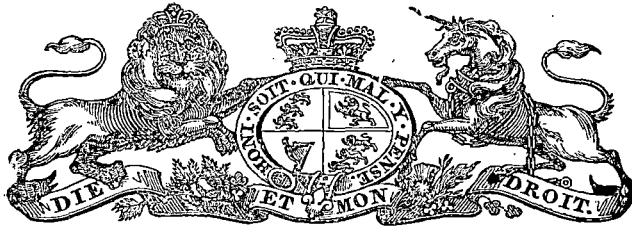


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PARLIAMENT OF TASMANIA.

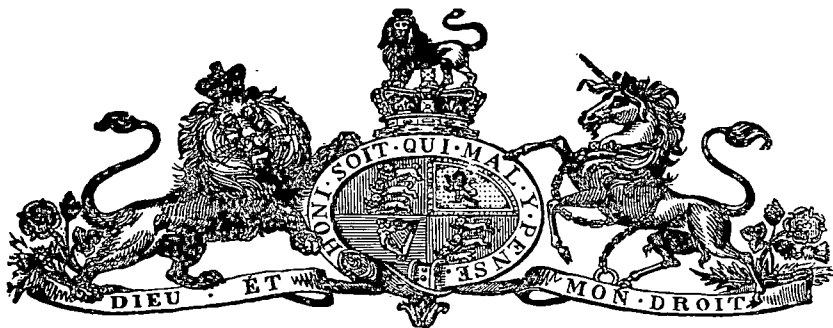
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STEAM DREDGE "AGNEW:"

REPORT OF BOARD OF ENQUIRY.

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Laid upon the Table by the Minister of Lands, and ordered by the House of  
Assembly to be printed, May 31, 1888.



## BOARD OF ENQUIRY ON STEAM-DREDGE "AGNEW."

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THE Board (consisting of Messrs. J. Clark, J. W. Bennington, and J. Kelly) met at Launceston on 15th March.

The Board decided to appoint Mr. W. J. M'Williams Secretary and Shorthand Writer to the Board.

The Secretary read the following memo :—

*The Inspector of Machinery, Hobart.*

MEMO.

Mr. Bennington (Engineer H.M.S. *Egeria*) and the Consulting Engineer T.S.N. Co. have, with the Inspector of Machinery, been appointed a Board to enquire into and report upon the condition of the dredge *Agnew* for my information.

The Inspector of Machinery is requested to make all arrangements for properly conducting this enquiry, and to see the other members of the Board with regard to appointing a day for the purpose most convenient to all (say, Wednesday next, Wednesday being the only day convenient to the Consulting Engineer T.S.N. Co.) The Marine Board have been asked to arrange for docking the vessel on Tuesday (after the arrival of the Board). Messrs. Kennedy and Sons have been notified that one of their firm may be present at the enquiry if they desire it, and the Engineer-in-Chief has been informed that the Superintending Engineer Harbour Works may be similarly notified.

E. N. C. BRADDON, *Minister of Lands and Works.*

*Public Works Office, Hobart, 8th March, 1888.*

Copy of this memo. has been sent to each member of the Board.

Mr. Bennington was unanimously elected Chairman of the Board.

The Secretary read the following correspondence :—

*Launceston Hotel, 12th March, 1888.*

SIR,

WE herewith beg to call your attention to the enclosed copy of a letter addressed to the Superintending Engineer of Ports and Harbours.

We have, &c.

JOHN CLARK.

J. W. BENNINGTON.

*Engineer-in-Chief.*

(Copy.)

*Launceston Hotel, 12th March, 1888.*

SIR,

THE Consulting Engineer of the T.S.N. Co., the Inspector of Machinery, and Mr. Bennington (Engineer H.M.S. *Egeria*), have been appointed a Board of Enquiry into, and to report upon, the condition of the *Agnew* (dredge) for the information of the Minister of Lands and Works.

Pending the concurrence of the Consulting Engineer of T.S.N. Co., the other members of the Board think the scope of the enquiry will include the following matters :

- (1.) Sighting of dock before and after docking of *Agnew*.
- (2.) Sighting of *Agnew* before and after docking.
- (3.) Survey of all parts of *Agnew* above water.
- (4.) Calling for information as to working of dredge *Agnew* from the following :—(a) Mr. Bogle ; (b) Captain of *Agnew* ; (c) Superintending Engineer of Ports and Harbours ; (d) Mr. Bogle's successor ; (e) Craneman of *Agnew* ; (f) Mate of *Agnew* ; (g) Mr. M'Kenzie (Salisbury and Co.) ; (h) Mr. Scott (Salisbury and Co.)
- (5.) Survey of under-water fittings of *Agnew*, and other matters relevant to enquiry.

We beg to call your attention to the above, especially par. 4, art. (c).

We beg also to call your attention to the fact "that the Engineer-in-Chief has been informed that you may be notified of the enquiry." Mr. Kennedy also has been notified.

We remain,

Sir,

Your obedient Servants,

JOHN CLARK.

J. W. BENNINGTON, R.N.

R. BELL, Esq., *Superintending Engineer Ports and Harbours.*

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Dredge *Agnew* Correspondence.

Launceston, 14th March, 1888.

GENTLEMEN,

WE hereby beg to inform you that a survey will be held on board of the dredge *Agnew* at Launceston. The attendance of a representative of your firm is requested, relative to the alterations and repairs effected by your firm.

Yours obediently,

JOHN CLARK, *Inspector of Machinery.**E. E. Salisbury's Estate, Launceston.*

Launceston, 14th March, 1888.

SIR,

YOUR attendance is requested at the offices of the Marine Board at Launceston to give information relative to the working, condition, &c. of the dredge *Agnew* during the time you were in charge of the machinery as engineer.

Yours obediently,

JOHN CLARK, *Inspector of Machinery.*  
J. W. BENNINGTON.MR. E. BOGLE, *Launceston.*

It was resolved that the Members of the Board should make a personal inspection of the *Agnew* before proceeding to take evidence.

It was resolved that the following witnesses be invited to give evidence:—Messrs. Edward Bogle, formerly engineer of the *Agnew*; Captain Capurn; A. Hendry, mate; E. Poulter, craneman of that vessel; J. T. M'Donald, H. M'Kenzie; and J. Scott; of the firm of Salisbury and Co.

The Board then adjourned till 4 P.M. for this purpose, and an inspection, lasting over three hours, took place.

The Board met at 4 P.M. Present—Messrs. J. W. Bennington (Chairman), J. Clark, and J. Kelly.

It was resolved that a telegram be forwarded to Mr. Wm. Reid Bell, requesting him to come to Launceston and give evidence.

At 4.55 the Board adjourned till 9.15 A.M. next day.

March 15.—The Board met at 9.15 A.M. Present—Messrs. J. W. Bennington (Chairman), J. Clark, and J. Kelly.

Minutes of the previous meeting were read and confirmed.

The following witnesses were then called and examined:—Edward Bogle, late engineer of the *Agnew*; Thomas Alfred Capurn, master of the *Agnew*; Alfred Hendry, mate of the *Agnew*; Emanuel Poulter, craneman of the *Agnew*; J. T. M'Donald, H. M'Kenzie, and J. Scott, members of the firm of Salisbury and Co.

The following letter was read by the Secretary:—

*Re Dredge Agnew.*

Launceston, 14th March, 1888:

GENTLEMEN,

I REGRET being unable to reply to your letter of the 12th instant (received last night) and your telegram of this afternoon, but having no official cognizance of the constitution and scope of your Board, I have referred your communication to the Engineer-in-Chief.

I am, &amp;c.

WM. REID BELL, *Superintending Engineer of Harbours.*To JOHN CLARK, *Esq.*, and J. W. BENNINGTON, *Esq.*, *R.N.*

The following copy of the letter addressed to the Engineer-in-Chief by Mr. Bell was also read:—

*Dredger Agnew.*

Formby, 12th March, 1888.

SIR,

IN reference to my telegram of 10th instant, *in re* the enquiry into the matter of the *Agnew* dredger, instituted by the Honourable the Minister for Public Works, I hereby beg respectfully to enter my very strong protest against the appointment for that purpose of the Inspector of Machinery, as he is the person responsible for the design and construction of the vessel, the fitness of which for her purpose I have called in question.

I also wish to point out that the enquiry being instituted without communication with me, the officer appointed by the Honourable the Minister to the charge of the vessel and dredging operations, and while the vessel is in the hands of the contractors, who have not completed the alterations sanctioned, I cannot be responsible for any difficulties or liabilities incurred through stopping the contractors' operations.

I am, &amp;c.

WM. REID BELL, *Superintending Engineer.**The Engineer-in-Chief, Hobart.*

At 2.10 P.M. the Board adjourned till 9 A.M. next day.

*March 16.*—The Board met at 9 A.M. Present—Messrs. J. W. Bennington (Chairman), J. Clark, and J. Kelly.

Minutes of previous meeting were read and confirmed.

Mr. R. R. Liddell, as engineer of the *Agnew*, was called and examined, this closing the evidence.

It was resolved that the remainder of the cement be removed from the vessel; that the dock be flooded, and another examination of the *Agnew* be made to ascertain the extent and position of the leaks.

At 1.10 P.M. the Board adjourned to make the examination resolved on.

J. W. BENNINGTON, *Chairman.*

## RE DREDGE AGNEW.

*Hobart, 23rd March, 1888.*

SIR,

WE the undersigned, Members of the Board of Enquiry appointed by you on 8th March, 1888, to enquire into and report upon the condition of the Dredge *Agnew*, have the honor to submit for your consideration and information the following documents; viz.:—

Letter of Proceedings.

Report of Survey held by us on the hull, machinery, and equipment of the Dredge *Agnew*.

Recommendations and suggestions resulting from the survey; with sketches.

Shorthand report of information as to the condition, &c. of the hull, machinery, and equipment of the Dredge *Agnew*, obtained from various officials and others that have been or are employed on the vessel.—(See evidence.)

Observing that we have given the matter our most careful and serious attention, and have held a thorough and impartial survey of the hull, machinery, and equipment; and that the opinion as to the conditions and cause of such condition, expressed by us, is in strict accordance with the survey, and without prejudice, favour, or bias toward any person or persons.

We have the honor to be,

Sir,

Your obedient Servants,

JOHN CLARK, *Inspector of Machinery.*

JOHN KELLY, *Con. Engineer T. S. N. Co.*

J. W. BENNINGTON, *Engineer, R. N.*

*To the Hon. the Minister of Lands and Works, Tasmania.*

## LETTER OF PROCEEDINGS RE DREDGE AGNEW.

*Hobart, 22nd March, 1888.*

SIR,

WE have the honor to submit for your information the following account of the proceedings of the Board of Enquiry instituted by you 8th March, 1888, to enquire into and report upon the condition of the Dredge *Agnew* now at Launceston.

*Thursday, 8th March.*—Received copy of a Letter of Instruction from the Hon. the Minister of Lands and Works, &c.

*Saturday, 10th March.*—Received copy of specifications, drawings, and correspondence *re* Dredge *Agnew*, and read the same.

*Monday, 12th March.*—Messrs. Bennington and Clark arrive at Launceston.

Visit Dredge *Agnew*; arrange with master of vessel to begin survey next day.

Letter was written to Mr. Bell, Superintendent Engineer of Ports and Harbours, informing him of scope of enquiry, and intimating a desire to receive information *re* Dredge *Agnew* from him; also to Mr. Fincham, Engineer-in-Chief, enclosing copy of above.

Shorthand reporter's presence at meetings arranged for, and the Marine Board Room was kindly placed at our disposal by the Master Warden.

*Tuesday, 13th March.*—Visited *Agnew*; arranged for and started the opening out of all parts of the hull and machinery for survey, and prepared to work the hopper doors.

Letter was written to Salisbury & Co., asking for presence of a representative of the firm at survey and enquiry.

Dock-blocks were examined, found to be too far apart, and five (5) extra ones were added under the machinery and crane; arranged to dock after the arrival of Mr. Kelly.

Mr. Kelly visited on arrival; gave him copy of specification and drawings, and all correspondence; had his approval of proceedings during his absence. He mentioned the fact that he had inspected various dredges at Melbourne after he had heard from the Manager T.S.N. Co. that his services were asked for on this enquiry.

Dredge *Agnew* visited at 2.30 P.M. by the Members of the Board. (Mr. Kennedy watching proceedings.)

Trial of hopper doors, winches, and gear were carefully watched and noted,—the original and new gear being used to lower and raise the doors; the number of men employed; the time taken to do the work under both conditions being noted, as well as the working and efficiency of the gear.

Cement in side chambers ordered to be removed to get at leaks; and authority was given to Master of dredge to employ the necessary labour.

Dredge was docked at 5 P.M.

*Wednesday, 14th March.*—Messrs. Bennington, Kelly and Clark met on board the *Agnew*, (Mr. Kennedy present), in dock. Cement being removed from side chambers.

Hopper doors lowered by means of original fittings.

Formal meeting in cabin. Present—Messrs. Bennington, Kelly, and Clark; shorthand reporter; Mr. Kennedy watching proceedings. Mr. Bennington elected Chairman.

Surveyed the hull externally and internally; boiler externally and internally; machinery generally; all winches, steam and otherwise, and the equipment generally; noting deviation from specification or drawings, all defects, and comparing by measurement of the various parts with specifications and drawings.

Salisbury & Co., represented by Messrs. Scott and M'Kenzie during the survey of alterations effected by their firm under the instructions of Mr. Bell. Telegram sent to Mr. Bell:—"Your presence is required on survey of *Agnew* at once. Wire reply."

*Thursday, 15th March.*—Messrs. Bennington, Kelly, and Clark met in Board Room of the Launceston Marine Board. Letter received from Mr. Bell, declining to appear, and stating that he had no official cognizance of Board; also objection to constitution of the Board. Shorthand writer taking notes; Mr. Kennedy watching proceedings.

Examined Mr. Bogle, late engineer of *Agnew*, formerly Clerk of Works during the building, &c., Assistant to Inspector of machinery; Mr. Capurn, Master of *Agnew*; Alexander Hendry, mate of *Agnew*; Wm. Poulter, Craneman of *Agnew*; and Messrs. M'Donald, M'Kenzie, and Scott, of Salisbury and Co., relative to condition, method of working, defects, and alterations of hull, machinery, and equipments, &c.

Mr. Kelly left at 2 P.M., for *Pateena*, after suggesting the flooding of the side chambers to ascertain the extent and position of leaks in hull.

Letter to Minister of Lands and Works, informing him of early closing of the enquiry, and asking for instructions.

*Friday, 16th March.*—Messrs. Bennington and Clark met in Marine Board Room; shorthand writer present. Examined Mr. Liddell, of the s.s. *Warrentinna*, late of *Agnew*, as to condition, method of working, defects, and other matters relating to hull, machinery, and equipment of *Agnew*. Afterwards proceeded to *Agnew*, and put six (6) inches water into side chambers; examined the bottom of hull, and noticed that nearly every hinge rivet leaked badly into dock; arranged for pumping and drying out compartments.

Telegram from Minister of Lands and Works to hand *Agnew* over to Mr. Bell; informed Master of vessel of this officially. Left Launceston by 3 P.M. train.

*Monday, 19th March.*—Reported progress to Minister of Lands and Works.

Messrs. Bennington and Clark met at the office of the Inspector of Machinery to discuss and formulate rough draft of Report.

*Tuesday, 20th March.*—Messrs. Kelly, Bennington, and Clark met; read and discussed, and amended *seriatim*, the rough draft of Report.

*Wednesday, 21st March.*—Met and discussed the amended Report; wrote out and signed fair copy.

We have the honor to be,

Sir,

Your obedient Servants,

JOHN CLARK, *Inspector of Machinery.*

JOHN KELLY, *Con. Engineer, T.S.N. Co.*

JOHN WM. BENNINGTON, *Engineer, R.N.*

*The Hon. the Minister of Lands and Works, Tasmania.*

## REPORT OF SURVEY ON DREDGE *AGNEW*.

*Hobart, 22nd March, 1888.*

SIR,

WE, the undersigned Members of the Board of Inquiry instituted by you to enquire into and report upon the condition of the dredge *Agnew*, have the honor to submit, for your information, the following report of survey on the hull, the machinery, and the general equipment of that vessel, held at Launceston on March 12, 13, 14, 15, 16, 1888, in pursuance of your orders.

We would state that we have, to the best of our ability, made a careful, strict, and thorough survey; and that the statements and opinions herein expressed are in accord with that survey, and from notes taken at the time.

*Hull.*

Thoroughly inspected the whole of the exterior of hull, below and above water-line, and noted that in all particulars the specification had been carefully observed; and that the vessel had been well and carefully built. Some of the plates had not been bent or moulded so cleanly as they might have been, owing to the builders having no bending or rolling plant of sufficient size; but this is no defect, or only a defect of appearance. On the port side, at about 10 feet from the stem, on the bilge line of plates, there is a compound dent in the plate, of an average depth of  $\frac{3}{8}$  in. (maximum =  $\frac{5}{8}$  in.), evidently caused by the vessel riding over some hard substance, probably her anchor. The surface of the plate or the strength of the material is not affected.

On the port side, on the plates above the bilge and below the water line, extensive pitting of the surface of the plates has taken place, and to a less extent generally over hull. This is caused no doubt by the paint being off the bottom for some time, and to its consequent unprotected state against the corrosive action of the dirty water stirred up by dredge during work, and also circulating round and from the wooden piers of the jetty alongside which she is frequently fastened. This action is, no doubt, promoted by the surface of the plates having been roughened in the process of riveting and bending.

Great care should be taken that the surface of the hull be kept well coated by some protective material, and the vessel should be carefully watched for this purpose.

A lamination of the surface of a plate was found on the starboard side, at about 21 feet from the stem, on the rounding of bilge plates. It was about  $2\frac{1}{2}$  square inches in area and  $\frac{1}{8}$  in. thick. This was cleaned off; the surface of the metal under it was in good condition, and the strength of the material has not been appreciably affected. This is a flaw in the manufacture of the plate, and not easily noticed in building.

Four butts of plating in bottom require caulking.

Keelson was found to be according to the specification and drawing.

Hopper-doors, hinges, chains, adjusting screws, and gear attached to doors, as originally fitted, were in conformity with the specification, and well and faithfully built.

The keelson has been materially weakened by being extensively cut in 12 places in horizontal web to permit of the passage of the new chains fitted since the vessel has been at Launceston.

The doors have had double hinges fitted lately,—a very good idea if properly carried out, as the strain on the lynch-pins would be better borne; but the sockets for the pins are so badly attached to the ship that there is a most serious leak through the rivets. Caulking with red lead and yarn, and a very thick application of cement and marine glue, has been tried both inside and out, but the leaks are still serious.

The primary cause of the hinge difficulty appears to have arisen from small stones getting into a recess cut in doors to receive the boss on the side of hopper, and to the force employed to try and shut the doors while the stones were in such position breaking a hinge-pin, which had a small central flaw in metal unobserved while being turned in lathe.

The difficulty, we believe, could have been remedied (as was suggested at the time of its first occurrence) by beaching the vessel, and cutting away the corners of the recess.

We would suggest that all the hinges be removed from hopper sides; that the palms be properly fitted to the rounding of the corner of hopper-wall, as was originally done by the builder; that the rivet-holes be carefully rimered larger; that not less than  $\frac{3}{4}$  in. good iron screw-bolts (with countersunk heads and feathered necks) be well fitted to the holes, put through from the outside, the nut screwed up on a  $\frac{3}{4}$  in. iron plate of sufficient size to cover each palm fully, and fitted to skin, bedded with gromets and red-lead putty, great care being taken that the surface of backing-plate and of inside of hull fit close together, and are brought close by the bolts; that the surfaces of hinge-palms and shell fit; and that the centres of pin-holes are in accurate line on each side, so that the doors may not twist in opening or shutting.

The doors have been bevelled off on the hinge side, in our opinion, in the wrong direction, as now when the doors are open there is a V recess formed with the corner of hopper, offering a lodgement for stones, liable to wedge in and be not easily removed by the wash of water through hopper. The shield plates recently fitted over hinge-edge of doors to prevent stones getting in are, in our opinion, unsuitable, as if any heavy material falls upon them the leverage on the rivets securing them to the side of hopper would tend to make and keep those rivets loose and leaky, and it is almost impossible to make a good caulked joint between shield and hopper plating.

The method and place of securing the shields are bad, as it is by rivets, in a line of rivets in hopper-walls, so that there are three thicknesses of plate to be made secure, and that only with  $\frac{3}{4}$  in. rivets, which are too long to be wrot home properly, and are consequently more or less leaky; the jointing of the wall-plates where these rivets are is, of course, much shaken.

To put on these shield-plates the alternate rivets on the garboard strake of hopper sides were removed. No bolts were used to secure the plates together while fitting the shields. A very considerable amount of sledging was employed to shape the plate and bring it into place, and this, too, when the pitch of the dock-blocks was decidedly inadequate to the weight of the ship with all the rivets intact. We consider it, therefore, very possible that some of the old work in the neighbourhood will require a thorough overhaul and testing for tightness.

We would recommend that the shield-plates be removed one at a time, the holes be carefully rimered, and bolts be fitted to make a temporary job of the seam; each plate should be removed in turn, and the holes and joint treated in the same way. When all the bolts are in the riveting may begin, a rivet taking the place of the bolt withdrawn, and so along the whole of the seam of rivets (every rivet in the seam should be removed to ensure a tight joint). A wooden shield should be fitted, secured by bolts screwed into plating of hopper, in a line under the seam mentioned above, having nuts and washers inside, the sides of hopper at corners being considerably stiffened by the introduction of gusset-stays between sides and floor-plates of side chambers.

Under any circumstances the shield-plates must be taken off, all the rivets in the seam drawn, the joint treated as above, and larger rivets used, properly wrot home. Caulking the seam will be impossible, or nearly so, with the shields in place.

The bridle chains on doors were originally of  $\frac{3}{4}$  in. tested iron, and did the work required of them, nor were there any defects in them. The only difficulty there has ever been was caused by a forelock jarring out of the shackle-pin, so allowing the shackle to spread, pin to slip out, and the chain get adrift. The pins never broke, and there was no necessity to fit the present chains out of proportion with the others; in fact, they are inversely proportional, as now the chain carrying the lighter load is the largest, viz., 1 in. and  $\frac{3}{4}$  in. respectively.

The adjusting screws for all chains are to the specification, and have ample drift to the worm for all adjustments required, the trouble experienced on one occasion having no connection with the alleged insufficiency of drift, but to the manner in which the screw was adjusted in fixing a door-shackle which had come out, as mentioned in previous paragraph.

The original chain fittings are amply strong and efficient; the new chains are of the same length as the originals, and the original screws are still in position.

Hopper-beam and keelson are well built and securely and efficiently secured to the frames, &c. of ship, as required by specification,—indeed there is an ample margin in that respect in favour of the strength.

The hopper-door, winches, and gear, were subjected to a most thorough and careful inspection and trial. The doors were lowered and raised by means of the original and present fittings, and in each case by the same number of men as when at dredging work; and after carefully watching these operations, noting the time required in each case, the amount of labour expended and required, and hearing the opinion of the men employed at the winches, we have no hesitation in condemning the present fittings in their entirety, viz., the worm and worm-wheel gear fitted recently; and we recommend the restoration and use of the original fittings, viz., the ratchet levers, as we are of opinion that this is efficient, strong, and safe, and the work can be done in almost half the time the other gear requires,—an important matter when doors are banging about in a sea-way.

The method of carrying the heavy weight of the Priestman's crane and grab-gear seems to have been well designed and very well carried out, and appears efficient in every way; the only defects being the wear and tear of the grab-teeth, natural to the kind of work in hand.

The stern and rudder-posts are, with their attachments, in accordance with the specification.

Interior of hull was carefully surveyed and observed by measurements in many places to be in accordance with the specification, and we believe the vessel to be a strong one in her class.

In the bow compartment, the deck over this has been slightly weakened by the cutting of a man-hole in front of anchor-winch, causing, no doubt, the slight vibration complained of. We recommend the introduction of a 2 $\frac{1}{4}$ -inch round iron stanchion between No. 3 frame and the keelson, which would stiffen the deck.

There are no liners between stem-piece and the hull-plating on upper and lower strakes.

The connection between the port hawspipe and collision bulk-head has been broken to clear chain which had kinked in pipe; this should not be permitted to remain so, as the value of the collision bulk-head is much reduced. All opening into water-tight compartments, and joints on water-tight bulk-heads, should be always in good condition, ready for closing, or closed if not in use.

In mess-deck, observed that the straight length of steam-pipe to anchor-winch is of iron; this was explained by Messrs. Kennedy & Bogle as due to the fact that the necessary copper pipe was not obtainable in time when required. New copper pipe is being prepared for fitting.

Side-chambers to hopper are made in direct conformity with the specification and drawings.

Sounded all rivets for hinges, and on seam where shield-plates are fastened; nearly all hinge-rivets loose, and also many of the others: to do this a great quantity of cement &c. had to be removed.

We would suggest that, when the defects of the hinges &c. are being made good, there be fitted gusset-stays from the floor-plates to frames on side of chamber (hopper side) to stiffen the corners and help to support hinges and doors.

#### *Coal Bunkers, Boiler, and Engine-rooms.*

All scantlings, &c. as per specification; and we noted that boiler and engine-bearers, frames, ties, and stays, the frames for carrying the thrust and other bearings, were according to the specification.

All valves, cocks, sluices, pump-suctions, mud-boxes, and pipes attached thereto are in accord with specification.

All keelsons, stringer-plates, frames, and girders are in all respects as required by specification.

Observed that many parts of boiler and engine-frames and bearers require attention, in the matter of cleaning, scraping, and painting, for preservation of strength and material.

The after compartment has three stiffening diaphragms, in a fore-and-aft direction, under deck, extra to specification; all else as per specification.

Tiller, gear, and all fittings are as required by specification.

The upper deck, all fittings, bulwarks, rubbing-strake, &c., as required by specification.

Observed that there were large patches of thick rust on the deck generally, but more especially in wake of hopper, and that the deck required cleaning, scraping, and painting with good paint or composition, for preservation.

#### *Anchor Winches and Engines.*

New ones are now being made, and will be presently fitted into position. Some of the trouble experienced in the working of the present ones appears to have been caused by the compressor cones being wet, and slipping while bringing home the anchor.

#### *Boiler.*

Examined the exterior. No leaks beyond the small one in seam, incidental to the working of such a boiler with steam of high temperature and pressure.

The scum-cock gland has been leaking badly. A practical man could have remedied this in an hour, by repacking the gland when steam is down. This, we believe, is the origin of the report "that the boiler leaked badly."

Examined the valves, cocks, and boiler-mountings generally.

Examined the interior, stays, tubes, furnaces, combustion chamber, pipes, &c.

Ample space is provided for cleaning. This we tested practically and personally. Of course only boys can get at crowns of furnaces and the lower parts to properly clean them. Top door 14 in. × 12 in. Lower door 12 in. × 11 in.

We believe that the boiler and its attachments are in accordance with the specification and drawings, well and faithfully built, and of good material.

Observed that the interior under-water surfaces were covered with a thin scale of black oxide of iron. We would recommend that a supply of fresh water be carried for the boiler-feed while dredging, and for "make-up" while steaming; that zinc slabs be fitted on the stays (in some approved manner); to prevent corrosion and pitting from the use of dirty or acid water.

#### *Engines.*

The main engines were opened up, and we examined cylinders, pistons, slide-valves, valves, cocks, framing, bearings (journals and brasses), working gear, shafting and couplings, and found them according to specification and drawings, of good material, well designed and manufactured.

Donkey-engine, as per specification.

Propeller, as per specification, the boss coated with cement.

#### *Summary of Survey.*

After a careful and thorough survey, to the best of our ability, we are of opinion that the hull, machinery, and equipment of the Dredge *Agnew* are in accordance with the specification (except in the matter of the articles noted in this report) and with the drawings, well and faithfully built, and, as far as we could judge, of good material.

We have the honor to be,  
Sir,

Your obedient Servants,

JOHN CLARK, *Inspector of Machinery.*

JOHN KELLY, *Con. Engineer, T.S.N. Co.*

JOHN W. BENNINGTON, *Engineer, R.N.*

*The Hon. the Minister of Lands and Works, Tasmania.*

## RECOMMENDATIONS AND SUGGESTIONS RESULTING FROM THE SURVEY OF HULL, MACHINERY, AND EQUIPMENT OF DREDGE *AGNEW*.

*Hobart, 22nd March, 1888.*

SIR,

WE the undersigned Members of the Board of Enquiry instituted by you to enquire into and to report upon the condition of the Dredge *Agnew*, herewith beg to submit to your consideration the following summary of the recommendations and suggestions embodied in the Report of Survey, which, if acted upon, are in our opinion calculated to add to the efficiency and usefulness of the vessel, her machinery, and equipment; these being the result of a careful and thorough survey.

#### *Hull.*

(1.) Should be kept coated with some good anti-fouling composition or paint, to prevent or limit the pitting of plates.

(2.) Four butts of plates require caulking.

(3.) Hinge-bosses for hopper-doors on ship's side should all be removed; the palms of the hinges be properly fitted to the rounding of the hull, with the centres of bosses in accurate line; the rivet holes should be carefully rimmed larger; good iron bolts, of not less than  $\frac{7}{8}$  in. diameter (with countersunk heads and feathered necks), should be fitted to the holes from the outside, a  $\frac{3}{4}$  in. backing plate of sufficient area to more than cover each of the palms should be bedded and fitted on to the inside of plating of hull, so that the backing plate, by the aid of gromets and red-lead putty, would form, when screwed down by the nuts, a water-tight joint with plate of hull.

(4.) The bevel of hinge edge of door should be filled in.

(5.) The shield-plates should be removed one at a time, all the rivets through and under it be drawn, the holes rimmed out larger, and bolts fitted to holes to make the joint temporarily, each section being so far advanced before the other is taken in hand; when all the plates have been removed and bolts are in all their holes, the riveting of the seam on both sides of hopper may commence, rivets taking the place of the bolts, one by one, until the whole seam is riveted; it should then be well caulked. Care should be taken to have the vessel well supported on plenty of blocks in the dock.

(6.) A wooden strake should be fitted on side of hopper, under the above-mentioned line of rivets, to protect the hinge edge of doors. This should be secured by means of screw-bolts screwed into the side plates, and secured inside by nuts and washers. The bolt-heads should be in recess in strake.

A sketch of such a plan is attached.

(7.) To help the hinge and shield fastenings, and to stiffen the corners on which the doors are hung, gusset-stays should be fitted between frames on side of hopper, and the floor plates in the side chambers.

(8.) The original bridle chains should be replaced on doors, as the present ones are disproportionate and unnecessary. The originals are in vessel.



## X

(9.) The hopper-door winch gear, as originally fitted, should be restored and used, as it is more efficient and satisfactory than the present arrangement, which is badly designed and put together; the brackets carrying the new worm shaft work severely on their fastenings, and are a source of danger to the men at the handles.

(10.) Extra strength should be given to the deck under the fore-anchor winch, by the introduction of a 2½-inch round iron stanchion, fitted with palms, between the keelson and No. 3 frame. This would lessen the vibration of deck when working winch.

(11.) Hawse-pipe on port side should have the joint to the collision bulk-head made good; and when fitting the new winch, care should be taken that the drift of the chain, from barrel to hawze-pipe nozzle on the deck, is sufficient to prevent the chain 'kinking' in pipe.

(12.) Upper deck should be cleaned, scraped, and painted with some good composition or paint, and care should be taken to prevent deterioration.

### *Boiler.*

(13.) Zinc slabs should be fitted internally, to prevent corrosion or pitting of material of boiler; this fitting is of use even when using apparently clean water.

Sketch of an approved method attached.

(14.) A supply of fresh water should, if possible, be carried for use when grab-engine is at work, and also for "make up" when vessel is steaming.

### *Supervision.*

A competent and properly qualified person should be appointed to supervise the carrying out of the above works, if it be determined to act upon the suggestions and recommendations herein offered.

### *Charge of Machinery, &c.*

Taking into consideration the value and importance of the Dredge *Agnew*, in the matter of hull, machinery, and equipment, and the desirability of having her efficient and useful at all times, and having seen the vessel as she now is, we would strongly recommend that a properly qualified engineer be appointed in sole charge of the material and mechanism of hull, machinery, and equipment, and of all stores connected therewith; that he should be directly responsible to the Minister of Lands and Works, or to some properly qualified person appointed by that Minister; that he should have charge of all repairs, alterations, or additions made to hull, machinery, or to the equipment, and be called upon to report upon the necessity for all such repairs, alterations, or additions; and no such repairs, &c. should be effected without his full cognizance and supervision.

He should keep a careful record of all repairs and defects; of the working of all machinery and gear in his charge; of the conditions under which the boiler and machinery are worked, as well as of all examinations of boiler, engines, and the machinery generally.

The engine-room log should be sent to office after certain stated periods, properly filled in and signed.

Believing that these recommendations will, if acted upon, result in the increased efficiency of the Dredge *Agnew*, and render her more useful and less liable to give trouble,

We have the honor to be,

Sir,

Your obedient Servants,

JOHN CLARK, *Inspector of Machinery.*

JOHN KELLY, *Con. Engineer T.S.N. Co.*

JOHN W. BENNINGTON, *Engineer, R.N.*

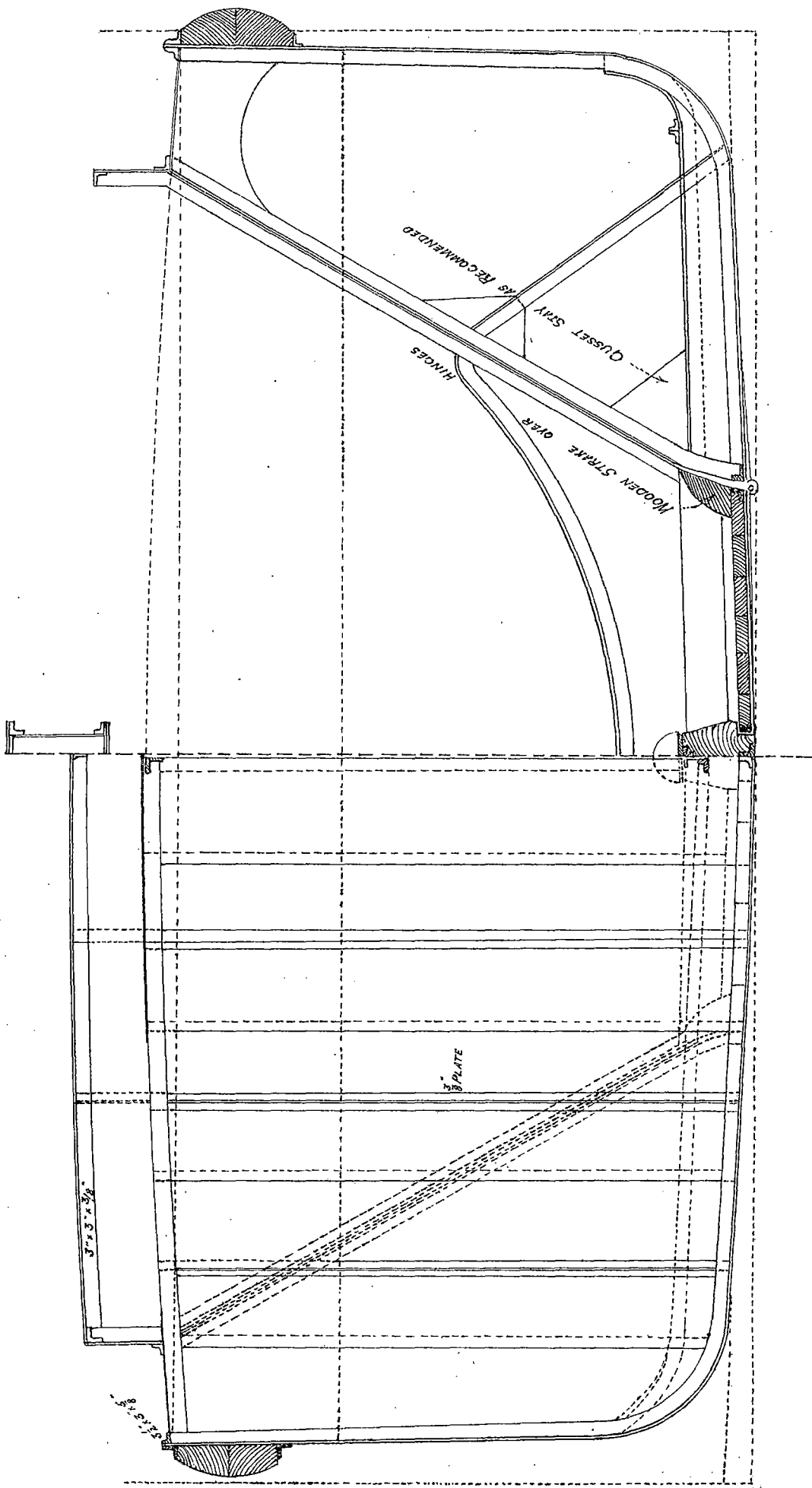
*To the Hon. the Minister of Lands and Works,  
Tasmania.*

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# TRANSVERSE SECTION

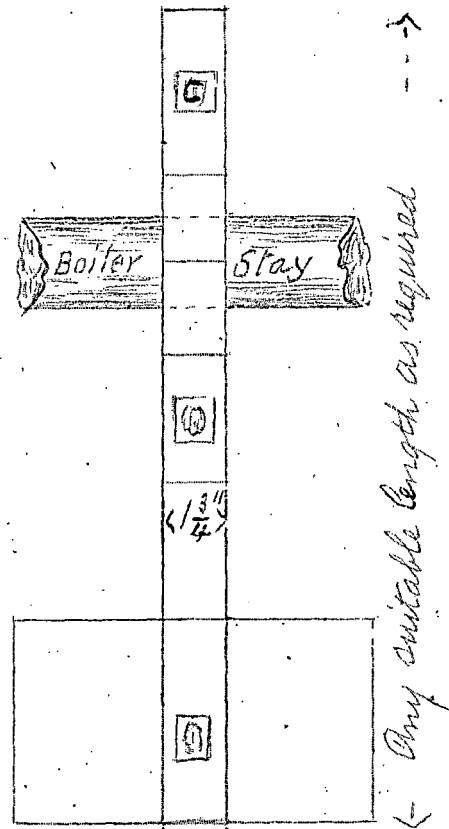
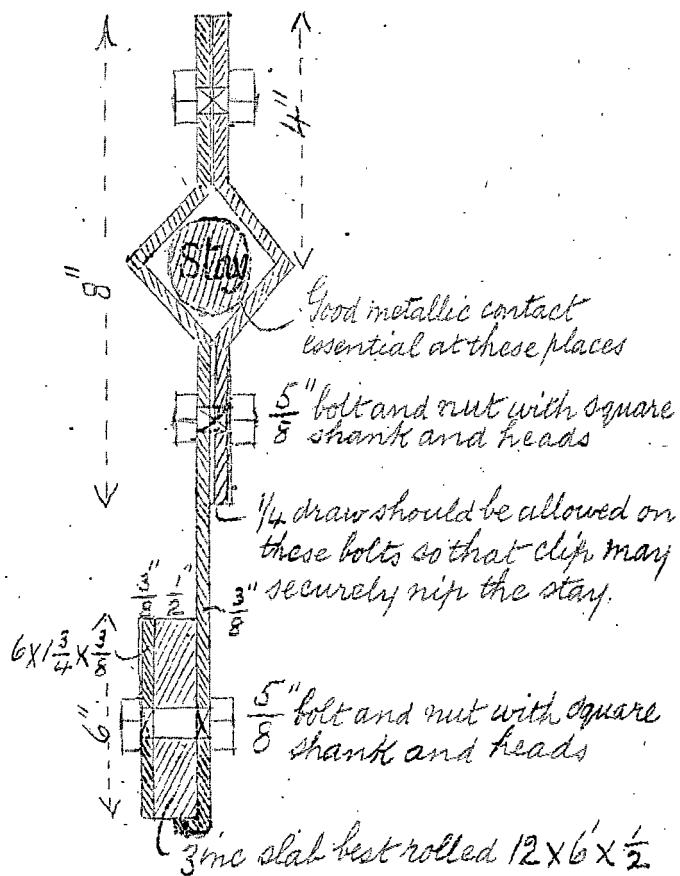
of  
500 TON HOPPER BARGE

Scale  $\frac{3}{8}$ " Inch to one Foot.



# Rough Sketch of Zinc Fitting for Boiler

## Naval Pattern



The hangers of  $1 \frac{3}{4} \times \frac{3}{8}$  iron of good quality.

Bolts  $\frac{5}{8}$  in diam. iron of good quality with square shanks and heads to prevent turning.

Zinc, best rolled  $12 \times 6 \times \frac{1}{2}$

Covering plate on zinc  $6 \times 1 \frac{3}{4} \times \frac{3}{8}$

Great care should be taken that the surface of the iron of hanger and stay in contact be perfectly clean and bright, as also of hanger, covering plate and zinc, and that the bolts under the heads be clean and well in contact with clean surfaces of hangers.

Sufficient drift should be given to the bolts on the hanger on stay to permit of the clip securely seizing the stay to make efficient metallic contact, the secret of the action of zinc, which should wear away and be deposited on interior plates &c. of boiler.

(100) J. W. Bennington  
Engineer R. N.

# EVIDENCE.

THURSDAY, MARCH 15, 1888.

EDWARD BOGLE *called and examined.*

1. *By the Chairman.*—What position do you occupy? Assistant Government Inspector of Machinery.

2. What certificate do you hold? I hold the Board of Trade's certificate.

3. Were you appointed Clerk of Works to the dredge *Agnaw*? Yes.

4. When? I was appointed on May 23, 1887.

5. Were you present at the whole of the building? Yes.

6. Were you assistant inspecting engineer? Yes; and certified to Mr. Clark that the specifications were carried out faithfully.

7. Were you present at the launch? Yes.

8. Did you see the machinery taken in? Yes.

9. Was the dredge afterwards docked? Yes, before leaving for Formby.

10. Were you present? Yes.

11. Did you observe any weakness in either vessel or machinery? Nothing whatever, except where an iron pipe was used instead of a copper pipe.

12. Were you present during the trial trips? Yes, as engineer of the vessel. I was appointed engineer just after the second trial trip.

13. Were you engineer during the second trip? Yes; I was then engineer on behalf of the contractors.

14. Were you in charge when she was brought round to Formby? Yes; and for three months after arriving at Formby.

15. What was her behaviour in regard to strength and stability during the run round? I never noticed anything wrong. We steamed round from Port Arthur to Formby without a hitch.

16. Did you have a trial of the hopper apparatus and the working of the doors, as well as of the engines? Yes; the hoppers, doors, and winches worked very well, as did all the fittings. They have always worked well.

17. Did you have any difficulty in opening or shutting the doors? No; they opened and shut quickly, provided there were no stones in the hinges.

18. Did she do the dredging work satisfactorily? Yes, so far as the boat was concerned; but we had had some very rough weather.

19. In a heavy sea, such as you experienced outside the Formby bar, is it necessary that the doors should work quickly and smoothly? Yes. When we had fine weather, and dredging small shingle, we would steam miles out to sea, discharge the spoil, and be back ready for another load in less than an hour.

20. How long were you in the *Agnaw*? Three months; I left her on September 3.

21. Were there any structural difficulties, or any difficulties with the machinery while you were on her? None whatever.

22. Did you go through the usual practice in clearing boilers, &c.? Yes.

23. Did you have any difficulty in getting into them for inspection or cleaning? None whatever.

24. Did you, during that time, report any difficulties or weakness in the ship or machinery? No; I only reported to Mr. Kennedy, to whom I was responsible as contractor's engineer.

25. *By Mr. Clark.*—What position was the *Agnaw* in on the morning of September 2, 1887? She was almost high and dry on the gravel bank. Her stern was very much raised. I should say the after part of the rudder-post was 4ft. or 5ft. off the gravel.

26. What quantity of spoil was in her? About 140 tons.

27. Speaking as a practical engineer, what strain, in your opinion, was the ship then subject to? I was very anxious about her. I thought she was in a very critical position, especially as the boilers were full of water.

28. Were any defects noticeable then in the doors or rivets? I got up at 5 o'clock and met one of the firemen; I went all round her. We looked thoroughly, but could see no straining in the ship or leakage.

29. Whom did you leave in charge? Mr. Liddell, who came to relieve me.

30. *By Mr. Kelly.*—During the construction of the vessel, was the whole of the work carried out in strict accordance with plans and specifications and the terms of contract? Yes, I am sure of that.

31. Did you report to that effect? Yes.

32. Do you consider that everything was carried out in strict accordance with the plans and drawings of the ship? Yes.

33. Had you any reason to suspect that the vessel had developed any weakness in hull or machinery? No, I am certain I had not.

34. Was the vessel ashore on September 2nd? Yes.

35. Was there any spoil in the hoppers then? Yes.
36. Were the hoppers full? No; I think there were about 100 tons in. The hoppers would carry 200 tons.
37. What was the cause of the vessel going on the bank? She was anchored with one anchor, and the shingle there is of a very movable description. It blew very hard during the night, and with a strong tide running she was driven over the bank, where she grounded when the tide left her.
38. Do you think she was driven on the bank by the weather and left there? Yes.
39. When the water left the ship aground, in what position was she lying? It is a very steep shelving bank, and she rested 30 feet over the bank, her stern being raised, and her bows in deep water.
40. Do you mean that 30 feet of the ship was overhanging without support? Yes.
41. How long did she remain in that position? She must have remained in that position for six tides. When I left she was in that position, and I believe she was so for three days.
42. Can you say if any defects then existed in the hull? No, I don't think there were any.
43. Were there any signs of weakness visible when you left? No. I examined the vessel inside and outside, and there were no signs of weakness.
44. *By the Chairman.*—Did you, whilst engaged as engineer of the ship, observe any signs of leakage in boilers or hull? None whatever; everything was tight and sound.
45. *By Mr. Kelly.*—Were you also engineer of works whilst the boilers were being constructed? Yes.
46. Were the boilers and engines constructed in strict accordance with the specifications and drawings? Yes, entirely so.
47. From the time of your appointment as engineer of the vessel to the time of your leaving her, did you find any defects in the engines? No.
48. Did they work with stability? Yes; they were thoroughly capable of doing their work during the whole of my time aboard, and gave entire satisfaction.
49. In working the boiler did you find any unusual leakage? None.
50. Was there any leakage? Only what is to be expected in the shell of any boiler working under high-pressure steam generated from salt water. All boilers subject to the same conditions would leak in the same way. The *Agnew's* boilers leaked less than is usual in steam vessels working under high-pressure steam.
51. Under the conditions in which you did your work, did you have any difficulty in keeping your boilers clean? No; we frequently used salt water.
52. Did you take all necessary precautions to prevent the boilers salting? Yes.
53. In what condition did you leave the boilers? They were in thoroughly good order.
54. Were they thoroughly clean? Yes.
55. *By the Chairman.*—What staff did you have? One fireman and myself.
56. *By Mr. Kennedy.*—What position did you occupy previous to your appointment as clerk of works for the construction of the *Agnew*? Second engineer of the *Mangana*.
57. Are not the first signs of weakness in a ship shown in her bearings? Yes.
58. During the three months you were in the ship did you observe the slightest weakness in her bearings? No; I observed no weakness whatever.
59. Did she show any weakness when coming round from Hobart? No; everything was perfectly tight and staunch.
60. Did you notice when the vessel was lying in still water if the water was higher in the hoppers than when in a sea? I know there is a difference.
61. Is the water in the hoppers like a seething pot when in a seaway? Yes, there is a good deal of wash.
62. When fully laden with spoil are the hoppers full? No; she would not carry the hoppers full of spoil; there is always water in the hoppers, but she was generally loaded up till there was very little water left in the hopper.
63. *By Mr. Kelly.*—Are you of opinion that the stones get into the hinges when the hoppers are full? No, they get in when the spoil is being deposited. I think if she were brought head to sea and kept steady there would be no difficulty.
64. *By the Chairman.*—In what position was the vessel kept when the spoil was deposited? In all positions, generally when under weigh.
65. Would not the doors be liable to be injured if lowered whilst under weigh? We used to slow to dead slow.
66. Did the doors slam about when lowered? Only when the weather was very heavy.
67. Did you ever report anything wrong with the ship or machinery? I only made one report to Mr. Kennedy.
68. *By Mr. Kennedy.*—What was the nature of the report you made to me? It was in connection with the iron steam pipe leading to the former winch which was supplied owing to copper not being obtainable when it was fitted. Mr. Clark permitted an iron being fitted instead of copper, on Mr. Kennedy promising to replace it with copper as soon as a copper pipe could be imported, and a copper pipe is now being fitted.

THOMAS ALFRED CAPURN, *called in and examined.*

69. *By the Chairman.*—What position do you occupy? Master of the dredge *Agnew*.
70. What certificate do you hold? Certificate of Master from the Board of Trade.
71. How long have you been master of the *Agnew*? Since she was launched.
72. Were you launched with her? Yes.
73. Have you held a similar position before? No; I have been chief officer.
74. In what service? In the Tasmanian Steam Navigation Company.
75. Have you been attached to the *Agnew* ever since she was launched? Yes.
76. Did you bring her from Hobart to the Mersey? Yes.
77. Were you satisfied with her behaviour during the trip in regard to her seaworthiness and other qualifications? Yes.
78. Did you report any defect either of the ship or equipment? No.
79. On your arrival did you begin dredging? Yes.
80. Did you have any difficulty in carrying on dredging operations? The only difficulty we had was with the anchor winch.
81. What was the matter with it? When heaving the anchor the compressor used to jump out of gear when a strain came on the cable; but I do not think it would have occurred in still water. I think it was owing to the very fast tide running, causing the ship to yaw about.
82. Did you steam out to sea to deposit your spoil? Yes.
83. How did you lay the ship? We stopped generally, but sometimes would go slow to wash the stones out of the doors.
84. Did you have any difficulty in depositing spoil? Sometimes we had a little difficulty with the stones getting into the hinges of the doors, but that was only occasionally.
85. Did the hopper winches work satisfactorily? Yes.
86. How many men had you on the winches? Three.
87. How long would it take you to deposit the spoil? From seven to ten minutes to deposit the spoil and heave the doors up again.
88. When did your first difficulty occur? We carried away some of the shackles before we had been at work very long, but that was not important.
89. *By Mr. Kelly.*—From the time you left Hobart in charge of the *Agnew* until arrival at Formby had you any fault to find with the vessel or machinery? None.
90. Did she show any symptoms of weakness? None.
91. When you commenced to dredge did you experience any difficulty? The only difficulty we had was with the forward anchor winch.
92. What was the difficulty? Often we could not get the anchor up without some difficulty.
93. Did these difficulties occur in all waters, or only in a strong current or seaway? We had no difficulty in smooth water, only when the tide was running strong.
94. Did you have any difficulty with the doors in ordinary working? Only when the spoil was deposited in smooth water, then the stones would get in at the back of the hinge.
95. What course did you adopt then? We used to heave them up two or three times and then down again, in order to clear them.
96. Did you at any time strain them in heaving up the doors with the stones in them? One hinge was broken through that cause.
97. Are you aware of any leakage in the air compartments? None whatever.
98. Was the ship perfectly tight until you arrived at Launceston? She was perfectly tight.
99. Were you aware of any leakage in the ship whatever until she was docked in Launceston? No, she was as tight as a bottle when she was docked.
100. Is it a fact that the ship went aground on one occasion at Formby with a certain amount of spoil in her? Yes.
101. What was the cause of her going aground? She dragged her anchors on account of the strong tide and gale blowing at the time.
102. In what position did she lie when aground? She had taken the ground from about the fore rigging right aft past the engine-room.
103. Was any portion of the vessel hanging over the bank without support? There was no support to her rudder post.
104. What length of the ship was overhanging? About ten feet.
105. How long was she in that position? She took the ground on 2nd September, and came off on 5th September—three days.
106. After the vessel was floated was she sounded to ascertain if she was making water? Yes. We tried her every day for a week, and found that she made no water, and we continually examined the air-tight compartments with the same result.
107. Did the vessel show any signs of weakness after the straining? No signs of weakness whatever. No injury was reported, because I did not consider the vessel was injured in any way.

108. If there is a strong current when you deposit your spoil, do you ease the ship in any way? We always ease her.

109. How? By putting her head to sea and going dead slow.

110. Have you had much difficulty outside in closing your doors? We have had very little difficulty, the only difficulty being with stones getting behind the hinges.

111. Is that the only difficulty you have experienced with your work? Yes.

112. What was the cause of the ship being brought to Launceston? We came to get a broken hinge repaired.

113. When was the hinge broken? On 6th October.

114. Were you aware of the slightest weakness in the hull of the ship or her machinery until after she was docked? None whatever. She was as tight as a bottle when she went into the dock; no vessel could be tighter.

115. *By the Chairman.*—How is it supposed the hinge was broken? I cannot account for it, but I think it must have been by the stones getting behind it.

116. Did you then stop working when you discovered that the hinge was broken? No; it did not interfere with the work, and we continued working until ordered to come to Launceston. We worked for several days and then laid up at Formby for two months before coming to Launceston.

117. Were you docked at Launceston? Yes.

118. Did you see the vessel when docked? Yes.

119. Were you on board when the repairs were being done? Yes.

120. Under whose orders did you work? Mr. W. R. Bell's.

121. By whose orders did you come to Launceston? Mr. Bell's.

122. By whose order were you docked? Mr. Bell's.

123. Who gave orders for the repairs being done? Mr. Bell.

124. Who supervised the repairs? No one has been there to supervise the repairs but myself.

125. Did you supervise the works? I did not supervise them, but I was there the whole of the time.

126. Had you an engineer on board? Mr. Liddel was the last, but he left the ship at Formby.

127. Who brought the ship from Formby to Launceston? Mr. Bell and the firemen.

128. Had you no engineer when the ship was docked? No.

129. Was there actually no engineer on board or present to supervise the work? No. Mr. Bell used to visit her occasionally.

130. When the repairs were taken in hand were you there to see that they were properly done? I was not supervisor of the works, but I used to look at the works occasionally to satisfy myself. I am not an engineer.

131. *By Mr. Kelly.*—Under whose orders were these alterations undertaken in the hopper to prevent stones getting behind the hinge? Mr. Bell's.

132. To whose designs was the work done? Mr. Bell's.

133. Was the work done under the supervision and to the satisfaction of Mr. Bell? I cannot say.

134. When this work was completed, was Mr. Bell there? I do not know.

135. Was he there when she came out of the dock the first time? I do not think so.

136. Was the vessel tested to see if she was tight before any cement was put into her? Yes.

137. Was she tested before being brought out of the dock the first time? No.

138. Did she continue to leak immediately she came out of the dock? Yes.

139. Where? I believe it came in through the hinges; I could see the water coming in through the cement, and surmised that it came in through the hinges.

140. How much water did she make? We had to use both the steam-pump and hand-pump to keep her afloat until we went into dock again.

141. What was done to remedy the defects when she was re-docked? The cement was taken out of the compartments to see where the water was coming through.

142. *By the Chairman.*—Did they take out all the rivets along the hopper compartments? No, every other rivet.

143. Are you quite certain of that? I am.

144. *By Mr. Kelly.*—Are you certain of your own knowledge that only alternative rivets were taken out? I am certain.

145. Why were the rivets taken out? It was done to allow them to fasten the rivetting of the shield plates.

146. When you returned into dock, what remedies were taken to stop the leaks—were the rivets taken out? Several rivets were taken out; we used putty in the shield plates, and a mixture of cement and tar in the compartments.

147. Did you discover all the leaky rivets and remove them? Three or four rivets on each side were taken out.

148. Did you use marine glue? We used a solution—a mixture of Mr. Bell's—it was not marine glue.

149. Was she tried with water, or tested to see if she was tight? We ran water into the dock to come above the shield plates; we discovered several leaks in the angle irons.

150. Are you perfectly sure that the ship leaked when tried? Yes.

151. Did you succeed to your satisfaction in making her tight before taking her out of the dock? My opinion was never asked on the subject.

152. By whose instructions was she taken out of the dock? Mr. Bell's.

153. When the ship was floated the second time, what condition was she in? She has not been tight since we took her out of the dock the first time. She has been re-docked three times.

154. Did you discover leaks the third time? Yes.

155. Were you supposed to make them good? I am waiting instructions from Mr. Bell.

156. Has Mr. Bell seen her since she was docked the third time? Yes.

157. What provision has been made for making the ship tight and seaworthy? I believe they took out one or two of the hinge rivets. They broke the cement and tried if they were tight. A few drops of water had come through before the rivets were taken out.

158. *By the Chairman.*—You have been quoting from your log-book—did you write the whole of that log-book yourself? Yes, every word.

159. *By Mr. Kelly.*—When you came out of dock for the third time was the ship still leaking? Yes.

160. Did you use the steam-pump? No, we used the hand-pumps.

161. How often did you pump her? About once a-day, generally in the morning.

162. What water would she make in the day? Not more than an inch every four hours.

163. How much cement did you put into her? Fifteen or sixteen casks.

164. How much of that pitchy composition was used? I cannot say how much, but a considerable quantity.

165. Were you satisfied with the appliances for opening and closing the hopper doors that were in the vessel when she left Hobart? Yes; I was quite satisfied with the appliances.

166. Have you ever made any complaints of them since? No.

167. At whose suggestion were these appliances altered? Mr. Bell's.

168. Was there any necessity for these alterations? Not that I am aware of.

169. Did you think any improvements in the appliances were necessary? No.

170. Were you quite satisfied with them? I think the hopper doors should be chambered off to prevent the stones from getting into the engines. I had spoken privately to Mr. Bell about it.

171. Was that the only suggestion you could make? Yes; that is the only suggestion I ever made.

ALEXANDER HENDRY *called and examined.*

172. *By the Chairman.*—What position do you occupy? Mate of the *Agnew*.

173. What certificate do you hold? A Board of Trade certificate as first mate.

174. How long have you been in the *Agnew*? Since she left Hobart.

175. Have you ever been in any other dredge? No, the *Agnew* is the first.

176. Were you in the *Agnew* during the voyage from Hobart to Formby? Yes.

177. Had you rough weather? Yes, very rough one night.

178. Were you satisfied with the ship's behaviour? Yes, quite satisfied.

179. Did you see any signs of weakness or leakage in her? There were no signs of weakness whatever in any of the compartments of the vessel until she came to Launceston. She was lying for five months at the Mersey, and the pumps were never required. I went through the compartments once a week, and saw that there was no water in her. The ship was perfectly tight.

180. What were your duties when dredging? Seeing that the vessel was secured, and getting the spoil out of her.

181. Did you work the hopper winch? I have charge of one end, and the craneman the other.

182. In working the hopper doors have you had any difficulty? We had a good deal of trouble with the windlass gear, but we had no trouble with the hopper winches. The gear gave perfect satisfaction when the stones were clear, and everything worked efficiently and well.

183. Had you any trouble with the bridle screws? Yes; at the forward bridle one drew out.

184. Could you see the screws from the deck? Yes.

185. How did you remedy it? We put the ship's bows on the bank, and I went down and screwed it up.

186. *By Mr. Kelly.*—Had the screw enough thread? It was screwed on about an inch.

187. How much worm was there? About an inch.

188. Are you using the same screws now? Yes; they have been away to the shop. Two of them were bent when we came to Launceston.



189. What bent them? I could not say.
190. How much thread was there to the screws? There are about 4 inches of spare thread after being screwed up.
191. Were those screws stripped? No; I put the same screws back in their places.
192. Have you had difficulty with stones getting at the back of the doors? Yes.
193. Did that occur often? Yes, nearly every time we had stones in.
194. What course did you adopt in depositing the silt? We steamed out to sea and then went easy. We stopped her altogether by putting her head to sea before depositing the spoil.
195. Do you think it better to come to a dead stop before depositing the spoil, or let it go when steaming slowly? We tried both ways and found it better to have her stopped. The swell made the doors move.
196. When you found there was a stone in the door what did you do? We dropped the door again and if the stone kept fast we removed it with a small spade we kept for that purpose. The stones got jammed in the hinge.
197. Had you any difficulty in working the purchase for opening and closing the doors? No; the purchase has been sufficient, but the shackles of the doors have given way three times.
198. What was the cause? The pins through the shackles worked out, and then the forelock worked out.
199. Then practically the shackles did not break? No, I have them aboard now; the shackles did not break, the pins worked out. It was caused by the forelocks coming out, then the pins drew out in the working.
200. Are the chains you have taken out to be replaced by heavier ones than those that were shipped in Hobart? Yes.
201. Did they do their work well? Yes, we never had any difficulty with them.
202. Were you satisfied with their work? Yes, quite.
203. *By Mr. Kelly.*—When you left Formby was there any leakage in the ship? No, she was perfectly tight.
204. Who gave instructions for the alterations? Mr. Bell, I believe, but I had nothing to do with that.
205. Have you ever made any complaint that you experienced difficulty in working the hopper doors, or that other appliances were necessary to supersede those you had when leaving Hobart? No.
206. Were any other appliances necessary? None whatever.
207. After the alterations were effected to the hopper, and before the vessel came out of dock, were any tests made of her condition before she was cemented? No.
208. What did you find when she was floated? She was making water rapidly.
209. Could you detect where the leakage came from? Yes; it came through the riveting of the hinges.
210. Could you see if there was any leakage from the rivets where the shield-plates were put on? Yes, we could see the leakage came from the rivets and in the seams.
211. Did you see the workmen cutting out the rivets? Yes.
212. How many were taken out? So far as I could see, they took out every other one.
213. Did they cut the rivets out on each side of the hopper before any were put in again? Yes, every other rivet was taken out right round both hoppers before the plates were fitted.
214. When they were fitting in those rivets did you observe if the rivet holes were good and fair? The heads of the rivets they were driving in, instead of being straight, were at an angle. I thought by that the holes were not true.
215. Did you notice the distance the blocks the ship was resting on were apart, or how she was supported before the rivets were taken out? I think the blocks were about seven feet apart.
216. Were there as many blocks then as there are now? No, there are more blocks there now; they are closer together now.
217. Would she be less liable to get out of line now than when she was docked first? Decidedly she would.
218. What system was adopted to get the shield-plates in? They were sledged in by large hammers to get them into their place. There was a great deal of hammering; they were very severely hammered to get the proper set in.
219. In your opinion was there sufficient hammering to create a leak by jarring the adjacent rivets? Most decidedly.
220. Did the ship make much water when she came out of dock? Yes, a great deal. It was necessary to put four men on with hand-pumps, but they could not keep her clear, and we had to get the steam-pump at work to keep her afloat.
221. How long was it before she was redocked? Twenty-four hours.
222. What steps were taken to make her tight when redocked? Part of the cement was taken out. We went back so far as the rivets of the hinges, and commenced caulking the rivets. We saw the water running through the rivets.

223. Was she tested in any way before taking her out of dock? The second time she was cemented, after putting a little water in to try the rivets. We found that the rivets leaked after the cement was put in.

224. *By the Chairman.*—Have you noticed any excessive vibration of the deck by the anchor winches? It was about the same as in any other vessel.

225. What difficulty had you with the winches? When any strain came on the cable the worm worked out, and the pawl did not catch, letting the chain run right out, and it was some time before we could catch it again.

226. *By Mr. Kelly.*—Are you aware if at any time the links got jambed across the hawsepipes? No.

227. Did the winches work well in smooth water? No, the after winch will not heave up the slack of the chain. When taken to the winch end it worked without trouble. There is enough power in the winch to heave anything, but the grip is not sufficient.

228. *By the Chairman.*—Were you in the ship when she grounded on September 2? Yes.

229. Did you notice how she was lying on the ground? Yes, part of her stern was overhanging for about 8 or 9 feet.

230. Was the other part supported right along? There was water to the fore rigging all the time.

231. How long was she there? Two days and three nights.

232. Did she leak? No, I went round her, and she did not leak a drop.

233. *By Mr. Kelly.*—What caused her to go ashore? The wind was blowing very hard, and she touched the bank; being broadside on, the wind and tide drove her ashore, and the tide left her. We tried to heave on the anchor, but the ground being shingle it would not hold.

234. When on the bank, was a considerable portion of the ship without any support? Yes.

235. After she floated, did you perceive any weakness or leakage in her? No; I went all through her, and saw no signs of weakness whatever. There were not the least signs of any weakness.

236. How much spoil was in the hoppers when she was ashore? About 60 or 80 tons.

237. Has she been ashore any other time? She struck lightly once or twice on the bar, but did not stop. We grounded her twice to fix the shackles, but that could not hurt her in the least.

238. What caused those marks in her port bow? I do not know. One night, whilst lying at Torquay wharf, I heard something thump against her. I got up, but could see nothing. I thought she had bumped against the wharf.

239. Was there any deficiency in the vessel until she came out of dock? No, she did not make three pints of water from the time she was launched until she came out of the dock in Launceston.

240. Does she answer her helm? Yes. I have no fault to find with the ship in any way, if they would leave her alone. I do not want to be in a better seaboat.

EMANUEL POULTER *called in and examined.*

241. *By the Chairman.*—What position do you occupy? Craneman of the *Agnew*.

242. How long have you been in the ship? Six or eight months.

243. Have you found any fault in the machinery that you had to work? None.

244. Did you see any difficulty in their working? No.

245. Did you assist with the winch to work the doors? Yes, occasionally.

246. Did you complain of the hopper fittings? No, there was nothing wrong, only with the stones getting behind the hinges.

247. Did you hear any complaint about the winch gear? No.

248. Have you seen or heard of any leaks in the vessel? No, not until we came out of the dock.

249. Were you in the ship when she went ashore at the Mersey? Yes.

250. Did you go round her whilst ashore? Yes.

251. How much was overhanging? From 20 to 30 feet.

252. Are you certain it was as much as that? Yes, quite certain.

253. Did you notice by the vessel how much of her was overhanging? Yes; the after part from about the middle of the boiler.

254. Did you hear of any leakage in the vessel after that? No.

255. How much spoil do you think was in her? About one hundred tons.

256. How did she go ashore? By dragging her anchors.

257. *By Mr. Kelly.*—Was there much trouble on account of the stones in the hinges? Yes, in fine weather; but when there was any sea on the stones were washed out.

258. In what position was the vessel when you deposited the spoil? Head to sea.

259. Did they let the spoil go whilst the ship was in motion? They slowed her down to dead slow. When the door was let go she was put full steam ahead and then full steam astern, to make a wash in the hoppers.

260. Were the hinges really dangerous to the working of the ship? I do not think there was actual danger, but there was a certain amount of difficulty in getting the anchor home.

261. Were there any signs of weakness in the ship after being aground? None whatever.

262. On what other occasion was she on the bank? We put her on once to repair one of the shackles of the doors.

263. What was wrong with the shackles? The pin used to draw out, and one of them broke by the shackles opening.

264. Was it through a weak part in the shackle? No.

265. Were the original chains shipped in Hobart weak or in any way unable to do their work? Certainly not.

266. Were they quite up to their work? Yes.

267. If the pin drew, would the heavier chains now in the ship be any improvement? None whatever.

268. If they had to cut away the angle iron to get in a heavier chain, would that weaken the keelson? Yes, certainly.

269. Beyond the bursting of the pipe, have you seen anything wrong with the fittings or machinery of the vessel? No.

270. Are you satisfied with the working of the whole gear? Yes, quite.

271. Have you any cause to be dissatisfied with anything you have seen in her? No.

272. Was the ship tested to see if she was tight before the cement was put on? No; she was cemented first and tried afterwards. They were cementing the floor of the air-chamber whilst the water was rising in the dock, and it entered the compartments so quickly that the men were driven out, and I had to get up steam to pump her out to keep her afloat. We had to use the hand-pump to keep her going meanwhile.

273. How many rivets were taken out of her? I think it was every other one.

274. Before any of the plates were put on were the alternate rivets taken out all round? Yes.

275. Was she left in that position any length of time? Yes, a considerable time.

276. Are there more or less blocks under her now than when these rivets were out? There are more now.

277. Would it have been better to have taken out one plate at a time? I think so.

278. *By Mr. Clark.*—Did you notice how they shaped the shield-plates on the hopper side? They took them to the shop and bent them a little, but not sufficient to fit, and then they plied them up with sledge-hammers.

279. When they put on the shield-plates were the holes fair? No, the drifts were used a good deal. I think the holes must have been considerably out.

280. Had they much difficulty in driving the rivets out? I do not think so.

281. Do you think it possible that by taking the rivets out the vessel drooped? I do.

282. Do you think any weakness was created by the vessel drooping by the rivets being taken out? Yes. I have lain at night in the engine-room whilst the rivets were out, and she creaked and cracked so much that I got up to see what was going on.

283. Do you think she strained on account of the rivets being taken out? I do, most certainly.

284. *By Mr. Kennedy.*—Did not the anchor winches always work well in dry weather? I did not see much difference in them.

285. Had you any difficulty in getting the anchor home when it was considerably out from the ship's bows? No.

286. In working the crane until you left the Mersey, did you find any difficulty in the dredge working freely? No, it worked quite freely all the time.

287. Was any difficulty perceptible until she was docked in Launceston? None.

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J. T. M'DONALD, *called in and examined.*

288. *By the Chairman.*—What position do you occupy? I am a member of the firm of Salisbury and Co.

289. Have you a contract for alterations to the dredge *Agnew*? Yes.

290. Had you proper specifications for those alterations? We were given a rough idea of the work wanted, and from that we formulated what we thought conveyed Mr. Bell's ideas.

291. From whom did you get the rough sketch of the work? From Mr. W. T. Bell.

292. In doing the work were the hinges removed? Yes.

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HENRY M'KENZIE, *called in and examined.*

293. *By the Chairman.*—What position do you occupy? Member of the firm of Salisbury & Co.

294. Did you supervise the work at the dredge *Agnew*? Yes.

295. Under whose instructions did you work? Mr. Bell's.

296. Did he supervise the work? Yes; he was not there continuously, only from time to time, but my instructions were from Mr. Bell alone.

297. *By Mr. Kelly.*—In putting up the shield-plates, what rivets did you remove? Alternate rivets right round.

298. Were alternate rivets taken out right round at the same time? Yes, I am sure they were all out at the same time.

299. Did you take a level? Yes, I made a level up the door and along the hopper.

300. Was there any hammering to get the shield-plates in shape? Not much. It was half-inch iron, and it would be useless to attempt to hammer it into form.

301. Did the rivet-holes get blinded? No.

302. Did they require a considerable amount of drifting? No.

303. Did the ship alter in shape whilst the rivets were out? I do not think it possible for her to do so; she was well blocked.

304. Were there as many blocks under her then as there are now? There are more now.

305. Were you instructed to use the same sized rivets as those taken out? Yes.

JAMES SCOTT, *called in and examined.*

306. *By the Chairman.*—What position do you occupy; Member of the firm of Salisbury and Company.

307. Were alternate rivets taken out right round before the plates were fitted? Yes.

308. *By Mr. Kelly.*—Was there much drift in the rivet holes? No, they were very fair.

309. Did the vessel swag? She did not swag after the plates were marked, the holes were not drifted much. The drifts were used to keep the plates in position.

310. Would it not have been better to put in bolts to keep her from drooping? It would have been better to have had each shield-plate refitted before the whole of the rivets were removed.

311. Did not removing the rivets take away the stability of the vessel? No doubt it took away the stability to a certain extent.

312. *By the Chairman.*—Were you directed to put in the same sized rivets without making other holes? Yes.

313. Were you instructed to make larger holes and use larger rivets? No, I was instructed to use the same sized rivets.

314. Does that apply to the rivets in the hinges? Yes. The firm received instructions from Mr. Bell in regard to repairing the hinges, and those instructions were carried out.

315. *By Mr. Kelly.*—What is the thickness of the metal in the hinges? From  $1\frac{1}{4}$  inches at the throat to about  $\frac{7}{8}$  inch at the tail.

316. What rivets are they fastened on with? Five-eighths inch.

317. *By the Chairman.*—Do they in some instances go through two thicknesses of plates and the angle irons? Yes, some of them were  $3\frac{1}{2}$  inches in length.

318. *By Mr. Kelly.*—Do you think those rivets strong enough? It would have been better to have stronger rivets.

319. When the repairs were effected did you take any means to test if the ship was tight before putting in the cement? No; she went out of the dock without my instructions.

320. Did you intimate to Captain Capurn or any one else that you were finished with the work, and that the ship was fit to go out of the dock? No.

321. Was the water let into the dock without your instructions or knowledge? Yes, and before the men were properly finished. I did not know that the dock-gates were open until I saw the water coming in. The cement was at that time quite green.

322. When the ship was docked a second time did you trace the leaks? They were pretty well marked the first time; we could see tolerably well where the water was making. The second time we put the water in, and the whole of the cement was taken out. We not only saw the water making the second time where the new cement was, but also where the old cement was. The cement was cracked and the water was making through it badly.

323. When in dock the second time did you take any rivets out? Yes, we took out the rivets that were looking bad, and where we saw the water coming through.

324. Did you test the ship before taking her out of the dock the second time? She was leaking very little.

325. What means did you take to prevent the leakage? We caulked a little, and had the cement made finer, making it flow more.

326. Did she have to go into dock a third time? Yes; the port side leaked worst the first time, and the starboard the second time.

327. Did you take out any rivets the third time? No; the cement was taken out, and the hinges and rivets were caulked.

328. What did you use the third time to prevent leakage? We used a mixture of Portland cement and Stockholm tar.

329. Who ordered it? Captain Capurn said he was instructed to use it.

330. Were you aware that the ship was too slender or weakly constructed to allow certain repairs being carried out? I never thought she was weak.

331. *By the Chairman.*—Did you object to do any work because of the weakness or slender construction of the original work? I did not.

332. Mr. Bell writes a letter stating that the ship is slim built; was that letter written through any statement of yours? No.

332A. Was it on your responsibility that he made that remark? I do not think that from anything I said such construction could be made. The term "slender construction" was not used by me.

333. Did you say anything to convey the meaning that you feared that the slender construction of the vessel would prevent you undertaking any work? I only said, "The vessel in dock and the vessel in the water are two very different things." I certainly said that the vessel should be higher in the dock, and that we could not get the plates in as they should be for that reason.

334. *By Mr. Kelly.*—Were all your instructions from Mr. Bell carried out under his supervision? Yes; and Captain Capurn was instructed to see that the work was carried out. In Mr. Bell's absence Captain Capurn was to see that the work was done.

335. Were the winches and worm gear done by Mr. Bell's instructions? Yes, all the work was done by Mr. Bell's instructions. When the vessel was first brought to Launceston Mr. Bell said in the event of her being docked there would be no necessity for putting in stronger rivets in the hinges. Mr. McDonald asked if he would put in stronger rivets in the hinges, and I afterwards asked the same question, because I knew there was an impression that stronger rivets should be used, but Mr. Bell said No.

ROBERT RICHARD LIDDEL *called and examined.*

336. *By the Chairman.*—What certificates do you hold? Board of Trade Certificated Engineer.

337. Have you had much experience as an engineer? Yes; I have supervised the building of three vessels in Glasgow, being sent Home for that purpose, twice from Melbourne, and once from Launceston.

338. Have you been engineer on the *Agnew*? Yes, I was appointed to her in September last year.

339. Where was she then? At Formby.

340. Was she ashore? She was ashore at that time.

341. What position was she in when ashore? She shifted her position several times; ultimately she lay with about twenty or thirty feet overhanging.

342. Did you notice how much of her was overhanging? From about the stoke-hole plate to the stern.

343. Did you go round her? Yes.

344. Did you notice any leakage in the ship then or afterwards? No, none at all.

345. How long was she ashore? On September 2nd she was aground. There was a strong tide running and a strong gale blowing, and the anchors dragged. On September 3rd we tried to get her off by steaming and kedging, but she was not got off until the 5th.

346. Was there any leakage when she came off? No.

347. What was your opinion of the vessel? Speaking from my own personal experience, I think she was a faithfully and well-built vessel of her class.

348. By whom were you appointed to the ship? I was guarantee engineer for Mr. Kennedy, but was paid by the Government for three months.

349. While on board did you have any difficulty with the hinge gear for the doors? None, except the stones getting into the receptacle for the hinges. There was a small hole cut in the door to allow the hinges to play, and stones caught in the holes.

350. Did you ever make any complaint of the hinge gear? No; it was perfectly efficient, except where the stones got fast in the door.

351. Did any of the shackles carry away? Yes, one of the shackles bent out, but the shackle did not break. One of the adjusting screws came out, but I would attribute that to its being over-wound.

352. Do you think the chains or any of the gear were weak? No, they were perfectly strong and efficient.

353. Did you observe any weakness in the anchor winches? They were troublesome, but were perfectly able to lift the anchor when they had a fair load, but if she took a sheer and brought her up with the cable athwart the hawse there was difficulty in getting her away again.

354. Were the compressors kept clean and dry? Yes; and sand was put on them to make them hold.

355. Was there any excessive vibration or sign of weakness? The vibration is less than usually found in steamers. She is a very strong vessel.

356. Did the crane gear work well? It is a most excellent crane.

357. Did you have any difficulty with the engines? None whatever.

358. Had you much difficulty in cleaning the boiler? No difficulty at all.

359. Had you left the ship before the hinges broke? No; but I left her before she came to Launceston.

360. Had any repairs been made before you left? No.

361. Did you know anything about them? No; my opinion was never asked about any repairs or suggestion for alteration. Everything was done by Mr. Bell through the captain. I was never consulted in the matter.

362. Did you ever make any complaint of defects in the vessel to the authorities? None; I never had any cause to complain.

363. When in Glasgow did you notice the dredging vessels employed on the Clyde? Yes; I gave them considerable attention. Several dredging vessels were being built on the Clyde when I was there, and I took notice of what was going on.

364. In the dredging operations how was the *Agnew* worked in depositing the spoil? We steamed right out to sea, the engines were stopped, and the doors let go; then we would steam ahead to wash the spoil out of the hoppers.

365. Did the stones always collect in the little pocket made for the hinge? Yes.

366. Speaking as a practical man, if the vessel had any instability or faultiness, would she have shown signs of weakness when she was ashore on 2nd September? Certainly she would; rivets would have sprung, and weakness would have exhibited itself if there was any weakness or anything wrong in the ship.

367. How much spoil was in the hoppers when the vessel was ashore? The hoppers were as full as they could be. I should think about ninety tons, not less.