practically, there is very little difference, but it is due to the fact that the cast steel piece can be worn very thin before breaking. Sometimes centrifugal pumps for dredging purposes are lined throughout with renewable steel plates. This is an advantage in some cases, but, as a rule, the delay and expense of renewing the linings amounts to more than the occasional renewal of an entire pump shell as the latter can be put in in less time than linings. Also the bolts or fastenings of the linings tend to produce abrasion and wear at that particular point. Wherever there is a crack or joint in the interior of the pump, it is liable to produce an eddy or change of direction in the flow, and a stream of gritty material acting in this way will soon cut out the fastenings and joints of the linings. A great deal can also be done to reduce the interior wear of the pump by careful design. It is better to allow ample clearance for the flow at all points, especially the periphery of the pump, and this can be so proportioned that the abrasion is comparatively slight and evenly distributed. If experience shows that there is undue wear at one point, it means that there is a stream of gritty material flowing or impinging against the surfaces at that point and at a high velocity. This can be remedied by removing those surfaces further away, thus giving the stream more room at that point. Many pump designers are of opinion that the throat or cut-off of the interior of the pump should be as close as possible to the periphery of the pump runner, in order to prevent any flow past this point. Careful experiments have shown that this makes very little difference, and that for dredging pumps especially it is better to allow great clearance at this point, otherwise it will cause great wear.

Hydraulic dredges may be divided into four leading types: First. The sea-going hopper type; second, the lateral feeding or ship-channel type, with floating discharge pipe; third, the forward feeding or Mississippi type, with floating discharge pipe; fourth, the radial feeding with spud anchorage and floating discharge pipe.

The dredge "King Edward VII.," which forms the subject of this paper, belongs to the fourth class,—that is to say, it is anchored by spuds and has a radial feed, the cutter describing an arc of a circle about the spud as a centre, and the material is principally deposited on shore or to a distance through the floating discharge pipe.

It will aid in understanding the construction of the dredge and the reasons for adopting this particular construction, if we first