Correspondence.

An Arrangement of Twin Propellers for Aeroplanes.

To the Editor of the SCIENTIFIC AMERICAN:

The lesson to be learned from the Wright disaster at Fort Myer, Va., is the fact that having two propellers on a horizontal line is radically wrong, as the forward thrust is shifted entirely to one side, if anything happens to either propeller, and no movement of the steering devices can overcome this side thrust, as the plane of resistance of the supporting surfaces is at nearly right angles to this side thrust. I designed an aeroplane some years ago and placed the propellers above each other to avoid this very contingency. The propellers being in a vertical line allows of a stronger and simpler plan, as one of them can be placed directly on the engine shaft, the other being either above but preferably below the line of the planes. Now if anything should stop one of these propellers, a change in the vertical steering rudder added to the higher speed of the remaining propeller would tend to overcome the loss of one, and would prevent the machine's falling, though it might sail slowly to the earth. Builders of aeroplanes will eventually be forced to adopt this arrangement of propellers, as it may be seen that it has other advantages than those mentioned above.

E. L. BAILEY.

Raleigh, N. C., September 26, 1908.

A Question of Priority of Invention.

To the Editor of the SCIENTIFIC AMERICAN:

Referring to the article entitled "Nasmyth—the Centenary of a Great Inventor," appearing in your impression of October 10, page 238, and partly quoted from the Engineer of London, allow me to correct two misleading statements as to Nasmyth's priority of invention. The article states that in 1838 Nasmyth brought out a self-adjusting bearing for the shafting of machinery, which consisted in giving a spherical form to the exterior of the bearing; also, he invented an inverted vertical steam engine. In Nasmyth's autobiography, edited by Smiles, the date of the latter invention is given as 1848.

It is far from my wish to detract in the smallest degree from the fame of Nasmyth. He was unquestionably a great inventor, but, as in the case of other great men, some of the prior achievements of his contemporaries were subsequently ascribed to him.

When Nasmyth was established at the Bridgewater Foundry, near Manchester, John George Bodmer, M.I.C.E., was in business at the Britannia Foundry in the same city. The two engineers were much in contact, and Nasmyth frequently consulted Bodmer on difficult matters of construction.

It must be explained that Bodmer was a native of Switzerland (born in 1786) and emigrated to England in the early thirties—partly for the reason that his native country gave no protection to inventors. At that time there was great opposition to foreigners, and the English engineers, as well as the workmen, threw every obstacle in Bodmer's way.

Nevertheless, he made a determined fight for success, and originated many improvements in machinery, among them being a spherical journal box in 1834 of the same construction as Nasmyth's of four years later. These spherical bearings were successfully used on locomotives and cars on English railways. In 1841 he invented the inverted vertical steam engine, anticipating Nasmyth by seven years.

Bodmer's diaries are now in my possession, and they give a highly interesting account of how this indomitable Swiss engineer, who was about fifty years in advance of his time, grappled with difficulties and obstructions which to-day are unknown to the scientific inventor.

During his residence in Switzerland and Germany in 1804, he invented spiral-gear wheels. In 1808 he made a breech-loading rifled cannon, which was thoroughly tested by the officers of artillery in the Grand Duke of Baden's regiment, and pronounced successful; but it was not adopted, for the world was not then ready for breech-loading firearms.

In England, in 1833, he invented the double-piston balanced steam engine, and locomotives on this principle were used on the London and Brighton and South-Eastern railways. Bodmer said that they ran with absolute steadiness at all speeds. They anticipated the balanced locomotive by about fifty years. The original drawings of these locomotives are in my hands; they had cylindrical slide valves, variable expansion valves, superheaters, feed-water heaters, and four-wheeled trucks.

At Manchester Bodmer introduced new forms of cotton machinery and machine tools, some of the latter being subsequently ascribed to Whitworth. Bodmer claimed to have improved the whole system of cotton spinning, one of his inventions being a carding engine, the drums or cylinders of which were self-stripping. He affirmed that if the English cotton-mill owners had adopted all of his improvements, they would have reduced the cost of production by one-half.

English engineers openly opposed him, but secretly copied his improvements, and in 1842 it was found that his inventions were in unlawful use in over sixty mills and machine shops in Lancashire; but Bodmer patented his inventions and proceeded against his infringers, from whom he collected heavy damages. He obtained fifteen patents in England and many more in foreign countries. Three of his English patents were so valuable that they were prolonged, at great trouble and expense, by special act of Parliament.

In 1842 Bodmer invented a rolling mill for rolling railway wheel tires in the circle, and these mills have been manufactured from that day to this, the latest being installed in the Standard Steel Works Company's shops; also a complete plant for the Japanese government.

In 1843 Bodmer brought out his patent air pump for condensing engines. The plunger of this pump was conical, and wiped over the ports in such a way that no valves were required. This valveless air pump is now, with slight improvements, being manufactured by a London syndicate.

Bodmer subsequently moved to London, and associated with the leading engineers of the day, including Brunel and Robert Stephenson; but they regarded him as a radical, and received him coldly. When he suggested that railway cars should be built with a central passageway and a lavatory for the convenience of passengers, he was laughed at. In 1846, at a meeting of the Institution of Civil Engineers, he was amused at the pompous way in which fuel consumption, tractive effort, and counterbalancing of locomotives were discussed by the great English engineers, without proper data. Bodmer affirmed that they were talking wildly, and the only way would be to build a stationary testing plant, so that the locomotive and its movements could be studied while the working parts were running at full speed. This was regarded as such an outlandish scheme, that it was not even discussed.

He tried to get his balanced marine engines built by Penn and Rennie, the leading marine engineers of London, but they feared him as a competitor, and told him that they would not build his engines, not even if they got orders from the British government.

In 1847 failing health necessitated Bodmer's return to Switzerland, where he designed machine tools for his son-in-law, Frederick Reishauer, who was a tool maker at Zürich. These tools were successful, and enabled Reishauer to start the extensive works at Zürich now known as the Actiengesellschaft für Fabrikation Reishauer'scher Werkzeuge, where some of Bodmer's machine-tool inventions are in present use, and where his drawings were lately discovered.

Bodmer died in 1864. He was one of the most brilliant inventors of the nineteenth century, but it is only now that engineers have begun to recognize the great scope and value of his inventions, and the part he played in the development of modern machinery.

HERBERT T. WALKER.

Binghamton, N. Y., October 12, 1908.

Rearmament of Warships.

To the Editor of the SCIENTIFIC AMERICAN:

You have recently published a couple of letters on the rearmament of our more important battleships and cruisers. The projects mentioned would, however, entail considerable reconstruction of ships and turrets, and, as you noted, the money needed to effect this could be spent to greater advantage on new ships.

It seems to me that by using more powerful 8-inch guns the required result might be easily obtained. A 50-caliber 8-inch gun, as used by the Russians, ought to be able to fire a 340- to 350-pound shell. (The new French 50-caliber 12-inch gun uses a shell correspondingly heavier than that employed in their 45-caliber model.)

An 8-inch gun thus equipped would have practically the same size shell and as great a velocity as the 50-caliber British 9.2-inch, which is considered equal to a 45-caliber 10-inch gun.

The increase in length and weight over the present 8-inch model would be very slight and, if the military masts, cranes, and flying bridges were removed from our battleships and cruisers, these guns might also replace some of the 7-inch and 6-inch, thus giving a broadside superior to the "Aki" or "Lord Nelson" for the battleships and to the "Kurama" or "Shannon" for the cruisers. Fifty-caliber guns are more easily worn out than 45-caliber ones, but still the 50-caliber are used.

T. B. THOMPSON.

Greenwich, Conn., September 11, 1908.

On October 11 Mr. Wilbur Wright increased his aeroplane record with a passenger to 1 hour, 9 minutes, and 45 seconds. His passenger in this flight was M. Painleve, a member of the French Institute. The flight was executed with perfect steadiness, and was the most successful that has as yet been made. After teaching three different men how to operate the aeroplane, Mr. Wright, according to report, will return to the United States.

V.—THE JAPANESE NAVY OF TO-DAY.

The fact that our Atlantic fleet of sixteen battleships is just now in a Japanese harbor and the recipient of Japanese hospitality gives particular interest to the present article on the Japanese navy. Comparisons of a friendly character will be inevitable, and it is a matter for considerable satisfaction to know that, in spite of the recent rapid growth of the Japanese navy, it cannot assemble, even to-day, so formidable an array of first-class battleships as that under command of Admiral Sperry.

The Japanese navy ranks fifth in importance among the leading navies of the world. The relative rank of the four other navies is Great Britain, United States, Germany, and France. Each of these has been treated in a separate illustrated article of the present series—the British navy on March 7, 1908, the United States navy December 7, 1907, the German navy August 8, 1908, and the French navy September 19, 1908. The rise of the Japanese navy to its present position as one of the leading navies of the world, has been rapid and highly spectacular. For the beginnings of her *modern* navy, we need go back not more than twenty years, or, say, to the commencement of the last decade of the nineteenth century. At that time her fighting strength consisted of three cruisers of the "Hashidate" class, each carrying a 12½-inch gun and eleven 4.7-inch quick-firers; the little armored cruiser "Chiyoda" of 2,450 tons; and a few smaller cruisers which to-day would be considered in the gunboat class. With this Lilliputian fleet she crushed the naval power of China and gave such evidence of latent genius for naval strategy and tactics that she won the instant respect of naval critics the world over, who predicted for her a brilliant naval future. The wresting from Japan of Port Arthur (one of the richest fruits of her victory) by the joint action of France, Germany, and Russia, stung deeply the pride and stimulated the activity of this valiant race. They immediately set about the construction of that fleet which, less than ten years later, in a series of brilliant victories, crushed the naval power of Russia and all but swept her navy out of existence. Although we have placed Japan in the fifth position in respect of the number, displacement, and fighting power of her ships, it should be remembered that the actual fighting value of a navy depends as much, if not more, upon its men as it does upon its material. Moreover, the fact that the Japan of the future will probably be fighting in her home waters, and within easy reach of her naval bases, will necessarily give her great advantage over any of the navies, more powerful on paper, with which she may have to contend. It is only during the last few years that Japan has undertaken the construction of ships in her own yards. Consequently, the bulk of her navy is of foreign build, and bears the impress of foreign design. The earliest ships of her modern navy were built in France; but the majority of her battleships and armored cruisers have been designed and constructed in English yards, notably those of Armstrong and of Vickers-Maxim. Consequently, her ships, and particularly the battleships, approximate more nearly those of Great Britain than they do to the ships of any other navy. Since the Russian war, however, Japan has progressed by leaps and bounds. She has struck out on original lines, and in her latest battleships and cruisers she has produced ships of large size, high speed, and carrying exceptionally heavy batteries. A particularly notable fact is the tenacity with which she has clung to the secondary battery. She followed the big-gun-ship fashion set by the "Dreadnought," without sacrificing the 6-inch gun; her latest battleships carrying a very formidable armament of 6-inch and 4.7-inch rapid-fire guns. Her new vessels are thoroughly up-to-date, and Japan has adopted the turbine as the exclusive motor power for her future vessels of large size.

SUMMARY.—The Japanese navy includes fifteen battleships of over 10,000 tons displacement, the oldest of which was launched in 1894, and most of which are not over ten years old. Their total displacement is 233,094 tons. Four of these, of the "Dreadnought" type, are at present under construction. The thoroughly modern character of Japan's navy is shown by the fact that it includes but one battleship of such early date as to relegate it to coast defense, and this is the "Iki," one of the Russian battleships captured at the battle of Tsushima. This vessel is of 9,672 tons. Japan is strong in armored cruisers, having thirteen of these ships with a total displacement of 136,212 tons.

Of second-class cruisers Japan possesses four, of 23,306 tons aggregate displacement. These are fast protected vessels with a speed of from 20 to 22 knots. There are also fifteen third-class cruisers of from 2,450 to 4,277 tons displacement—a miscellaneous lot of vessels ranging from the 25-knot "Sutsuya," formerly the Russian "Novik," to the 17-knot "Hashidate," of 4,277 tons, carrying as its main armament a 12½-inch gun. The total displacement of ships in this class is 52,025 tons.