Rivets are snap-headed wherever possible, but unfortunately their use is very restricted on account of the necessity of having a smooth surface where the handle passes through the friction trunnion box.

Several designs of steel bucket arms have been tried, but as the rivetting gave continual trouble they have been discarded in favour of those of combined wood and steel construction. The latter are comparatively easy to repair and give good satisfaction generally.

The total weight of a handle as described above is about 26,600 lbs. There is no doubt whatever that a solid dipper arm would prove much more durable than one split for the greater portion of its length, but its use is hardly possible with a single hoisting wire.

The standard bucket is of seven cubic yards capacity, and is built with a curved lip and front. There are also a few straight lipped dippers of five and a quarter yards capacity, but though specially designed for dredging very hard material they have proved not at all superior to the larger bucket and are, therefore, used only for work in a strong current where swinging is difficult with the dipper of large size, or when filling boxes which the seven yard bucket would overload. The body or shell of both sizes of dippers is of steel plate, with butt joints and single cover strap. The lip and lower band are of cast steel and are rivetted to the shell, rivetting being countersunk on the inside to insure a smooth surface. The door is composed of a single piece of inch and a quarter steel plate rivetted to a cast steel hinge piece. The latching device is on the toggle joint principle, and, considering the extremely severe usage it is subjected to, gives good satisfaction. Bails are a single steel casting, secured to the hoisting wire socket a cast steel shackle. The shackle takes up considerable room, but its use is necessary to prevent injury to the wire by sharp bending at the point where it enters the socket.

Each dipper carries four teeth which are of cast steel with chisel points. The teeth are made hook shaped, the hook fitting over the lip at places where projecting lugs are provided to prevent side play. The lower end of each tooth is secured to the shell by four bolts. With this arrangement of fastening, a change of teeth can be effected in about half an hour.

Several attempts have been made to design a dipper tooth that will last a reasonable length of time in hard digging. Detachable points of hardened steel were experimented with but proved a failure through lack of strength either in the point itself, or in the body of the tooth which had to be cut away to receive it.

Silver tips were V welded into the teeth and given a trial in rock digging. It was found that when the points were tempered