A Comparison of the New and Old.

Fig 1 represents an old hand crane used by the Wellington Harbour Board for many years, and which is still capable of lifting 30 cwt It is, however, now used only by carpenters' gangs for wharf repairs.

Fig 2 shows the new 20-ton hydraulic crane erected at the end of the railway wharf This splendid machine has a vertical lift of 100 ft while the jib head is 90 ft. above the mean-tide level. The jib derricks have a maximum rake of 50 ft. (33 ft. over edge of wharf) into a minimum of 16 ft. rake. The jib rotates all round and the crane is treble power, having lifted on test 2¼ tons with one ram, 11¼ tons with two rams and 20 tons with three rams (net load) The foundations consist of four concrete piers resting on a concrete bed 36 ft below mean-tide level The total cost, including foundations, crane, freight, erection and testing, was £5,350, and the makers of the crane are Messrs Tannett, Walker & Co., Ltd., Leeds.

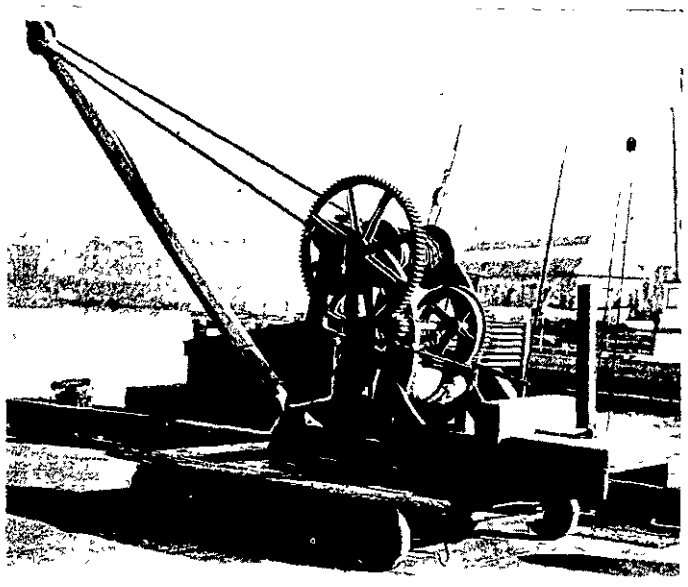
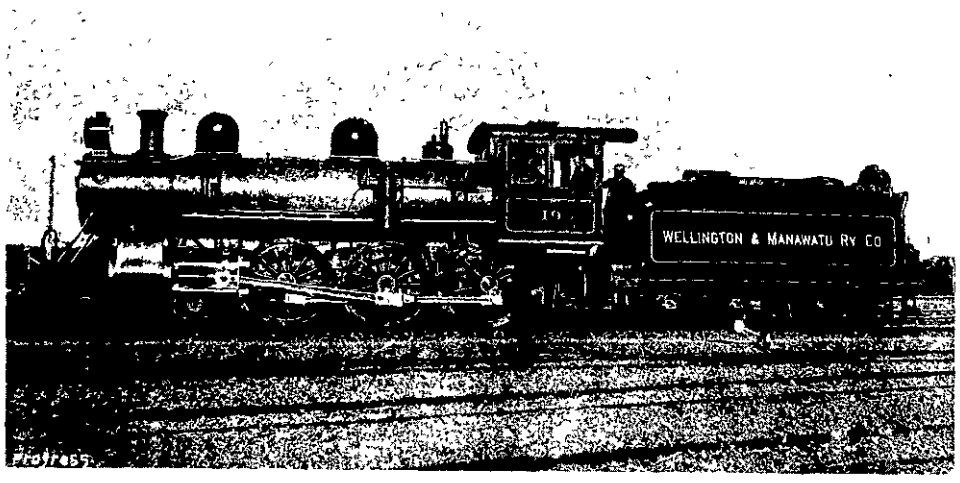


FIG. 1 —30-CWT CRANE THAT HAS BEEN USED BY THE WELLINGTON HARBOUR BOARD FOR MANY YEARS PAST

The Wellington-Manawatu Company's engine No. 19, which we illustrate herewith, is a passenger locomotive built by the Baldwin Locomotive Works, of Philadelphia, U.S.A., and is used for hauling the mail train between Paekakariki and Longburn. It is a 10-wheeled locomotive having three pairs of coupled wheels and a 4-wheeled truck, with cylinders 17" diameter and 22" stroke The valves are inside-admission piston valves worked by Stephenson link motion The diameter of driving wheels is 58" The driving wheel centres are cast steel and the front and back drivers are flanged, the middle drivers being plain. The boiler pressure is 180 lbs per square inch The boiler is lagged with magnesia sectional lagging and is covered with a Russian iron jacket. The diameter of boiler is 51", and the tubes are of solid drawn brass 1¾" diameter, the fire box being of copper with copper stays. The boiler has a heating surface of 1,100 square feet, and the grate area is 17 square feet The head light is of copper Leach's air sanding apparatus acts on the front and back drivers The tender is carried on two 4-wheeled trucks, having wheels of 30" diameter. The tank capacity is 2,000 gallons, and that of the coal bunkers 4½ tons The Westinghouse brake engages all driving and tender wheels, and there is a hand brake on tender Total weight of engine and tender 58 tons



WELLINGTON–MANAWATU RAILWAY CO'S EXPRESS ENGINE NO. 19.

Star Pictures.

At the annual meeting of the Philosophical Society the secretary (Mr T King) explained and exhibited certain stereographic star pictures drawn by Mr T. E. Heath, of Cardiff, author of "A Road-book to the Stars" Mr King explained how objects sufficiently near to the eye appeared solid through the combination of the images presented to the right and left eyes such images being seen from different points of view, and therefore, in slightly different perspective Scientific use of this fact had been made in the beautiful invention of the stereoscope about half a century ago, and that instrument, at first a scientific curiosity, had since done valuable service Its first astronomical application was to the moon, which for stereoscopic purposes had to be photographed at intervals of time, during the same phase, but in varying libration; the result being that the two pictures, united by the stereoscope, showed her as a spheroid. For the moon herself to be so seen at the distance of the earth, one would require a pair of eyes 66 000 miles apart At the Yerkes Observatory in the United States comets had been stereographically photographed, and, what was still more remarkable, meteor-tracks on two separate occasions. Some of these were shown, and the effect of the light gauzy mass, standing out solidly against the background of a black sky sprinkled with stars, was very striking and beautiful But no stereographic photographs of star-groups could be taken, the whole orbit of the earth being as a point compared with their vast distances Light travelled rather more than 185,000 miles a second, and took over eight minutes to reach us from the sun, but the nearest star was three "light-years" away, and there were stars visible to the eye whose light was two hundred years in reaching us, while the telescope revealed luminaries thousands of light-years away It was a curious fact that on a scale representing the solar distance as one inch a light year would equal a mile Mr Heath, with elaborate calculation and great pains, had drawn a great number of stereoscopic projections of stars of the greater magnitudes, and many of these were shown—one representing the familiar South Polar group, which never set in this region. The stereoscopic effect was very striking and beautiful the comparative degrees of distance being wonderfully brought out Mr. King explained that these views of the constellations were such as would be given by a pair of eyes 107 light-years apart In the discussion following, the chairman and other members described methods of combining stereographic pictures by the eyes alone, without the aid of an instrument.

Longest Span in the World.

A REMARKABLE BRIDGE

ONE of the most remarkable bridges in the world, not only from the engineering point of view, but also from its relations as a link in transcontinental traffic will be that now under construction across the St Lawrence river about 6 miles above the city of Quebec and 170 miles below Montreal.

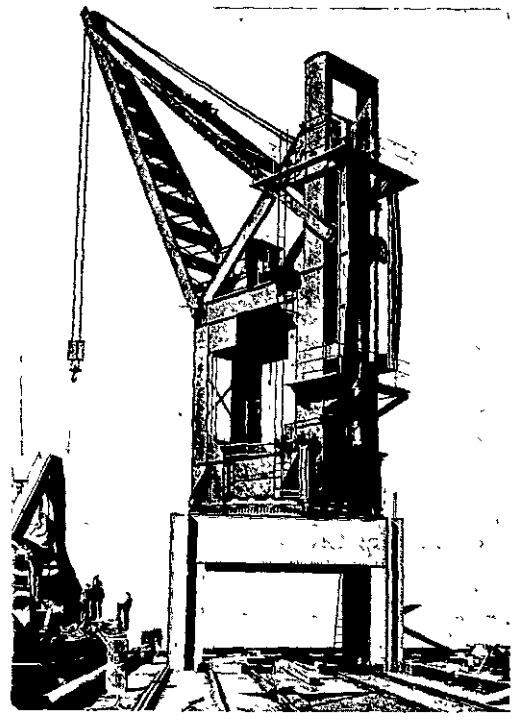


FIG. 2 —20-TON CRANE RECENTLY ERECTED BY THE WELLINGTON HARBOUR BOARD.

It will contain the longest span in the world, and will be the link that will render possible another all-Canadian transcontinental railway. The structure, it is supposed will be built in two years. All railways will be entitled to its use. In order to avoid obstruction to ocean-going craft, the bridge is not built on a series of piers extending across the stream, but consists technically of two great cantilevers carrying a huge central expanded span having a total length in the clear—that is, between the towers at either side—of 1,800 feet which is 90 feet longer than each of the two spans of the famous bridge over the Firth of Forth near Edinburgh Scotland

The approaches to the central span of the Quebec bridge are each 214 feet long extending from the shores to the supporting piers. All parts of the structure are of huge proportions, and consist mainly of built-up steel girders and other shapes, not a single casting being used The weight of each girder is 278 tons The anchor arms are 500 feet long The bridge has a very large capacity, the floor having a total width of 75feet It is designed to carry two lines of steam railroad, two trolley lines two carriage highways, and two sidewalks, the last-named being placed outside, and the rest of the traffic between the trusses, which are 67 feet apart, centre to centre The clear headway above water is 150 feet.

It is only in recent years that the construction of such a bridge has been rendered possible, through the development in the manufacture of steel shapes The steel mills are now furnishing rolled, rectangular steel in sizes that were not obtainable at the time the Firth of Forth bridge was built. As a consequence, the Quebec bridge is constructed with its cantilever towers in vertical planes. It will have built-up lattice chords and posts and 18-inch I-beams The result will be a structure lighter in weight, cheaper in cost and the most graceful in appearance among the bridges of the world For purposes of comparison, it may be interesting to note that the span of the Williamsburg suspension bridge at New York is 1,600 feet, that of the famous Brooklyn Bridge, 1,595 feet, and that of the new Manhattan bridge, 1,470 feet.