

SESSION



1910-1911

President: SIR DAVID GILL, K.C.B., F.R.S., etc.

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VOL. XXII.

PAPER OF TRANSACTIONS NO. CLXXI

## Notes on Salving a Gold Dredge,

BY MR. F. G. BUTT (MEMBER).

READ

Monday, December 5, 1910.

CHAIRMAN: Mr. JOHN McLAREN (Member of Council).

ALTHOUGH the above subject is not connected with marine engineering apart from the fact that two of us employed on the job were marine engineers, it may interest the members of the Institute, as a good many marine engineers are now engaged in gold dredging. Probably most of the members are familiar with the construction of a gold dredge; the one under review is known as a screen-dredge, with buckets of five cubic feet capacity, the hull built up of seven pontoons, the leading dimensions being: length, 74 ft.; beam, 32 ft. 6 in.; depth, 6 ft.; draft, 5 ft.; a long well forward for the bucket ladder to work in and a shorter one aft for the elevator tumbler.

In the beginning of August 1909 we were working in a river called the Fura, a tributary of the Ancona, which runs into the sea a short distance from Axim, Gold Coast Colony. The camp was about forty miles from Axim, the nearest place of importance being Prested, the mine known as Prested Block A being situated there.

There were three white men on the dredge, one being Mr. McKenzie, the dredge master, Mr. Gwynne, and myself, being employed in various capacities and generally finding plenty to

do, as the West African native, in spite of what some people may say, is certainly lacking in intelligence, with the exception of the Krooboys and natives of Accroi, where the Roman Catholic fathers have a very good school. The dredge was left on Saturday night at 10 p.m., this being the usual time to stop, resuming dredging at 10 p.m. on Sunday, all repairs, cleaning tubes, etc., being done on that day. On the starboard side of the river was a very high bank, and on the port side a flat with a slope to the riverside, the height at the termination being about 12 to 14 ft.

The dredge when left at the end of the week appeared to be in a perfectly safe position, about 14 ft. from the port bank; all pontoons being pumped out and fires drawn, two watchmen being left on board. At 4 o'clock on Sunday morning we got an unpleasant surprise, as one of the watchmen came up and told us the dredge was sinking. By the time we got down, which took us about ten minutes, we found the dredge about 4 ft. under water on the starboard side, all the pontoons on that side being practically full, the centre pontoon nearly. The port side was fairly dry.

Each pontoon, with the exception of No. 5, which had a hatch for going down to the centre pump, had a circular man-hole with a lid fitted and secured by bolts. As these were heavy doors with rubber joints, they were not left screwed down, more particularly as the two pontoons, Nos. 1 and 6, were rather leaky and had to be pumped out every day. This was principally due to under-water exhausts being fitted to both winches, a detail which was altered after. As far as we could see, all the doors were in position, and they had certainly been all left in position on the previous night.

The first thing to be done was to lower the ladder which had been lifted the previous night with the bottom tumbler just clear of the water, so that the ladder could be cleaned on Sunday. This took some time to do, as the ladder was resting on a baulk of hard native wood 12 in.  $\times$  12 in. As we had no steam and no chance of raising steam, we had to get the ladder clear the best way we could. After some considerable trouble we managed it by jacking the ladder up and cutting away one end of the baulk. We had a good length of 2 in. flexible wire, and a pair of treble purchase blocks. A strop was passed round the top tumbler gantry as high as possible, one set of blocks on to this, and the other pair on the bank fast to a

stout tree. And then all available hands were put on, and the wire set up as tight as possible. Another wire was passed round the elevator ladder and set up with a pair of 5 ton chain blocks, and a set of  $2\frac{1}{2}$  in. rope treble purchase blocks made fast to the derrick forward which is shown on the photograph. When we had got all these up we felt fairly sure that the dredge would not capsize, as by this time we were on the bottom on the starboard side.

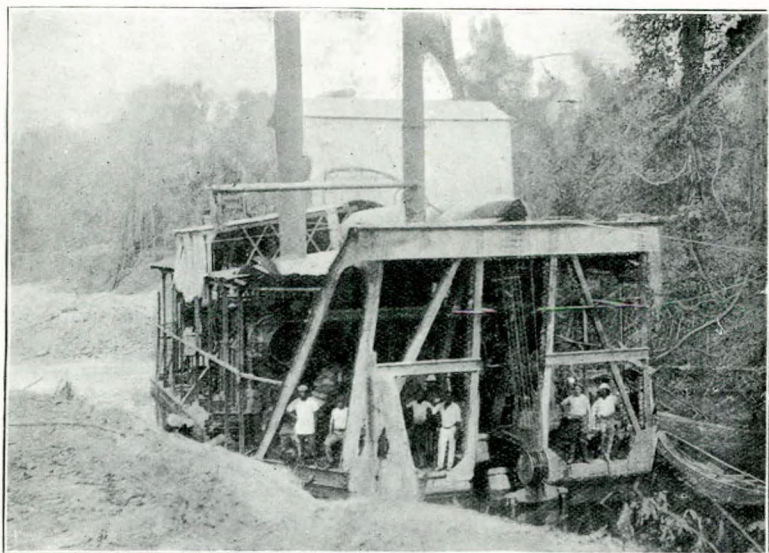


FIG. 1.

Whilst this was being done Nos. 1, 2, 3 and 7 pontoons were full and 5 and 6 were filling, we tried baling and two hand pumps, but could not prevent the water gaining, so much water was passing through holes in the decks, seams and open rivet holes; these we plugged as much as possible, but it was almost impossible to locate them. The dynamo was removed, all belting and all heavy gear, including a big safe, were shifted over to port. We then started to look round to see what we had in the way of pumps. We had 5 in.  $\times$  5 in.  $\times$  6 in. Worthington in good order, an old Worthington mine pump high lift  $2\frac{1}{2}$  in. suction, two small semi-rotaries  $\frac{1}{2}$  in. and  $\frac{3}{4}$  in. respectively, and an ordinary hand pump. Later on we sent

up to the Prested mine, Block A, and got a pump from them, a Sydney force pump  $1\frac{1}{4}$  in. suction, which was not at all a success as it got choked so easily. We were told by some of the boys that there was a portable boiler at an old abandoned mine, so I went off to have a look at it. After about a two hours' journey in a canoe and a good hour's tramp in the bush I found it, a horizontal sectional tubular boiler. All the fittings were gone, so we came to the conclusion it was not worth while taking it. The next day, however, the natives, including the three native winchmen and the blacksmith, who under the previous management had had things very much their own way, were inclined



FIG. 2.

to be mutinous. They were sent off to take the boiler to pieces and bring it down. This, however, they did not succeed in doing; I believe they did not know how to get the furnace out.

We decided on further consideration to fix up the boiler on the dredge, so that it would be used. The boiler was of a type very common in the United States, consisting of a cylindrical shell with tubes running the whole length. This is slung on a girder frame, and a casing built up to the centre line of the

boiler, containing the combustion chamber at the back, the inside and bottom being lined with fire bricks. A stout wooden box was made of 1 in. native cedar with three sides and a bottom. This was made as watertight as possible and the corners stiffened. On the outside corners we put sheet iron angles. This was taken down on board and tried on to the furnace front, that is the open side. We then took a wire, made one end fast to a stanchion at the back end of the boiler, and led the wire round the boiler casing and the coffer dam (as I will call it), and drew the end up taut with a pair of chains. On the sides of the casing we also fitted some  $\frac{3}{4}$  in.  $\times$  9 in. boarding that belonged to a tent floor. This left a space of about 9 in. between the wood and casing, which we filled up with clay rammed well down. On one side of this casing was a small door for cleaning out the combustion chamber. This was made watertight, and all round the furnace front was caulked and battens fastened down on the top.

The two pumps,  $\frac{3}{4}$  in. semi-rotary and force pump, were fixed one on each side of the boiler, and with the suctions leading into the box, we started pumping; but the water came in as fast as we got it out, but not so fast that we could not find where the worst leaks were. So it was decided to cut away the beading and also to remove the ashpit doors. This took some little time. The beading was easy enough, but the doors being so close to the deck and the water also being nearly 5 ft. deep at the time, we had all our work cut out as the nuts had to be cut. However we got them off, and then we had a flat surface to fit to. At first we tried puddling with clay inside and out, but this did not work; so having by this time got some cement, we mixed up concrete and had long bags made of thin canvas. These were filled up, some with cement, others with concrete, and laid all along the bottom, built up as high as possible; some old iron and fire brick were laid on top, and then stiff concrete above that. All round the furnace front was well caulked and wedged, and two pieces of wood fixed so as to allow filling with concrete. If we had had more cement we could have made the whole thing watertight, but as it was we had no difficulty in keeping the water down once the cement set. Whilst this was being done we were also getting the pumps in order, the bigger of the two Worthingtons was fitted to draw from the river direct, the suction pipe was uncoupled, and the suction arranged to take from No. 2 pontoon through

the manhole. To avoid awkward bends in suction the pump was tilted up. We then had to arrange some means of getting down into the pontoon, and also to prevent the water getting into the pontoon through the manhole. We at first thought of building up from the deck, but after looking round we found some empty oil barrels, and came to the conclusion that if one of these would suit the manhole we could fit an extension and shore the whole thing down. As luck would have it, we got one that just fitted into the hole. A square top was fitted on, making it stand up 5 ft. from the deck over all. We only had to caulk this in one or two places, and it kept perfectly water-tight. The suction was then led from the Worthington, and at the first start was to go down about 7 ft. from the level of the water, the end being left screwed so that we could couple up extra lengths as the water went down. The mine pump had also been taken in hand, but it did not look very promising. One of the native winchmen who called himself an engineer assured us that he had overhauled it and put it in order. As we knew what that meant it was taken adrift and put in working order, with the exception of the suction and delivery valves. We managed to get it to go, and it worked fairly well. Of course it did not lift much water, being meant for a high lift. This pump we fitted up between the dynamo and pump engine, leading the suction down into the pump room No. 5 pontoon, and a steam connexion made off the dynamo steam pipe.

All the doors were taken off on the starboard side, the joints cleaned, and doors replaced. As it was found impossible to fasten them down with the hinge bolts, they were shored down instead. By this time the river was down so that the water was a little above the firebars. The cement was now set, so we put on the two hand pumps. Naturally we found a good few leaks, the worst being where the blow-down pipe passed through the deck. This we fixed up with wood wedges and cement, and also stopped some few places in the coffer dam.

We decided to get up steam the next day. The water was fairly low, so that we had not much to come and go on. As soon as we got down we started to empty the furnace. It was tight, with the exception of one or two places, and as we had plenty of boys we managed to keep the water well down, the fire laid and set away. The week before the sinking we had fitted an injector; without it we should have had

some trouble, as the feed pump was of very little use and the other pump took from the feed tank. Of course we could have rigged up another connexion, but this would have meant running the main engine. By midday we had sufficient steam to make a start, and set both pumps going. I may say that the bigger pump of the two only stopped once in the whole time, and that was through a piece of wood under one of the valves. We fitted up a ladder so that we could get down into No. 2 pontoon, and when the water was about 5 ft. deep in the pontoon an extra length was added on; as it got lower more lengths were fitted, and a bend so that the suction would be well over on the starboard side. A strainer was also fitted. As soon as possible we went down and caulked all the leaks we could find in the deck, driving in thin wood wedges and plugs. We also cut a hole as low down as possible in the bulkhead between No. 2 and No. 7 pontoons; there was a manhole, but as it was 4 ft. up from the pontoon floor it only partially drained the water. A hole was also cut in the after side of the coffer dam between No. 1 and No. 2. When the water was low enough a hole was cut in this bulkhead, to let a man pass through. As soon as this was done and we could get into the compartment, another manhole was cut into No. 1 pontoon; this was the worst job of the lot. As the space was confined and the atmosphere rather too thick to be pleasant, a smaller hole about 2 in. diameter was also cut as soon as we could get at the bulkhead to let some of the water out, but not sufficient to stop cutting the hole. Another smaller hole had been cut in the after compartment between 2 and 3. No. 6 pontoon was also being baled, as we only had the small pump on that side. At midday on Friday the dredge began to show signs of righting, so a good strain was put on all the tackle leading on shore.

By this time all the starboard pontoons were practically empty, except No. 6. So the ejector was put on, and when this was empty the two after pontoons, Nos. 3 and 4, were drained by the same means, and at 4.30 p.m. we were all afloat again. As there was nothing damaged, it did not take us long to get things into working order again, and on the following Wednesday we were at work again; that is within sixteen days of sinking, twelve days of which were spent in raising the dredge, no work being done at night.

Apart from the boys' wages, which would have been paid

in any case, the extra expenses were about £25, the only material bought being the pump from Prested and a barrel of cement, the remainder being spent in giving the boys an extra day's pay and on five cases of gin distributed amongst them. The general local opinion was that the dredge would not be salvaged, and surprise was expressed when it was known we were at work again. Subsequently we heard that one engineer had thought of putting in a tender of about £1,000 to raise the dredge.

As to the cause of the sinking, the conclusion we reached was that the port bank being cut away by dredging, a part fell away, and the dredge, laying in shallow water, about 9 to 10 ft., heeled over, bringing the starboard side of the leaky deck under water. The two watchmen were probably asleep, and when they awoke to the situation were too frightened to venture through the bush in the dark, so the pontoons gradually filled up. None of the ejector cocks were found open, but to be on the safe side the ejector discharge was altered to discharge above water. So also the two winch exhausts. I shall be pleased to answer any questions on the subject, and hope that this contribution may be of interest to my fellow members.





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INSTITUTE OF MARINE ENGINEERS  
INCORPORATED

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President: SIR DAVID GILL, K.C.B., F.R.S., etc.

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VOL. XXII.

DISCUSSION ON "ELECTRO-MAGNETIC  
TRANSMISSION FOR MARINE  
PROPULSION"

By MR. JULES LECOCHÉ (MEMBER).

*On Monday, November 7th, 1910.*

CHAIRMAN: MR. JOHN McLAREN (MEMBER OF COUNCIL).

*And Monday, January 9th, 1911.*

CHAIRMAN: MR. WILLIAM McLAREN (MEMBER).

PAPER OF TRANSACTIONS NO. CLXXII.

"THE INTERNAL COMBUSTION  
ENGINE"

By MR. WILLIAM P. DURTNALL (MEMBER).

PART I. *read Saturday, September 17th, 1910, at the Naval and  
Engineering Exhibition, Olympia, W.*

CHAIRMAN: SIR DAVID GILL, K.C.B. (PRESIDENT).

PART II. *read Monday, November 28th, 1910.*

ADJOURNED DISCUSSION

*Monday, January 9th, 1911.*

CHAIRMAN: MR. WILLIAM McLAREN (MEMBER).

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SESSION



1910-1911

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