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NEW YORK, SATURDAY, NOVEMBER 24, 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 CONGESTION AT THE PATENT OFFICE.

There is no sign of improvement in the serious congestion that hampers the work of the Patent Office, which, more than ever before in its history, stands badly in need of a larger staff, receiving better remuneration for its services. Even as far back as the first of January of the present year, there were, in the thirty-nine divisions of the Patent Office, 17,353 applications awaiting action; while at the present writing there are about 21,000 cases on file which have not yet been examined. Moreover, the office is falling behind at the rate of from 250 to 300 cases a week.

As was to be expected, the delay is greater in some than in other divisions of the Office. In the more important divisions the delay varies from about five months, with nearly 500 cases on hand, in steam engineering, to nearly twelve months, with over 1,000 cases on hand, in the division of hydraulic motors, pumps, and sewerage appliances.

The arguments in favor of the exercise of a more liberal policy on the part of Congress toward the Patent Office are so obvious and weighty, and the appropriation that would be necessary to straighten out this miserable tangle would be so moderate in proportion to the benefit conferred, that the persistent indifference of Congress to the needs of this great institution is beyond all comprehension.

EXTRAORDINARY CONDITIONS IN THE STEEL INDUSTRY.

Rarely, if ever, in the history of modern industries, either here or abroad, has there been witnessed such an extraordinary condition as confronts the steel industry in the United States. Already the rail mills are crowded with orders to such an extent that their total output up to the end of next year will barely serve to meet the present demand; and the mills which are devoted to the production of structural steel are overloaded with work, and must be pushed to the very utmost to fill orders that are due to be delivered before the spring of 1907. Even more acute conditions prevail at the plate mills, the demand for whose output is to be attributed very largely to the growing popularity of steel cars. These mills have sufficient orders on the books to keep them going at full pressure, practically for the whole of next year. There are many evidences of the prevailing industrial activity; but none, we think, speaks so eloquently as this. Who would have predicted, at the time of the formation of the United States Steel Corporation a few years ago, that within so short a time not only that great aggregation, but also the independent concerns, would be taking orders for material which could not possibly be delivered for twelve months or more from the date of signing the contracts?

GROWTH OF THE SALTON SEA ARRESTED.

Recent reports from the locality of the Salton Sea indicate that the flow of the Colorado River from its natural channel into the Salton sink is at last under control, the recent rise in the Colorado having failed to imperil the dam which the Southern Pacific and government engineers have constructed at the break in the river's banks. Before its control the river had risen until it covered an area of several hundred square miles, and in the bottom of the depression it had a depth of between seventy and eighty feet. When the waters first reached the tracks of the Southern Pacific Railway, the latter were moved back for a distance which was thought sufficient to place them beyond danger from further encroachment. Yet it was not long before the waters were again lapping at the ties; and in spite of the fact that the tracks had been several times driven back by the ever-widening sea, the railroad, we understand, was contemplating the expense and trouble of another retreat. Recently the only indication of the original location of these tracks was the tops of the telegraph poles, which projected above the water far from the present shore line. As it is, the company was obliged to build an entirely new detour line, forty miles in length, at an elevation of about seventy feet above the old line, and nearly forty miles of the old line had to be abandoned. It is now stated that comparatively little actual damage was done to the cultivated section of the valley.

GUN TRIALS OF THE "DREADNOUGHT."

So great has been the interest aroused in the "Dreadnought," that our recent article upon this ship would be incomplete without some statement of the manner in which she behaved under the very severe gun trials to which she was recently subjected. These trials are of special interest to the naval constructor and the ordnance expert; for the former has freely predicted that when the ship came to trial, it would be found that too much had been attempted, and that the wide arcs of training through which it was claimed the 12-inch guns could be used, would have to be reduced, unless the ship were to be badly wrecked by the concussion and blast. It was freely asserted that the designed end-on fire of six 12-inch guns could never be realized, for the reason that the blast would be certain to distort the framing of the decks and vertical bulkhead forming the embrasures through which the guns, when trained dead ahead, would have to be fired; and instances were quoted where serious damage of this character had resulted to ships both of our own and the British navy. As a matter of fact, the scantling of the "Dreadnought," in those portions of the deck and superstructure that would be exposed to the blast, had been built of heavier section and weights to meet the resulting stresses; and after the gun trials, careful examination revealed no material injury to the ship. Eight of the guns were fired simultaneously on both sides of the ship, the guns being all laid at the maximum elevation of a little over 30 degrees. In spite of the fact that the aggregate energy of the broadside was 384,000 foot tons, or sufficient to raise the "Dreadnought" bodily 21 feet into the air, the roll of the ship under this heavy recoil is said to have been very slight. The forward pair of guns on the forecastle, and each pair of guns in the two turrets on the broadside, were fired simultaneously dead ahead, and each pair of guns in all the barbettes was fired on various bearings through its own arc of training; but no structural defect was revealed. Similarly, each of the guns was fired at various degrees of elevation and depression with satisfactory results. As the result of the trials, it was considered by the trial board that the whole of the ten 12-inch guns for broadside, and the six 12-inch guns for bow and stern fire, can be used effectively in any position.

THE SIZE OF OCEAN WAVES.

The latest investigation of the question of the size of ocean waves is that made by the eminent naval architect, M. Bertin, who agrees with all the qualified students of this subject in stating that the size of the largest ocean waves has been greatly overestimated. According to this authority, of the several methods by which the length of a wave may be determined, the most reliable is that of deducing it from the theory that there is a simple relation between the time of complete oscillation and the length. The longest wave of which M. Bertin has knowledge measured 2,590 feet from crest to crest, and its period was twenty-three seconds. The long waves, however, are not unusually high, and in deep water the height of a wave 2,590 feet in length would be not more than one-fiftieth of its length, or say about 50 feet. Observers, particularly those who were situated on small vessels, claim to have witnessed waves much higher than this, but their observations are not of much value, for the reason that the deck of such a vessel floats parallel to the surface of the waves instead of parallel with the plane of the horizon, and the inclination of the deck will thus give the observers an exaggerated impression of the height of an oncoming wave. M. Bertin accepts as reliable, records taken where this source of error was carefully eliminated, which show the highest waves in open water to have measured 50 feet from trough to crest, although he is of the opinion that in the southern seas waves of even greater height than this may occasionally be met. As the waves enter shoal water their period decreases and they become higher, so that on striking a shoal, a 40-foot wave will climb to a height of 50 feet or more. Should it meet an obstacle that approaches the vertical, it may easily be thrown up to a height of 100 feet or more; as at the celebrated Eddystone Light off Plymouth, where solid green water has at times been known to reach a height of 100 feet. Although the period of the longest waves may occasionally reach twenty-three seconds, and its length 2,500 feet, such waves are exceedingly rare, the common length of a long wave being something over 500 feet and the period ten seconds. The average period is from six to eight seconds, and the length from 160 to 320 feet. It is rarely that the height exceeds 33 feet.

PROGRESS OF THE PENNSYLVANIA EAST RIVER TUNNELS.

Interest has been so largely centered upon the construction of the Pennsylvania Railroad tubes beneath the Hudson River, the completion of which was recently announced, that the public is in comparative ignorance as to the extensive work which is being done by the railroad company in tunneling the East River. Altogether, four separate tubes are being driven, which are known respectively as tunnels A, B, C, and D. Of the four, tunnel A, the northernmost, is the least advanced. The tube has been driven for only about 150 feet, and the men are now beginning to get out of the solid rock into the sand and gravel. Tunnel B is the farthest advanced, the shield having been pushed out into the river bottom for a distance of over 900 feet from the shaft, which is located near First Avenue on Manhattan Island. Tunnel C is about 600 feet out from the shaft, and tunnel D a little less than 900 feet. It is gratifying to learn that the company is using every effort to protect the men from the effects of working in compressed air, a number of devices having been adopted for this purpose. The latest of these is the provision of an independent supply of compressed air for each lock; an arrangement which has the advantage that, in case of fire or accident in a lock nearer to the shore than the one in which the men are working, they will continue to receive fresh air independently of the disabled portion of the tube. In tunnel B, at a point about 500 feet from the shaft, a new bulkhead is being built for the installation of an additional set of locks. When these locks have been constructed, the air pressure back of them, that is, on the land side, will be reduced. The advantage of this arrangement is that a much smaller chamber will be maintained under high pressure, and the lowering of the pressure within the completed portion of the tunnel will afford a test of the tightness of the cast-iron tubes against the surrounding water.

SANTOS DUMONT'S LATEST FLIGHT.

A cable dispatch from Paris announces that Santos Dumont, at 4 o'clock on Monday afternoon, November 12, made a new record with his aeroplane, "14-bis," which we illustrated in flight in our last issue. This time he flew against a slight breeze for a distance of 210 meters (689 feet), or a trifle over one-eighth of a mile. The machine was in the air for 21 seconds, which corresponds to a speed of 22.36 miles per hour. Thus the machine did not show as much speed as in the previous trials, doubtless because it was flying against a slight wind. The machine showed good stability, and apparently had the capability of making a much longer flight. It also showed that it was capable of being steered with ease. M. Dumont made a sharp turn to the right, with the intention of describing a circle, but so great was the crowd of people on all sides, that, fearing for their safety, he shut off power and descended. The flight was at length made after several unsuccessful attempts earlier in the day, in which the motor failed to operate perfectly. At 2 o'clock there was a strong breeze blowing, and it was decided not to try to fly against it. By 4 P. M. the breeze had died out considerably and a number of attempts were made to fly with the wind. The machine rose in the air, but only for a distance of 270 feet. The flight occupied 7 1-5 seconds, and 82.6 meters were covered, corresponding to a speed of about 25.66 miles per hour. Finally, a flight against the wind was attempted, with the result noted. M. Dumont expects to make further trials in private, so that he will not be hampered by a crowd of spectators. He hopes in the near future to win the $10,000 prize for a flight of one kilometer in a circle. In the flight of the 12th, he won the $300 prize for the first flight of 100 meters.

While they give Santos Dumont great credit for being the first publicly to demonstrate the practicability of the aeroplane flying machine, American experimenters, who have done the most work in this line, do not believe that the stability (and therefore practicability) of Santos' machine under all weather conditions is by any means assured. The fact that he did not attempt to fly it against a strong wind, when this is just what is needed to aid in getting such a machine up in the air, shows, they argue, that he does not have much faith in its stability. Santos, on the other hand, is so elated by his success that he prophesies that aeroplanes for private transportation will soon be in use in large numbers. He admits that his present machine (which, he says, has 80 square meters, or 762 square feet, of supporting surface) is somewhat inefficient, but he thinks that others will soon be built intended for higher speed and which, with greater horse-power and less supporting surface, will be capable of transporting individuals quickly from place to place. He says that the only danger to be feared is breakage of the rudder, and he seems to forget alto-