

THE TOMBS AT MUKDEN OF THE MING DYNASTY.

The history of China is marked by the alternate rule of native and foreign dynasties. The house of 'Tsing, to which the present rulers belong, is of Tartar race, and revolutions with the object to free the nation from foreign domination have occurred from time to time, and may break out again, as there are powerful secret societies in China working for the overthrow of the ruling dynasty. As the scepter is now in the hands of the Mantchoo-Tartars, so it was held up to the fourteenth century by Mongolian monarchs. At that time the crown was wrested from the invaders by Tsen-Yueng-Tsang, the founder of the Ming dynasty, who, from a simple bonze or priest, rose to be first a brigand chief, then the leader of a national insurrection, and finally emperor.

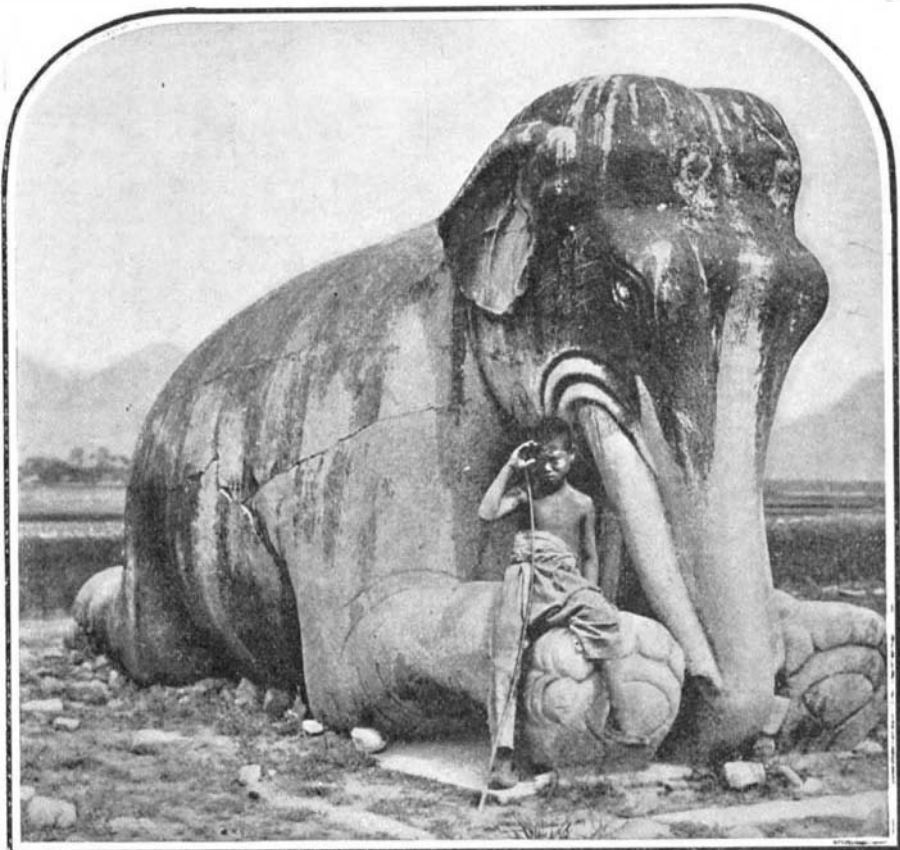
The Mings reigned from 1368 to 1644, when they succumbed to the Tartar invasion. Fourteen emperors

of this dynasty ruled China, and they are all buried at the same place near Chang-ping-cho, with the exception of King-tai-hoang-ti, who reigned for Ying-tsung, the fourth emperor of the dynasty, while he was held captive by the Tartars.

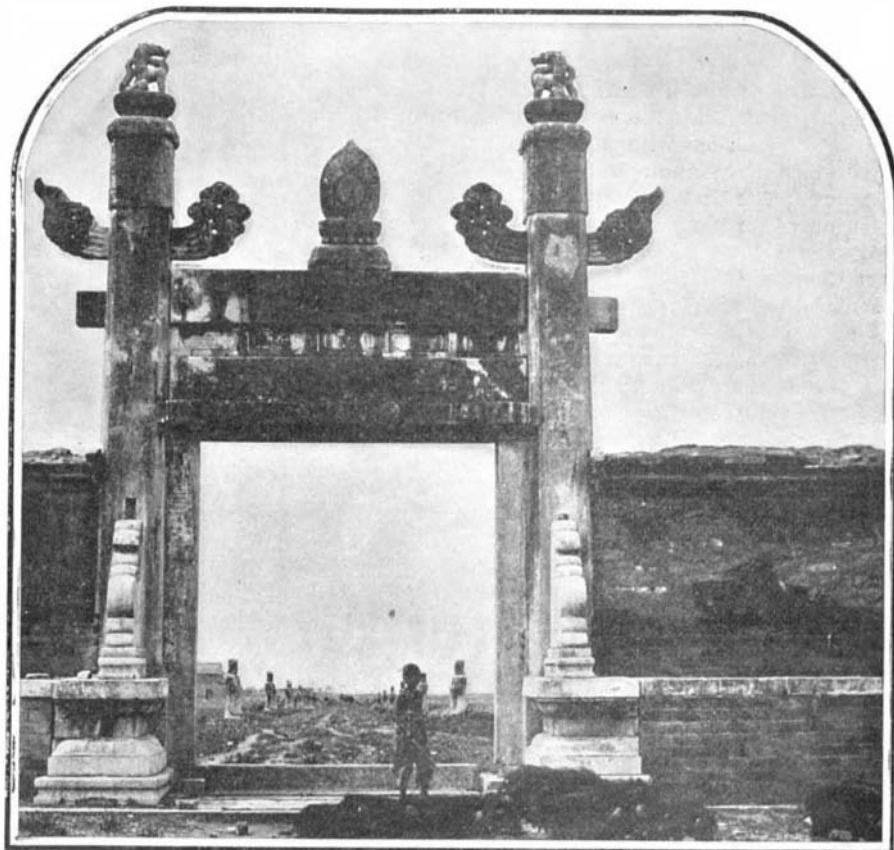
The graves are in a plain, so that the entire grounds can be readily overlooked from a near-by hill. Formerly the Mantchoo-Tartar emperors even went so far as to offer sacrifices at the graves of their predecessors; but this practice has been discontinued long ago, and the rites are now performed twice a year by a descendant of the Mings. The emperors are buried with their wives, and originally there prevailed the barbarous custom of burying the women alive with their dead sovereigns. Ying-tsung decreed that the women should be buried in the mausoleums only after their death.

The burial grounds are remarkable not only by the tombs themselves, but by a monumental gate, having

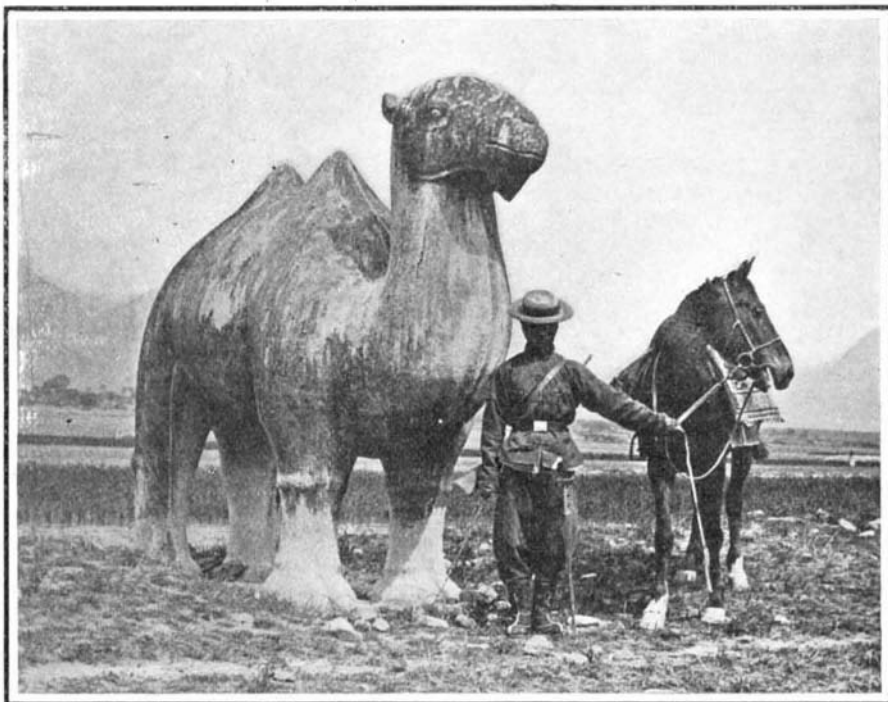
five passages or arches, of which the central passage is the largest, the others being progressively smaller. At some distance from this entrance are three gates, called Tahung-men, upon which is carved an imperial edict ordering travelers to alight from their horses. These gates are connected with the entrance by the so-called Holy Road, which in older times was open to the emperors only; and for the burial of empresses and concubines, they made use of underground passages leading to the tombs; these passages still exist at the present day. The Holy Road is the most interesting feature of the burial grounds. It is lined on both sides with colossal monolithic statues, standing about 200 yards apart. There are in all thirty-six statues, of which twenty-four represent animals and twelve high dignitaries or celebrities. The statues are exceedingly well made and by no means crude productions; their artistic execution is no less a source



An Ancient Ming Statue of a Kneeling Elephant.



Gateway at the End of the Avenue of Ming Monuments.



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One of the Stone Ming Camels.



Statues of Famous Soldiers.



Statues of Camels Erected by the Mings.



The Horse Statues near Mukden.

COLOSSAL STATUES AT THE BURIAL PLACE OF THE MING DYNASTY NEAR MUKDEN.

of wonder than the presence of these monuments at a point which evidently is far away from the quarries whence the monoliths were taken. The statues are made without pedestals, and are disposed in groups of four each. First come four lions, then four rams, then camels, elephants, horses, and finally chimeras. In each group two animals are represented standing and the other two lying down. After the animals follow the statues of four military mandarins, four civilian mandarins, and four of China's celebrated men.

Thirteen hills surround the burying grounds, and from each of them a good general view may be obtained. The impression created by this strange sight is quite peculiar. The statues of the animals, rising immediately from the ground without pedestals, and surrounded by the high grass, have a degree of realism which is entirely lacking in Occidental statuary, with its elaborate pedestals and inclosures. The Japanese authorities issued instructions that the tombs and statues be respected. It is to be hoped that no stray shots in the recent battle may have struck these curious statues.

POWERFUL GERMAN WINDMILLS.

BY CHARLES B. HAYWARD.

In this country, while the windmill is in universal use, its scope of duty seems to be confined almost entirely to the driving of pumps or other water-raising appliances, though experiments have been made to adapt it to the production of electrical energy with the aid of accumulators to tide over periods of calm. However, it is not evident that this was ever carried beyond the experimental stage or that the windmill at its best in this country is much more than a sort of "farmer's assistant," acting in the capacity of a drawer of water.

In Germany this most economical of all powers has been developed to a point that is surprising. The Empire has not the abundant supply of water power with which this country is blessed, nor is cheap fuel present in such quantities. Even the "spiritus" or raw potato alcohol, of which millions of gallons are now annually consumed in hydro-carbon engines, is not as economical a source of power as the wind, though it sells so low as to be the strongest competitor of American petroleum in the German market. Accordingly, a great deal more attention has been paid to the development of means for

taking advantage of wind-power than here. This is manifest in the number and variety of articles and books on the subject in German which deal with the windmill as a source of power for general purposes, whereas about the only information of the kind ob-

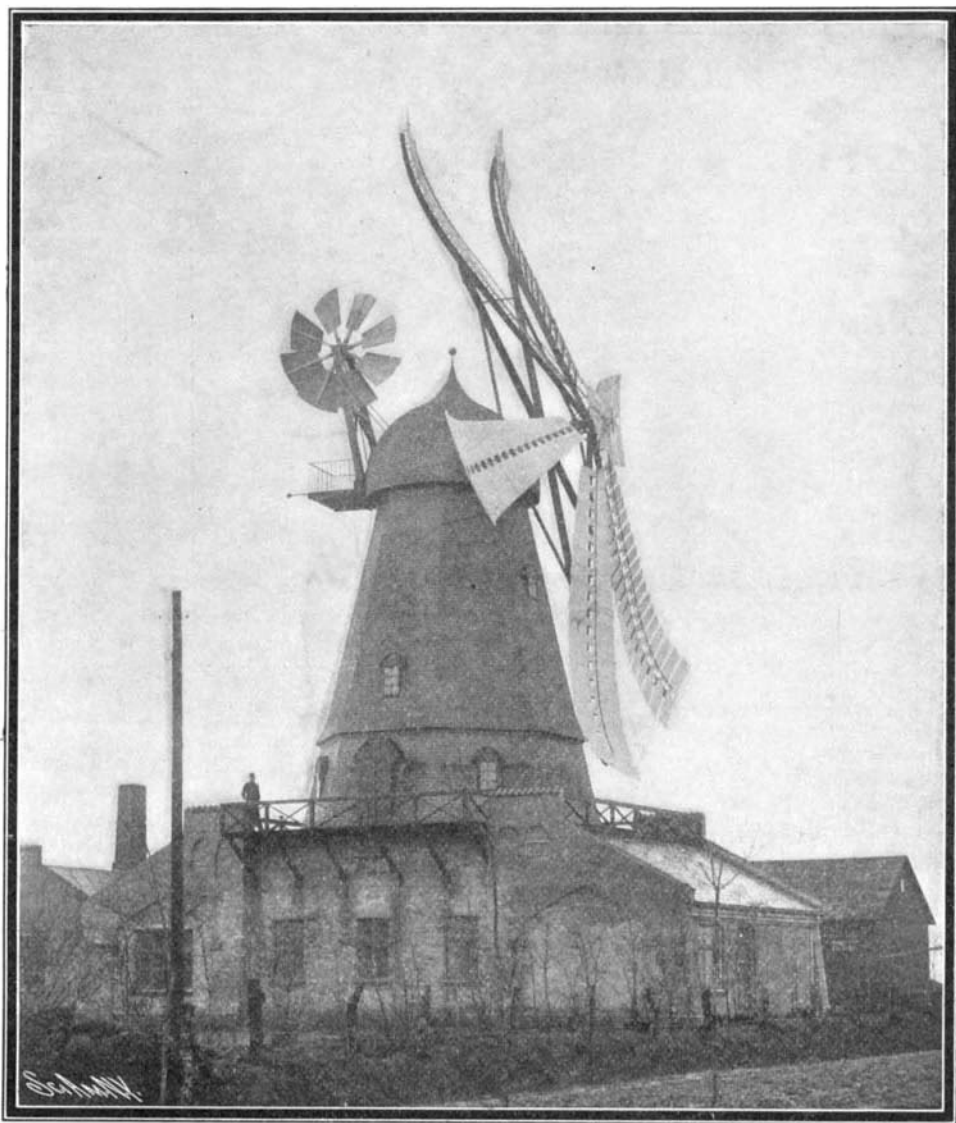
Holland and North and Central Germany. The Holland form, however, owing to its solidity and general good service, has in large measure displaced the trestle mill. From the modern standpoint both these are very antiquated, as it is now more than a century ago that

Americans began to improve upon these types, and the result is the windwheel of to-day. Fixed framing was primarily employed, but later gave way to an adjustable frame, this latter being closely associated with the so-called wind turbines.

The oldest types of these windwheels were those of Allen, Halladay and the Eclipse, while an early type of the present wind turbine was introduced by Leffel. Then there was the Wolff turbine, constructed with a horizontal wheel similar in principle and position to the axial water turbine. But this idea apparently did not meet with success, for the present type has a vertical vane carrier, the guides of which are of arched or scoop form. The horizontal wheel referred to was not the first of its kind by any means, as a patent was granted in England to Robert Beatson, F.R.S.E., for a horizontal windwheel prior to 1798. This, however, was based on an entirely different principle. Like many another inventor, Beatson was confident that his invention was destined to revolutionize windmill construction, and in an essay exploiting it he refers to the fact that horizontal windwheels of the same basic principle were largely used at the time in parts of Tartary and Asia as well as some provinces of Spain. Square sails similar to those of a sailing ship were used, but the great difficulty was that the resistance of the returning vane almost cut in half the power of the active side. In the countries in question this was overcome by screening the idle side from the wind entirely. But one-half of the wheel was thus exposed

at any time, and as the screen was not an automatic device it was impractical, owing to the necessity of attendance, to shift it with changes of the wind.

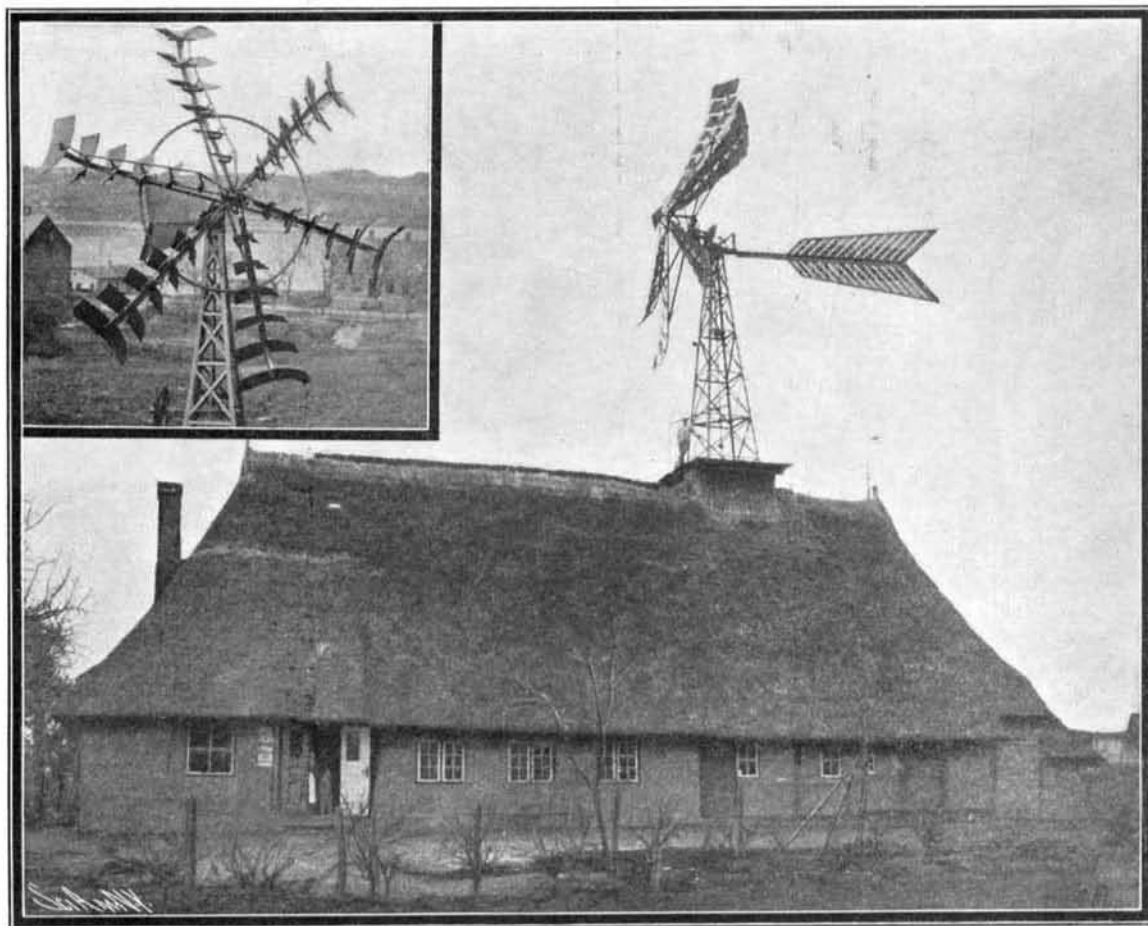
Smeaton disagreed with Beatson on every point and averred that a horizontal wheel could not be constructed that would have the efficiency of the common or vertical type. Beatson's wheel consisted of four upright frames placed at right angles to one another on the arms of a spindle, each frame being filled with a large number of light wood slats or canvas flaps,



A 50-Horse-Power Wheel. One of the Most Powerful Windmills in Existence. Built for Electric Lighting and General Power Service.

tainable in this country deals with it in connection with irrigation and is contained in bulletins issued by the Department of Agriculture. Naturally not every locality is suited to the use of a windmill, but a great many parts of Germany have been found to be favorably adapted to its use, both on the coast and in the interior.

The oldest forms of wind motors are the German or trestle windmill, and the Holland or tower mill, and many of these of both types are still found throughout



A 6-Horse-Power Wheel for Farm Work.



An 18-Horse-Power Wheel, 40 Feet in Diameter.

POWERFUL GERMAN WINDMILLS.