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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.

IS THE AEROPLANE PRACTICABLE FOR SCOUTING?

The army tests of aeroplanes at Fort Myer are naturally bringing the question of the military value of the airship into marked prominence. Our esteemed contemporary Engineering News, in the course of a thoughtful article upon this subject, is evidently less enthusiastic over the military possibilities of the airship as a future means of obtaining full information of an enemy's dispositions and movements than we are. It quotes, with an evident reservation of doubt, our statement that if the airship can only fulfill its present promise, the time is not far distant when the art of war as practised to-day will be stripped of its most important element of success (secrecy) and its prosecution, at least along modern lines, will be rendered well-nigh impossible. Our contemporary believes that we, in common with others who believe in the usefulness of the future aeroplane scout, have failed to realize how completely such a large object in the air will be at the mercy of the sharpshooters of the enemy. This is a point well worth consideration.

In the first place, then, let us state our conviction that an aeroplane in motion will be an extremely difficult object to hit. To "wing" it successfully (the dirigible because of its inflammable gas bag and great size is so obviously vulnerable as to be out of the discussion) it will be necessary to use a gun of considerable caliber; for the perforation of the canvas wings by the tiny, clean-cut holes of a modern rifle bullet, would amount to nothing at all. Now, for a modern field gun to do any accurate shooting, it is absolutely necessary to have the exact range. To get the range, even with the best range finders, is a difficult matter either ashore or afloat, and when the object is in motion the difficulties are increased; but both on sea and land the gunner has the advantage that he can mark the fall of his shots and make corrections until he has found the exact range. Moreover, he has the advantage, particularly on the sea, of knowing that the change of direction of the object takes place only in one, or approximately in one plane. Furthermore, the speed of the moving object is usually not more than 15 miles an hour at sea, and less than a fifth of that speed on land. But the perfected aeroplane, moving through the air at 40 to 60 miles an hour, at an elevation of, say, from 2,000 to 3,000 feet, will be a totally different proposition. At these high speeds it will change its position at the rate of from 60 to 80 feet a second. Unlike the army or navy target, instead of being confined to movement in one plane, it can move in as many planes as the operator may choose. It is certain that, if he finds himself under fire, he will follow an undulating or wave-line course, varying from a direct line both vertically and laterally. Nor could an object, sweeping through the air at high speed on a sinuous line of flight at the height named, be hit by point-blank fire with the heavy field guns, which alone would possess sufficient disabling power to bring it down. In spite of the great improvements that have been made in the training mechanism of field guns, it would be impossible to hold the piece on such an object a sufficient length of time to secure a point-blank hit. Perhaps something might be accomplished with time-fuse shells; but even with these, the firing, for the reasons stated above, would be largely of the "pot-luck" kind.

An important advantage in favor of the immunity of the aeroplane scout from hostile fire is that, in order to make a reconnoissance, it would not be by any means necessary to sail directly over the enemy's camp, fortifications, or line of march. Anyone who has done topographical work is well aware of the great advantage of observation afforded by each additional 50 or 100 feet of elevation. It would be possible to make a fairly good map of Manhattan Island and its environs, even from the 600 or 700 feet elevation of the Singer or Metropolitan tower, and to include in the map quite a wide radius of country. Hence the aeroplane, if subjected to hostile fire, could draw off to the outskirts of the locality to be observed and mapped, and still have a sufficiently detailed view of the country for all practical purposes. Now at this greater distance, the machine would have the advantage that its planes would be directed fairly tangential to the curve of the trajectory, or curve of flight of the projectiles; and should the aeroplane be reached by the shells of the enemy, the chances are that a large majority of them, even if they fell within the area of the cross section of the machine, would pass harmlessly between the planes, rudders, etc., without making a hit.

MANUFACTURING UNDER THE REQUIREMENTS OF THE BRITISH PATENT ACT.

For some months articles have been published in the leading American periodicals on the question of the necessity of manufacturing patented articles in Great Britain to preserve the validity of patent grants, but most of the information furnished is misleading, and most of the conclusions drawn show only too clearly that many of those who have undertaken to inform the public concerning the requirements are deficient in a knowledge of British or general patent practice, and in the rules of statutory construction.

The new law in Great Britain authorizes any person, after the fourth year of the term of a patent, to apply to the comptroller for the revocation of the patent if the patented article or process is manufactured or carried on exclusively or mainly outside of Great Britain. Under this provision, all British patentees have been advised to commence at once the manufacture of their patented articles in Great Britain, whether or not the patentee has any trade in that country or whether or not there is any real demand for the goods. Undoubtedly, it is true that when a British patent is dated more than four years ago, the articles which are sold under the patent in Great Britain should be manufactured in that country, or at least the manufacture should mainly be carried on there. Such a case comes directly within the wording of the statute; and while the comptroller has discretionary power to grant an extension of time, it would be foolhardy for a patentee to jeopardize his British trade by a failure to comply with the requirements. In other cases, such as when the patentee for one reason or another has not commenced the sale of the patented articles in Great Britain, no necessity can be seen for the taking of precautionary measures, although those interested should make certain that the goods are at least mainly manufactured in Great Britain when the industry is introduced there after the fourth year of the term of the patent.

There has been a great agitation in diplomatic fields in an effort to secure exemptions in favor of citizens of particular countries; but when it is understood that all the principal countries are either directly or indirectly accomplishing the purpose sought to be attained by the new British act, it will be realized that there is little prospect of Great Britain's relinquishing her rights. In many countries manufacture must be commenced within a stated time; and when the provisions of the laws are compared, Great Britain will be found to be much more lenient than some countries which take the matter as a personal grievance. In other countries, the manufacture at home of the patented as well as a great many other goods, is indirectly accomplished by tariff laws. Our high tariff, for example, accomplishes exactly the same purpose as the new British patent act; and our copyright law, exacting as it does the requirement that foreign books enjoying copyright privileges here, must be set and printed in the United States, places us much in the same self-protective position with regard to literary works.

When the whole matter is carefully considered, the growth of the underlying principle of the protection of home industries is perceived in the recent enactment.

PROPOSALS FOR COOLING THE SUBWAY.

The latest of the series of admirable reports made by Bion J. Arnold to the Public Service Commission deals with the question of cooling the New York Subway during the summer months. The expectations of the builders of the system that it would present a cellar-like coolness in hot weather were doomed, as the New York public realizes to its sorrow, to disappointment. The optimists forgot that each one of the thousands of motors on the cars would be constantly throwing off heat in such quantities as to more than offset the natural coolness of an underground chamber. It will be remembered that, as the result of the recommendations of Mr. George S. Rice, chief engineer of the Rapid Transit Board, made in March, 1906, grated openings were made in the Subway at the stations; twenty-five exhaust fans in conjunction with fourteen ventilating chambers were installed between 59th Street and Fulton Street; automatic shutters for the discharge of the heated air were placed in roof openings between Fifty-ninth and Ninety-sixth Streets; and an air-cooling plant was built at the Brooklyn Bridge station. Although this installation has tended to relieve the heated condition and improve the ventilation, the Subway is still too hot for comfortable travel.

The method of cooling recommended by Mr. Arnold is as follows:

First. Block the present louvres open during the day and allow them to operate at night when the fans are being run.

Second. Construct as many protected openings as practicable between the Subway and the street.

Third. At the Fourteenth Street and Grand Central stations install large disk fans located in such a way as to draw air from the street through the kiosks and force this air in large volumes down upon and among the persons waiting for trains upon the platforms.

Fourth. Construct a solid continuous division wall between the downtown and uptown express tracks extending from the north end of Ninety-sixth Street station to and including Brooklyn Bridge station. For the purpose of demonstrating the feasibility of such a wall it is suggested that the section extending south from the center wall now at Thirty-third Street station be constructed first far enough south to include the Fourteenth Street station. At stations the upper half of the wall to have vertically sliding counterweighted windows between columns.

The advantages of this scheme are that by constructing division walls between the tracks, the air can be made to travel in the same direction as the train. Each train, as it approached a free opening, would push out a large quantity of air and draw in by suction a considerable amount of air as it passed the opening, thus producing what might be called "piston" ventilation. It is estimated that at the present time there is a change of air in the Subway twice per hour. With the division walls in place it is estimated that the air would be changed at least six times per hour during the day. The deductions in Mr. Arnold's report as to the benefit to be secured seem to be conservative; and when it is learned that the cost of a division wall between Ninety-sixth Street and the Brooklyn Bridge would not be more than $76,000, if it were built of terra cotta, or more than $130,000 if it were built of concrete, the arguments in favor of making this change would seem to be strongly conclusive.

IMPROVEMENT OF NEW JERSEY-NEW YORK SUBURBAN SERVICE.—III.

PENNSYLVANIA RAILROAD.

In recent issues we have dealt with the extensive improvements which are being made in the suburban service between New York and New Jersey on the Lackawanna and the Erie railroads. The present article, the third of the series, describes the costly and important work done by the Pennsylvania Railroad in the improvement of its lines from Harrison, N. J., to the new terminal station at Thirty-third Street and Seventh and Ninth Avenues, New York, over a total distance of 8.6 miles, and in the construction of the vast terminal itself.

The commencement of this great work is found at Harrison, N. J., where a large yard and station is being constructed on a plot of land which measures approximately 3,500 feet in length by 2,500 feet in width. In addition to the commodious station, with separate express and local tracks, the yard will include extensive storage capacity for the rapid-transit cars and motors of the local service, and for the standard passenger cars and steam engines of the steam service. At this point the change of motive power will be made from steam to electric on all trains entering and leaving the zone of electric service. Immediately beyond the easterly end of the station the tracks rise on a 0.5 per cent grade to a level of 31.5 feet above the general ground surface, at which level they are carried on two skew bridges over the west-bound passenger and Newark freight tracks of the company and over the Morris & Essex Division of the D., L. & W. Railway. The whole of the new line, except at the various crossings of public roads, the Hackensack River, and the tracks of other railways, is carried on an embankment, which varies in height from 26 feet to 32½ feet above the surface of the Jersey meadows, the elevation of the latter being generally from 2 to 3 feet above mean tide level.

The bridging is exceptionally heavy and costly. In addition to the crossing of the Morris & Essex Division, which is over 600 feet in length, and the bridge over the west-bound passenger tracks and Newark freight tracks, over 400 feet in length, there are bridges over the N. & P. branch of the Erie Railroad;