 244,873 in maintenance of track and structures; 160,667 in maintenance of locomotives, cars, and general equipment; and engaged in transportation, 378,361. The aggregate amount of wages and salaries paid to employes was \$465,601,581—a sum which represents about 62 per cent of the total operating expenses of the railways.

The total amount of capital stock of all the railroads of the United States on June 30, 1897, was \$5,364,642,255 and the amount of funded debt \$5,270,365,819. The total amount of dividends was \$87,110,599, which would be produced by an average rate of 5.43 per cent on the amount of stock on which some dividend was declared.

The number of passengers carried during the year was 489,445,198, a decrease of 22,327,539 compared with the previous year. The total number of tons of freight carried was 741,705,946, which is 24,185,439 tons less than for 1896.

In the matter of gross earnings there was also a considerable decrease, the total being \$1,122,089,773, a decrease of \$28,079,603. The principal source of earnings was freight, \$772,849,314; passenger, \$251,135,927; carriage of mail, \$33,754,466; and carriage of express matter, \$24,901,066. The total expenses of operation for the year were \$752,524,764, and the income from operation, that is, the amount of gross earnings remaining after the deduction of operating expenses, was \$369,565,009; this amount is \$7,615,323 less than for the previous year.

The records of railway accidents are, as usual, very painful reading. The total number of casualties to persons on account of railway accidents for the year was 43,168. Of these, 6,437 resulted in death and 36,731 in injuries of varying character. Of railway employes, 1,693 were killed and 27,667 injured; among these 976 of the killed and 13,795 of the wounded were trainmen, 201 killed and 2,423 injured were switchmen, flagmen, and watchmen, the balance being employed in miscellaneous railroad duties.

We have referred to the fact that there is an increase in the number of engines and cars using automatic couplers. The work of equipment, however, is going on altogether too slowly, as may be judged from the fact that the casualties to employes resulting from coupling and uncoupling cars were 214 killed and 6,383 wounded. There is absolutely no excuse for such a frightful list of killed and wounded, nearly the whole of it being due to the risks entailed in the use of the old hand couplings. Many of the railroads have shown a commendable zeal in making the change, but there are others whose dilatoriness or indifference should be made to feel the full pressure of the law. The total number of casualties to persons other than employes and passengers were 4,522 killed and 6,269 injured. These were chiefly trespassers and tramps who were stealing rides on freight and other trains.

That "railroading" is a risky occupation is proved by the summaries showing the ratio of casualties, from which it appears that 1 out of every 486 employes was killed and 1 out of every 30 employes was injured during the year. The greatest risk is, naturally, incurred by the trainmen, including enginemen, firemen, conductors, etc., for it appears that 1 was killed for every 165 employed and that 1 out of every dozen was injured.

Surely there is room for improvement in the conditions of a service where every twelfth man is doomed to injury within the brief limits of fifty-two weeks' employment. That automatic couplers and other safety appliances would reduce these casualties is shown by the fact that only 1 passenger was killed out of every 2,204,708 carried and 1 injured out of every 175,115. The full text of the advance reports will be found in the current SUPPLEMENT.