The gold dredge of the present day is practically the dredge we see every day at work in our harbours and rivers, deepening channels and berths for shipping, with gold saving appliances added.

The spoil of the material lifted in the case of the harbour dredge is discharged into a hopper forming part of the structure of the dredge herself, in which case the dredge is fitted with propellers like an ordinary steamship, and after filling her hopper, slips her moorings, and steams out to sea, where the doors fitted to the bottom of the hopper are dropped open, and the spoil discharged into deep water; the doors are then closed by means of powerful winches, generally fitted with "Napier differential brakes," which act automatically, and the dredge then steams back to her working ground, picks up her moorings, and repeats the process: or the dredge may not be of the "hopper" type; in this instance, the spoil is discharged into "hopper" barges, self propelled, or towed, and deposited where desired in a similar manner to that above described; the dredge herself remains on her working site, and is kept supplied with barges for removing her spoil. Little or no dredging time is lost by working on the hopper barge system.

There is no reason, nor would it cause serious delay, for dredges working at the deepening of navigable rivers, or other places found to be auriferous, from passing their spoil over gold saving appliances before discharging it into the hoppers, and the working expenses defrayed or partially defrayed, if not a profit made by the gold recovered.

The gold dredge lifts the spoil and mixes it with a sufficient quantity of water to efficiently wash it, passes it in this condition over gold saving appliances and discharges it over the stern as treated material, namely, "tailings." Briefly, the gold dredge simply lifts the material at the forward end, washes it and discharges it astern; she does not make the water in the river, if she is working in a river, any deeper, she only cuts out an excavation to suit her own requirements, which she carries along with her as she goes. I mention this latter point because many are of the opinion that dredging a river implies deepening it, even dredging it for gold; but anyone who has seen any of our rivers which have been operated upon by a gold dredge, knows, it is not so.

I am not in this paper going into details of what is or what is not suitable ground for "bucket dredging." I shall start by placing gold dredges into two classes, namely:—"River" and "Paddock" dredges, disregarding any elevating gear they may or may not have, and give the following definitions of the two classes:—

A "River" dredge is a dredge designed to work with some depth of water underneath her, and is not called upon to cut her own flotation; she is, therefore, not provided with a projecting ladder to eat into banks, or with sharpened bows to work into corners, but is, as a rule, built square across the bows, especially if working in a current, such as runs in the Molyneux, in New Zealand; for the practice there has proved that a square nosed dredge remains steadier in the current; and does not "yaw" about so much as a sharp-nosed one. Of course they offer a much greater resistance to the current and require very heavy lines to hold them, but as a dredge is not built for speed like a torpedo boat resistance is not taken into consideration to any extent, beyond the usual practice of making the floor of the pontoon take an upward curve at the bow.

In Australia, at present, we have not such a thing as a dredge of the "River" class, all the dredges being "Paddock," and it is with this latter class that I propose to deal.

A "Paddock" dredge generally commences her existence by being launched into a hole containing water sufficient to float her. This hole may be a water hole in the bed of a river or elsewhere, or may be an excavation specially prepared for her reception anywhere; and from this hole or "paddock," as it is called in dredging parlance, cuts her own way over the claim.

Assuming that the ground has been inspected by a competent engineer, and in his opinion the conditions are suitable for dredging, it is of the utmost importance that the dredge should also be suitable for the ground, that is, be capable of bottoming at any part, dealing with timber or other obstructions that may present themselves, and efficiently treat and recover as much as possible of the precious metal contained in the material lifted. She must also be so constructed that her draught of water will not prevent her floating with ease over the shallowest portions of the claim without having to lift "bottom" to do so. A "Paddock" dredge should draw as little water as possible, and the draft should not exceed 5 ft. even in large dredges; a fair average draft is about 3½ ft. to 4 ft. with a day's (twenty-four hours) fuel on board and dredge working.

The first point for the designer to decide is the dredging depth, this to a great extent fixes the length of the hull, and is measured from the water line of the "dredge" to the cutting edge of the bucket when the ladder is lying at an angle of 45° to the water line. Some dredging engineers measure what they term the "maximum dredging depth" at an angle of 55°; this you will see makes a considerable difference, and it might be as well to ask the angle when buying, or when having a dredge designed, to specify the angle. Up to the present there is no fixed standard angle.

The next point is the material to be used in the construction of the hull. In Australia timber hulls are used solely, also timber superstructures for carrying the machinery. In some dredges, however, steel gantries are used, built of angle bars and plates, and make a very light and neat structure; these will be be dealt with in detail later on. The timber used for the framework is Colonial hardwood, generally of kinds procurable in the district in which the dredge is built, and she is planked and decked with similar timber. In a number of instances oregon, and in some cases kauri, have been used for planking and decking. There are places in Australia where, owing to white ants and other destructive insects, it would not be advisable to use timber in the construction at all, and it would be necessary to adopt iron or steel in its place. For several reasons steel is the material to be used in South Africa for hull construction. In New Zeland, most of the old type of dredges were built of steel or iron, but out of some two hundred built within the last five years, there has not been, as far as I can ascertain, a single steel hull built for use there. The material used for hulls in New Zealand now being Australian hardwood (blue gum chiefly) for the framework and super-structure, kauri planking and decking. Kauri is sometimes used in the super-structure. Red pine and other local timbers were used in "boom time" and on cheap work, but they are totally unsuitable. I shall not touch upon steel hull construction, but confine my attention to timber hulls only.

The main point in a hull is to make it as stiff as possible to resist the concussion and vibration it has to withstand. Few people realise the intensely severe nature of the work dredges on our rivers and flats have to perform. Immense hardwood logs sixty or seventy feet long (with perhaps a mean diameter of four feet), which have been buried in the wash for years and covered up with gravel and *debris* of all kinds by successive floods, have to be lifted and carried clear of the dredge. Huge boulders have to be negotiated to permit the dredge to pass. Floods at times rising thirty or forty feet rush past the dredge at a perilous speed, carrying with them islands of *debris*; and sometimes the dredge next above you joins in with the flood and pays you a visit. The snapping of a line, a blow from a log of floating timber and your dredge is doomed. And, lastly, what we are now suffering from—drought with all its concomitant troubles.

If the ordinary mining speculator who does so much general all-