nothing new about it: the distance is a little greater, and the electrical pressure a little higher, than those found in many another successful electrical transmission, and that is all. Once under way its reliability and general success as an engineering achievement is a moral certainty.

So far as its commercial value is concerned, there are figures available as to first costs and running costs. These may serve as a guide towards an estimate, but they will not prove very much. Who can tell us what will be the limit of Rhodesian and British South African development? Is not this vast territory loaded with varied wealth practically untouched? Was it not an unbounded belief in this gem of the British Empire which built the Cape to Cairo railway? There are men who know the potentialities of this virgin land, men who have already reaped some reward for their courage as pioneers; they are the men who can best gauge the value of the Victoria falls power scheme, and they are the leaders in its promotion.

Experiments on the Magnetic Character of Vessels.

[BY AN M.I.N.A.]

In the process of building a ship the vibration caused by the riveting and other operations turns the ship into a permanent magnet, the strength of the magnetism and the direction of its polarity depending on the direction of the ship during the building. This property has its effect on the compasses, and is the reason for the various operations of compass correction which have to be carried out on every new ship, magnets being placed around the compass to counteract the magnetism of the ship.

Captain Bartling, R.N.R., has carried out some most interesting experiments while the s.s. *Thueringen* was building at Bremen, and he has given the results in a short paper before the North-East Coast Institution of Engineers and Shipbuilders, read on Friday, the 24th May. The ship was built on the slip with the bow pointing S.53.3°E., and observations were taken at intervals to see how the strength and polarity of the magnetism varied. As the process of riveting was carried out so the magnetism increased, and then a bridge structure was put bodily into place. As it happened the effect of this was opposite to that of the ship. The effect of launching a ship from the adjoining slip was tested, and found to be very slight. When the ship herself was launched she was placed nearly as possible in the opposite direction to that of building, *viz.*, N.32°W., and it was found as time went on that the original magnetism was more and more neutralised, and she practically required no compass correction at all. She went to sea *without a compensating magnet for the standard compass*, and with only one compensating magnet for the steering compass. Such a state of things is highly desirable, because the compass is more sensitive to the earth's influence, and it is a point which shipbuilders might well bear in mind that if it can be done without inconvenience, it is a good thing to finish the ship afloat in the opposite direction to which she was built.

In a sister ship to the *Thueringen* the ship was berthed in a direction S.31.3°E., and it was found that seven compensating needles had to be put in the compass.

The effect on the compass of the magnetism of the ship and the compensating magnets is to diminish the directive force, and if this be H on shore it will only be KH on board, K being generally about 0.8. In a space like a conning tower, where the lines of magnetic force are drawn through the walls of the tower, K only equals 0.3, and in such a compass is so sluggish as to be practically useless. In recent warships the compass is placed in the lower steering position and the steersman in the conning tower looks down a telescope, or has the movements of the compass reflected up to him.

Captain Bartling makes the suggestion that horizontal material in the immediate neighbourhood of the compass should be made of non-magnetic nickel steel and he has done this in a large vessel now building, and from experiments he has made he hopes to arrive at a value of K of 0.9 to 0.95 in the above expression for the directive force on board.

A navigating officer depends so completely on his compasses for the correctness of his observations and the safety of his ship that owners and shipbuilders should do everything in their power to make the magnetic properties of the ship such that the compasses should be as sensitive and correct as possible. The suggestion above as to the bearing of a ship after launching could, in many cases, be easily carried out by builders if their attention was drawn to its desirability.—*The Mariner and Engineering Record.*

Electroplating with Cadmium.

As cadmium can now be had at a reasonable price, it may be of interest, says a writer in the *Deutsche Metallindustrie Zeitung*, to know that there may be obtained an absolutely satisfactory plating therewith by galvanic deposition. Up to a recent date, however, attempts in this direction met with no success.

Cadmium is soft, has no caustic action, does not readily dim under the action of vapours containing sulphuretted hydrogen, and its colour is as white as that of tin, although not so white as that of silver. As compared with the latter metal, however, the galvanic deposit is harder and permits a higher polish.

Experiments show that for this purpose a solution of cadmium carbonate is best, and that the most favourable results may be obtained by the employment of such a solution. to make this latter, a solution of any soluble cadmium salt in water is treated with sodium carbonate.

The Use of Compressed Air in Loggings.

BY E. A. STERLING.

Machinery of special design has found extensive use in logging operations, particularly in the forests of North America. Logging railroads donkey engines, steam skidders, and wire rope systems of various kinds contribute to the ease and economy of getting logs to the mills The primary steps of felling the trees and sawing them into log lengths have, however, been done mainly by hand labour up to the present.

Machine saws of practical value for cutting standing timber have never been perfected, largely because the necessary power has not been available, and also on account of the danger and difficulty of handling a machine of any kind in rough forest land. The same is true in the main of sawing the felled timber into standard logs. An exception to the latter is found on the lands of the McCloud River Lumber Company in Siskiyou County, California, where a compressed air "bucking-up" saw has been successfully used for some years. The trees are felled by hand, and cut into log lengths by the machine saw. The company operates on comparatively level land near the base of Mount Shasta, where the forest of yellow pine, sugar pine, and white fir is composed of unusually large individual trees in open stands. The ground cover is a rather dense chaparral.

The machine consists of a traction engine equipped with an air compressor and a storage tank. To the air tank are attached rubber hose which give a working radius of 300 feet. The saws, which are similar to a heavy cross-cut saw, are actuated by a piston working in a small cylinder set in a movable frame, which can readily be attached to logs of any diameter.

The cylinder, which has pivot trunnions removably hung in bearings, is connected with the compressed air tank by a line of hose. The usual outfit consists of three frames and one saw. The saw when started is left to work automatically, while the two empty frames are being moved to new cuts and attached to receive the saw. A "swamping" crew precedes the compressed-air saw and trims the felled trees, throwing the brush to one side to give room for the machines. The traction engine is moved under its own power to convenient points, where several trees are.

Sir Benjamin Baker died on May 19th at Pangbourne, Berkshire, England. He was born in 1840, and was undoubtedly one of the greatest engineers of the world.

The two engineering works by which he will be best remembered are the Forth Bridge in Scotland, and the Assouan Dam. Eiffel, the French engineer, declared the former "the greatest construction in the world." It is 2,765 yards long and cost £3,000,000. It is built on the cantilever principle and its main spans are each 100 feet longer than the main span of the Brooklyn Bridge. Its steel towers, 360 feet high, give 151 feet headway above the Forth at high water.

The Assouan Dam also cost about £3,000,000. It is a mile and a quarter long and raises the level of the Nile sixty-seven feet.

The dam is 120 feet high and varies in thickness from 82 to 26 feet. Behind it is a lake of 140 square miles, storing water sufficient to ensure the irrigation of the Delta in the dryest season.

For his work as constructing engineer of this great work Sir Benjamin received from the Sultan the First Class of the Order of the Medjidie. He had already been made a Knight of the Order of the Bath and of St. Michael and St. George. He received several honorary degrees from the leading universities of Great Britain, and was a fellow of the Royal Society.

The growing popularity of interlocking rubber tiling is shown by its invasion of new fields, being extensively used in kitchens, vestibules, and bath-rooms of the better sort: in fine ocean liners, lake steamers, ferry-boats, and yachts, where its non-slippery character and the fact that it remains unaffected by constant wrenching strains render it very valuable, and now it may be seen in one of the finest cathedrals in the country, and in one of the largest of our public art galleries.