I^1, and a coupling, 12, consisting of a sleeve into which the ends of sections of shaft *f* enter and are secured by pins, 13.

I wish it to be understood that I do not confine myself to the exact details hereinbefore set forth, as these may be modified in several ways without departing from the spirit of my invention.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. A dredge constructed with a well through which guide-rods may pass to support a bucket, substantially as and for the purposes set forth herein.
2. A dredge constructed with a well through which guide-rods may pass to support a bucket revolved by a chain and bevel-wheels, substantially as and for the purposes set forth herein.
3. A dredge constructed with a well through which guide-rods may pass to support a bucket revolved by a vertical shaft and spur-wheels, substantially as and for the purposes set forth herein.
4. A dredge-bucket having falling flaps and a bottom formed as shown on Figures 1, 3, and 4, substantially as and for the purposes set forth herein.
5. A dredge-bucket having falling flaps and a screwed shaft and nut, substantially as and for the purposes set forth herein.
6. In combination, a nut made in two halves, springs for separating the same, and a strap acting upon wedge-shaped faces, substantially as and for the purposes set forth herein.
7. In combination, a nut made in two halves, springs for separating same, a strap acting upon wedge-shaped faces and held in position by an adjustable eye-bolt and a pin, substantially as and for the purposes set forth herein.
8. A dredge constructed, arranged, and operating substantially as and for the purposes set forth herein and illustrated on the accompanying drawings.

Dated this 22nd day of October, 1896.

W. E. Hughes,
Agent for the Applicant.

An Improved Machine for Concentrating and Amalgamating the Precious Metals.

I, John Robinson, of Coromandel, Auckland, in the Colony of New Zealand, mine-manager, do hereby declare the nature of my invention for "An Improved Machine for Concentrating and Amalgamating the Precious Metals," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

The object of my invention is to provide an apparatus by which the operations of amalgamating and concentrating the precious metals after the ore has been crushed may be performed with greater facility and with less expenditure of power, and at the same time that the machinery is much more simple and more easily maintained and repaired.

In carrying my invention into effect I make use of a circular pan, having an inner and outer channel constructed at the periphery of the said pan and concentric with one another, and I divide this circular pan into two halves or semicircles, between which semicircles I fix a powerful arm, and to which I give a reciprocating motion by any suitable power, the pan itself having a central axis upon which it oscillates. The reciprocal motion I prefer to communicate by means of a shaft revolving in suitable bearings, upon which shaft is formed a zigzag groove, into which zigzag the end of the oscillating lever, or a roller attached to the same, is fitted, and makes one oscillation to the revolution of each zigzag.

Each half of the inner circle is fed with material from the battery or crushing-mill. Openings connect the inner and outer semicircles or channels, so that the material flows from the inner to the outer semicircle by the centrifugal force produced by the oscillating motion. In each of the outer semicircles are two orifices fitted with regulating valves, one for the discharge of the water and tailings, and one for the pyrites.

In order that my invention may be more easily understood I have illustrated the same upon the accompanying drawings, whereon similar letters and figures of reference indicate like parts: Figure 1 is a plan of my apparatus. Figure 2 is an elevation of the same. Figure 3 is an elevation of the discharge ports in the outer circle. Figure 4 is an elevation of the ports in the inner circle.

Referring to the views, A is the outer channel or circle and B the inner channel or circle, which channels are divided at C into two halves or semicircles, and between these semicircles I fix a powerful arm D.

The pan has an axis E, upon which it oscillates, and reciprocal motion is imparted to arm D and the pan by any simple motive-power, but preferably by a cam F, having a zigzag groove F^1, and mounted upon driving shaft G, revolving in suitable bearings G^1. A roller D^1 is attached to arm D to reduce friction and give ease of movement.

Material from the battery or crushing-mill is fed through chutes J into each half of the inner circle B, into which a quantity of quicksilver has been placed. Openings or ports K connect the inner and outer semicircles or channels through which the material flows by the centrifugal force produced by the oscillating motion of the pan, or by the inflow of fresh material. In each of the outer circles are two openings or ports: the one, M, forming an overflow for the tailings, and N a discharge into the concentrating-tank. These openings may be provided with valves to regulate the flow.

It will be seen that material may be brought from a battery down one of chutes J and material from another battery down the other chute, and thus the returns from such batteries may be kept separate; that, as the pan is made in two halves, it is portable; and that the outer circle or channel will save heavy minerals and may be adjusted to concentrate as required.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—