

of difficulties met with in carrying out the work, but for want of The Author. funds.

Mr. J. A. Wickham was correct in assuming that the alternate hatched and plain strips in *Fig. 9*, showed the monthly progress of the work; if the tabulated statement were placed opposite *Fig. 9* it could be seen at a glance how the monthly rate of progress of the wall compared with the tonnage of stone tipped, thus showing clearly the "washdowns" from time to time. The use of small stone was considered undesirable, apart from the reason given by Mr. Davis, and if permitted would result in a more or less solid wall on which the full force of the waves would be expended, thus nullifying the important feature of that class of breakwater construction, which allowed waves to expend their force in all directions within the voids provided by the use of big stones. Many years ago at Trial Bay, New South Wales, a breakwater was started upon the design and under the control of the Harbours and Rivers Department; shortly afterwards the whole work was handed over to the Prison Authorities who utilized the services of the prisoners on the construction. The character of the work was at once changed by using all stone from the quarry in the breakwater, which was rapidly pushed seawards only to be washed down, there remaining to-day but little of the wall to show the location of the work. No costs were given in regard to the work at Valparaiso, but in any case the seas at Newcastle were too rough to permit the use of hopper barges, even if the requirements of big stones did not rule them out of consideration. The 24 months required to complete the breakwater extension of 420 feet, included the time spent in the slow work of making a round head; thus the rapidity with which the wall was pushed forward, and the small losses due to washdowns, could be readily gathered.

### Correspondence.

Mr. T. E. BURROWS observed that it would be seen on reference Mr. Burrows. to any of the Figures showing the entrance, that there was a divergence of the lines of the breakwater walls, and the fact that the width between the walls was greater at their outer ends than the width of the opening at the pilot station, was one of the main causes of trouble as regards range in Newcastle harbour. He understood that the southern breakwater was designed and carried out in its present position on the ground of economy, as the line coincided with

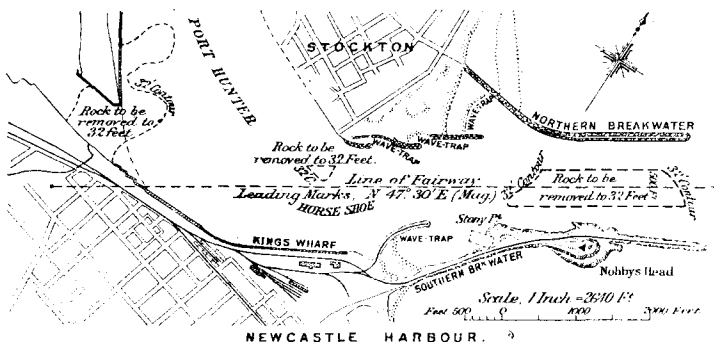
Mr. Burrows. a rocky reef, of which it was considered advisable to take advantage.

The present line of the entrance channel was fairly defined by the line of fairway marks bearing N.  $42^{\circ}$  E., and shown on *Fig. 3*. The line for the northern breakwater was designed to run parallel to the existing channel on about the same bearing. After some short length had been constructed and, in addition, some of the obstruction to deep water off Stoney Point had been removed by dredging, a deeper channel developed on the southern side, which became so pronounced that it had to be taken advantage of and was permanently marked by the green beacons on a bearing as shown *Fig. 3* of N.  $57^{\circ}$  E. That channel not only carried better water, but, from its position under the lee of the southern wall, was much safer for navigation, and further away from the oyster bank, and subsequently the northern breakwater. When the northern wall was constructed, it became manifest that the range in the port was being increased, and, as no other material alteration had occurred in the conditions at the entrance, it was evident that this extension was the cause of the added discomfort and damage to both vessels and wharves which obtained at, or near, the entrance. He decided, in looking for the cause, that the trapping of a portion of the wave between the outer ends of the walls was the main factor. A width of 1,600 feet of wave was caught between the extremities of breakwaters, and this was forced through a narrow neck of 1,200 feet at Nobby's, and that narrow was further reduced to 1,000 feet at the end of the guide wall. Personal observation confirmed the surmise, and showed that the height of the waves was increased as they approached the narrow. The wave-traps certainly provided relief to some extent, but not sufficient to prevent vessels moored at King's wharf and the Dyke from risk of damage and the moorings on the wharves being subjected to undue strain. For that reason he had advocated a stoppage of work on the southern breakwater extension, as he did not consider that the benefit to be derived from such work was commensurate with the expenditure involved. The line of fairway leading marks had also been altered under his direction to N.  $47^{\circ} 30'$  E., which bearing was practically on the centre line between the breakwaters. The extension of the northern wall had demonstrated the fact that it was required to prevent the sand entering the port from the Stockton beach, and it had certainly been most effective in that regard, and little or no dredging had been necessary since its completion. An entrance channel 500 feet wide to be excavated to a depth of 32 feet at L.W.S.T. had been designed by himself and commenced. A rock-drilling plant, together with two 5-ton Priestman grab-dredgers, had been constructed, and

were then being put to work on the deepening of that entrance (Fig. 29). Since 1913 the harbour works had been under his control as Chief Engineer for harbours and drainage, but the war had been

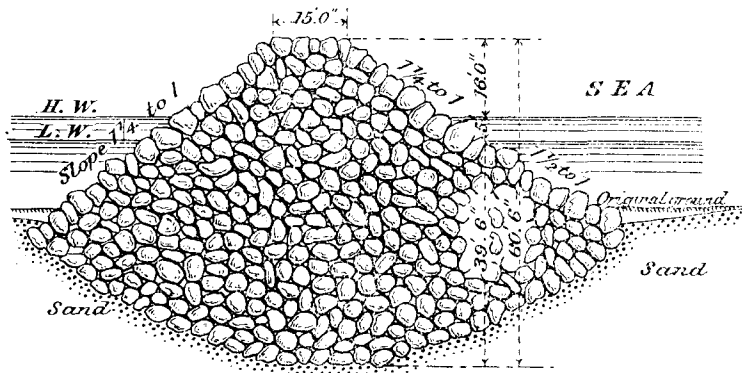
Mr. Burrows.

Fig. 29.



responsible for holding up many of the improvements that would have been carried out but for that catastrophe. Mr. Allan's cross-section of the northern breakwater was not in accordance with his own experience on similar works at the Richmond river entrance,

Fig. 30.



and it had been there found that where a wall was constructed of large rubble on sand, end-on to the waves, the centre of the wall was much deeper than the sides, and that the cross-section was more in keeping with the example shown in Fig. 30. The Paper should do good in bringing before the members of the Institution the

Mr. Burrows. conditions obtaining at the principal coal-shipping port in the southern hemisphere, where the improvements were wholly due to the efforts of the engineering profession.

Mr. Carey. Mr. A. E. CAREY considered that the extensive network of waterways and the large catchment area forming the basin of the Hunter river should ensure a deep outlet for the harbour at Newcastle, although the tidal range there was comparatively insignificant. The wave-traps were well placed, but the Author did not state whether spending beaches existed in rear of them. Presumably, such was the case, as, according to the Chart (*Fig. 4*), the water shoaled rapidly. With regard to the lengths of the breakwaters, the Author apparently advocated a general design such that the southern breakwater should considerably overlap the northern breakwater. The local conditions presumably required such a design, whereas it was generally a sound rule to project entrance piers to a similar length seawards. Apparently, the range in the harbour as built was excessive, and that might quite probably be much lessened or obviated by the adoption of a Brasher air installation on the south side of the entrance. Having regard to the sections of the breakwaters, it would appear, from the fact that the pierre perdue system was effective with interior rubble consisting of rough sandstone blocks weighing about 1 ton per stone, that the harbour was not attacked by very heavy seas. The Author had evolved a design (*Fig. 17*) whereby dolphins were constructed spaced 140 feet centre to centre, two spaced units forming a mooring berth, and capable of being subsequently filled up solid to provide wharf extension. It would be interesting if the Author would give the botanical name of the tree from which "turpentine" piles were obtained and would also state whether there were an export market for such piles of lengths exceeding 70 feet, as the dearth in Great Britain of reliable timber of long scantling was at the present moment a serious bar to the construction of works similar to those described. Mr. Carey had come to the conclusion that in foundations such as ballast and sand the recoil of piles was much greater than had hitherto been supposed. His partner, Mr. Ernest Latham, had been carrying out research work which was likely to prove of value. To determine initial penetration of a pile when struck by a falling weight, attempts were being made to record it by means of a simple inertia gauge attached to the pile head. The experimental results already obtained appeared to be promising.

Mr. Coad. Mr. T. H. E. COAD emphasized the desirability of using a sweep to determine minimum depths where boulder or pinnacle formations obtained. In removing shoals of rock at the entrance to the

Hamoaze and off Devonport dockyard some years ago, dozens of Mr. Coad. large boulders were found by means of a rail suspended from a boat after close soundings had shown sufficient water over the areas. At some distance from the tail end of one shoal, clear of the rounding buoy, a dredger's chain fouled a sharp pinnacle of rock standing 5 feet above the minimum depth, which, on further investigation, could not be found by sounding until a diver had been put down. The area on which the pinnacle stood had been repeatedly surveyed, and, but for the fouling of the dredger's chain, would probably have caused a disaster, after the buoy had been moved to its new position. Further details of the wave-traps mentioned would be of interest, and the effect which the guide walls had had on the rate of silting adjacent to and in the traps might be stated.

From the absence of diagonal bracings he presumed that there was little or no wind experienced alongside timber-jetties and dolphins. There were, however, occasions when vessels approaching jetties "bumped" badly, and it would be interesting to know the effect of such a blow on the reinforced-concrete plates supporting the pitching behind the jetties. The tipping of the rubble mound under jetties was shown as having been done in two parts, presumably, of spawls for a toe and of coarser stuff above. Further information as to the nature of the ground, which from its slope altering from 1 in 3.5 to 1.4 to 1 in 5 feet depth indicated a change from sand to some more stable material, might probably explain the necessity for the more compact toe.

Mr. W. FARROW was of the opinion that the electric cranes, with Mr. Farrow. their large headway and long reach beyond the face line of the wharf, had well met the coal-shipping requirements of Newcastle. Their great speed and the ease with which they travelled along the wharf usually made the slow work of bunkering of little moment when cargo coal was being taken, as a supply of bunkers could be readily given whilst trimming was in progress in the main holds, the loading of cargo coal being then resumed without lost time. The necessity for quicker despatch of vessels from the port became very acute during the progress of the war, and he had been entrusted by the Railway Commissioners with the whole question of obtaining a larger shipment from the existing coal-loading appliances. Up to that time, although shipment had been made to one vessel by two hydraulic cranes working at the same time, no attempt had been made to group a larger number, and he had decided, after full consideration, as the electric cranes so readily lent themselves to this class of work, to meet the requirements by grouping as many as four cranes to load a vessel at the same time. and the following records referring to the

Mr. Farrow. loading of ordinary vessels, having no special provisions for the self-trimming of coal were given :—

S.S. "Saros"	loaded with 3,545 tons in 12 hrs. 36 min. by 3 cranes.
S.S. "Aeon"	" " 6,052 " " 18 " 0 " " 3 "
S.S. "Koonda"	" " 2,100 " " 4 " 0 " " 4 "
S.S. "Ashridge"	" " 4,727 " " 16 " 38 " " 3 "
S.S. "Werribee"	" " 6,000 " " 11 " 10 " " 4 "
S.S. "Barwon"	" " 4,611 " " 10 " 45 " " 4 "
S.S. "Goulburn"	" " 3,387 " " 8 " 5 " " 4 "
S.S. "Yarra"	" " 3,194 " " 10 " 0 " " 3 "
S.S. "Omana"	" " 3,853 " " 11 " 18 " " 4 "
S.S. "Wear"	" " 2,742 " " 9 " 16 " " 3 "
S.S. "Koonya"	" " 1,253 " " 3 " 52 " " 3 "
S.S. "Iron Monarch"	" " 4,402 " " 19 " 33 " " 2 "
S.S. "Kilbaha"	" " 5,109 " " 17 " 20 " " 3 "
S.S. "Time"	" " 4,179 " " 12 " 10 " " 3 "
S.S. "Period"	" " 4,428 " " 8 " 0 " " 4 "

Mr. Farrow, showing the effect of the foregoing method of working on releasing vessels for other Admiralty requirements, remarked that Admiral Clarkson, Comptroller of Shipping for the Commonwealth of Australia, had declared his appreciation of the improvement in the coal output of the port during the critical period of the year 1918. With the improvements made by the Railway Commissioners in connection with the coal-loading appliances of the port as a whole, and the more recent methods of working the same—more especially in regard to grouping of the electric cranes—he considered that the existing appliances were capable of loading under ordinary working conditions a quarter of a million tons of coal weekly, which was considerably in excess of the record coal shipment of the port.

Mr. Hickson

Mr. R. R. P. HICKSON remarked that, having been in direct charge of the Newcastle harbour works from 1881 to 1889, and later, Engineer-in-Chief of Public Works, he was surprised to find no notice taken of the somewhat novel construction adopted with a portion of the south breakwater. His connection with the Public Works ceased in 1901, when he took up the position of President of the Sydney Harbour Trust, and at the same time Mr. Walsh, who had succeeded him in Newcastle, came to Sydney as Engineer-in-Chief to the Harbour Trust. Some time in 1904 or 1905 it was decided by the Government to go on with the south breakwater, which had been stopped for some years, and it was found that, owing to the tidal scour, stone was being tipped into a much greater depth of water than was shown on the section. That was such a serious matter as regarded the progress and the cost of the works that Mr. Walsh mentioned it, unofficially, to him, and suggested that if

a core could be constructed on the line of the breakwater a great deal of the scouring would cease. His idea was that, if some hulks were purchased and loaded with stone and sunk in the line of the breakwater, the difficulty would, to a large extent, be overcome. Mr. Hickson mentioned the matter to the Minister for Works, Mr. Lee, who appointed a Board, consisting of Mr. Davis, Under-Secretary for Works, Mr. Keele, then President of the Metropolitan Water Board, who had also been in the Harbours and Rivers Department, Mr. Walsh, and Mr. Wade, who took up the position of Engineer to the Harbours and Rivers Department; with Mr. Hickson as Chairman. After going very fully into the matter, the Board decided that Mr. Walsh's suggestion should be carried out, as being really the best thing that could be done in the circumstances. The results of this operation, which had been previously described in the "Proceedings,"<sup>1</sup> had been very successful. He was not aware that such a plan had been adopted elsewhere; but he could confidently recommend it to any engineers who were constructing breakwaters under somewhat similar conditions.

Mr. E. W. HOLLINGWORTH drew attention to the opinions quoted by the Author as to the cause of the resistance of turpentine piles to the teredo. He considered that the question was a difficult one to decide, for immunity depended as much on the kind of teredo as on the kind of timber; varieties which were immune in one locality were quickly destroyed in another. In New South Wales the worm was said to attack the sap of turpentine, but rarely the heart wood in sea-water, but in brackish water the worm was larger and more active, and turpentine did not resist it. It would be interesting to know whether there had been any settlement behind the new wharf (Fig. 11, Plate 1). The short reinforced-concrete plates used to retain the filling were very economical provided the toe did not slip.

Mr. J. B. LABATT remarked that he had read Mr. Allan's Paper with much interest, as he had recently had an opportunity of making a thorough inspection of the works referred to. He was much struck with the volume of trade passing through the port, but was more particularly interested in the question of the entrance works and their bearing on the extensive disturbance that was evident in even the innermost parts of the harbour in heavy weather. The extension of the south breakwater to a further distance, as proposed, would probably obviate the danger of a steamer being thrown on the north breakwater, as mentioned by the Author as having taken place;

<sup>1</sup> Vol. clxxxiv, p. 154.

Mr. Labatt. but in his own opinion a grave mistake had been committed in designing their lay-out. The decided convergence inwards of the walls and the channel must necessarily lead to the accentuation of any sea that entered between the breakwaters; and, although the suggested lengthening of the south arm would cut off more and more of the seas from that side as the arm might be lengthened, such seas would, after passing the outer end of the work, deflect and run right into the entrance, and cause disturbance inside. The wave-traps were quite insufficient for their purpose. He considered that all such entrances should be protected by breakwaters made parallel, or better still, diverging inwards.

Mr. Mitchell. Mr. JAMES MITCHELL remarked that the particulars given as to the relative positions of the seaward ends of the north and south breakwaters, with regard to the production of cross-seas at the harbour entrance and of range in the inner portions of the harbour were very interesting. The case mentioned in paragraph 2 on p. 14 was an example of a common cause of difficulty and sometimes of disaster at exposed harbour-entrances, especially where one pier-head overlapped the other. No mention was made in the Paper of any difficulty having been experienced in the handling of vessels owing to the existence of a  $7\frac{1}{2}$ -knot outgoing current from the harbour, but, with the usual speeds of cargo steamers, such a current left a very small margin for the effective control of a vessel. A strong outgoing current from a harbour was apt also to intensify any swell there might otherwise be at the entrance, and to cause a dangerous confused sea. It would be interesting if the Author would state what influence the currents at Newcastle had in that respect. Perhaps he would also state how the velocity of the current was measured, as there was a very common tendency to over-estimate the speed of currents in water.

With reference to the Author's remark, in paragraph 3 on p. 14, as to the range in the inner portions of the harbour, the simplest method of dealing with the problem would appear to be by improving the wave-trap at the root of the north breakwater. That could be done by cutting back the breakwater on the south-east side of the wave-trap, for a length of 900 feet, and rebuilding it on a line running about east by north, instead of on its present line of about north-east by east. Such an alteration would probably greatly increase the effective value of the wave-trap without interfering with the navigation of either incoming or outgoing vessels. The effectiveness of the wave-trap on the opposite side of the channel might also be increased, by cutting away the projection at Stony Point to the line of the inner side of the adjoining breakwater. Mr. Mitchell



had had an experience in the entrance-channel of an important harbour, similar to that mentioned in paragraph 3 on p. 7, and he fully endorsed the remarks of the Author as to the great importance of sweeping (by such means as a suspended iron-rail) for the detection of isolated boulders, pinnacles of rock, and similar dangers to shipping.

The AUTHOR, in reply to the Correspondence, considered that the range referred to by Mr. T. E. Burrows was worse with the big seas from the south-east, which, instead of turning sharp round the end of the southern breakwater, ran across the entrance. Seas which previously passed by the end of the northern breakwater to spend on the Stockton Beach were now caught by the 420 feet extension along which the waves ran (higher under such conditions on the north than on the south side of the channel) until the sharp curve in the northern breakwater (*Fig. 5*) allowed a portion of the waves to leave the wall and pass the wave-trap, thence to continue into the southern and small northern wave-traps, and up the harbour with the accompanying range. The waves, after leaving the northern breakwater, set across the channel towards the southern guide-wall, which divided them, one portion going into the southern wave-trap, and the other passing up the harbour; the waves then appearing higher on the southern than on the northern side of the channel. The north-east seas, however, rolled directly into the entrance, and ran along the existing 750 feet of the southern breakwater overlap; but such seas were "in the loose," until the end of the north breakwater was met with, when the confined width of the water-line between the walls was 1,440 feet at right angles to fairway, as against the 1,600 feet given by Mr. Burrows on the angle between ends of breakwaters. It was true that at a distance of 400 yards from the entrance, the width of water-line between the north breakwater and the foreshore of Nobby's was 1,150 feet; yet a gradual widening then took place, until in the next 400 yards there was a width of over 1,800 feet. That obtained until the southern guide-wall, some 300 yards further up the harbour, was met with; the functions of this wall being to train the out-going current in a northerly direction, and to divert a portion of the incoming waves into the southern wave-trap, to spend on the flat beach therein provided for the purpose. It was accordingly difficult to follow a contention—in effect—that the dividing of the 1,800 feet of water width in two by the southern guide-wall, was responsible for contracting the waves or increasing the range. Further, although the range had only caused serious trouble since the extension of the northern breakwater, yet the Author did not consider that the increase of

Mr. Mitchell.

The Author.

The Author. width of entrance from 1,410 feet to 1,440 feet could have any contributing effect; and he was of opinion that the increased range was alone due to the non-extension of the southern breakwater as authorized by Parliament. Scour at the tip head or other local conditions at the Richmond river might account for the difference in cross section referred to by Mr. Burrows.

Previous to 1912 it was necessary to dredge the entrance constantly, the very severe floods experienced from time to time having had insufficient scouring effect to keep the channel clear as anticipated by Mr. A. E. Carey. However, since the completion of the northern breakwater extension, the outgoing current had been more helpful, and the reduction in the dredging bill had exceeded the cost of the extension. Spending-beaches were provided at the back of all wave-traps, but the steepness of the one at the main northern trap materially reduced its effectiveness. Owing to the location of the entrance, it was considered undesirable to project the breakwaters seawards to the same length, the overlap of the southern breakwater—which, on completion of the authorized extension, would be 1,210 feet—being required for shelter, and in order to throw the big seas from the south-east clear of the northern wall, with a consequent reduction of range in the harbour.

Since the construction of the guide-wall of the southern wave-trap, Mr. T. H. E. Coad would be interested to know there had been much silting, the beach having come forward some 400 feet, thus forming an ideal spending-beach. There had been also some silting with resulting flat beaches in the two small wave-traps on the northern side. Gales ranging from 37 to 75 miles per hour had been recorded at the Signal Hill Station for each year since 1910; and in some of the wharves the surging of vessels in the harbour had caused damage to the monier plates, to provide against which the heavy horizontal bracing shown in Fig. 11, Plate 1, was designed. The reason for first building the toe of the mound had been already explained in reply to Mr. Kirkpatrick's remarks in the discussion.

The successful bringing into operation of the electric cranes, which were new to the port, was largely due to the wisdom of the Railway Commissioners in detailing a special officer for the purpose; and much credit must be given to Mr. W. Farrow for overcoming initial difficulties and introducing the system of grouping, which had done so much to increase the reputation of Newcastle as a port where quick despatch could be given.

No hulks were used in the southern breakwater, but presumably Mr. R. R. P. Hickson's reference was to the first 3,000 feet of the northern breakwater, which was completed before the Author took

up duty at Newcastle. The works for which the Author was responsible, it should be clearly understood, formed but a small item in the making of the port, for which the Author's predecessors in office, Messrs. C. W. Darley, R. R. P. Hickson, the late H. D. Walsh, and W. J. Milner were responsible; the success of the fine work of these engineers being perhaps best emphasized by the fact of there having been, on 12th July, 1869, only 14 feet of water on the bar, and room for but two overseas vessels in the port. In utilizing hulks great care needed to be exercised to ensure solid work, and in this respect the following extracts from a report by the Author on the 19th July, 1909, might be of interest: "On the 13th and 14th instant, diver Murray made a close inspection from line 27 to 18, *Fig. 4*, on the Stockton side of the north breakwater, and states there is no sand at present breaking through, but under the counter of the 'Regent Murray' (on line 25), which passes through the breakwater and extends to the Stockton side of same, he found undoubted signs of sand having gone through, he being able to walk right underneath the counter of the wreck, the stones lying on the deck and overhanging same. Undoubtedly with the blasting operations which were carried out this time last year, there was settlement of the wreck, in fact, this can be seen by the settlement of the breakwater itself on the top. Murray says that although he could have gone further than he did (12 feet from the end of the counter) he thought it was unnecessary to do so, and that the sand has now ceased to pass through the breakwater at this point, or at any point between the lines examined by him."

Mr. Hollingworth's reference to different kinds of borers attacking timber, was in accord with experience in Newcastle Harbour, where, however, the Teredo or Cobra (*Nausitora saulii*) rarely attacked turpentine piles, but ate the whole of the heart and nearly all the sap of other timber, leaving only a shell on the outside, so that a pile might look sound and yet be as hollow as a drum. When turpentine piles were occasionally attacked, it was more likely to be by the marine crustacean louse (*Spharoma Quyoana*), which ate inwards about 3 inches; so that the use of piles of large diameter was a desirable precaution against such contingency. There had been no appreciable settlement at the back of the wharf nor any pushing of the structure out of alignment, such as would occur with movement of the toe.

The Author concurred with the views expressed by Mr. J. B. Labatt, but was of opinion that on completion of the extension the seas from the south-east would not turn sharp round the end, but would, as at present, run across the entrance. These cross-sea

The Author.

The Author. conditions minimized the usefulness of the wave-traps, which were more effective when the waves were running straight into the entrance—as with the north-easters—the tendency then being for the wave to be drawn by friction to the breakwaters on either side, allowing the centre to run forward into a V form until the wave ultimately divided, one portion to the north and the other to the south, thus giving comparatively smooth water in the centre. The wave-traps were provided in the intervening distance to intercept the waves running along either breakwater and to allow the same to spend on the beaches provided for the purpose. Mr. Labatt questioned the lay-out of the entrance works, which were designed by Mr. C. W. Darley, M. Inst. C.E., in 1895. It must, however, be remembered that in giving evidence before the two Parliamentary Standing Committees on Public Works, the Author definitely stated in evidence that precisely the trouble from increased range which was being met with in the harbour, would follow an extension of the northern breakwater, if without a corresponding extension of the south breakwater; and in such circumstances the original lay-out could not be held responsible for conditions now obtaining. Further, the large number of wrecks which the charts showed as having occurred from 1812 onwards, indicated what a dangerous port Newcastle was, prior to the construction, in 1907, of the extension of the southern and the completion of the first 3,000 feet of northern breakwater. Since then—in addition to local tugs oftentimes with barges in tow, which formed a fair proportion of the shipping using the entrance—70,000 vessels, with a registered tonnage of over 50,000,000 tons, had passed in and out of the port without a mishap. This fact lent weight to the opinion previously expressed by the Author<sup>1</sup> that it was doubtful whether more successful engineering and commercial results have been obtained in the construction of any artificial harbour entrance.

In the case cited in the Paper and referred to by Mr. James Mitchell, it might be said that had the northern breakwater been of the same length as the southern breakwater, the steamer would have been left on the wall, instead of having sea room to straighten up and safely make the entrance. The  $7\frac{1}{2}$ -knot surface velocity of current occurs only in times of maximum flood, when the navigation authorities have to be satisfied that a vessel has sufficient power to be under full control before giving a clearance. The velocities were measured with floats passing fixed stations on shore. The Author considered it more desirable to keep the waves out of

<sup>1</sup> Minutes of Proceedings Inst. C.E., vol. clxxxiv, p. 214.

the harbour by the extension of the southern breakwater, than to The Author. endeavour to minimize their range effect by moving over the northern guide-wall. He, however, agreed with Mr. Mitchell as to the cutting away of Stony Point, a work which was in hand when the Author left Newcastle, but was subsequently stopped for want of funds.

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