

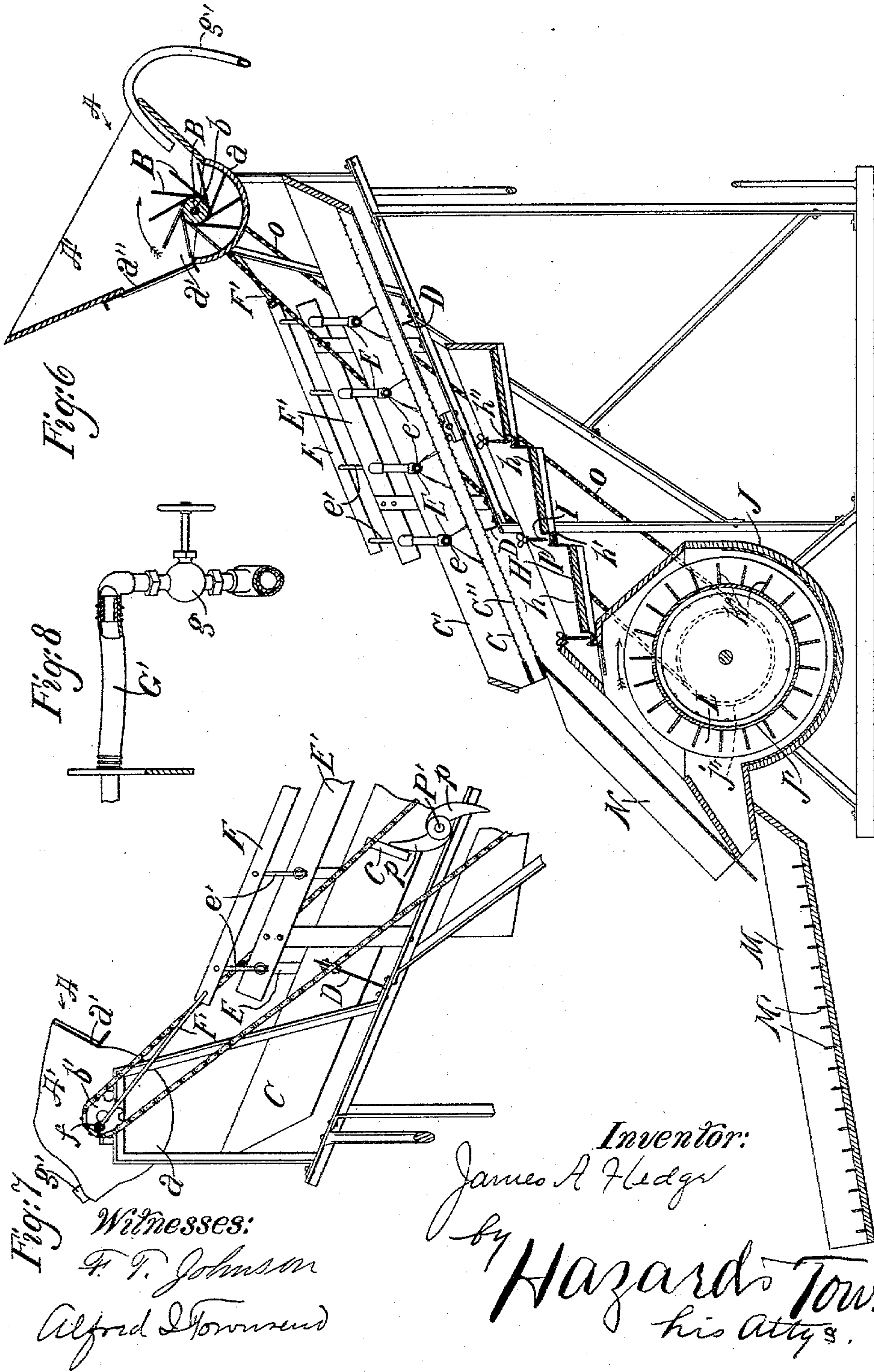
(No Model.)

2 Sheets—Sheet 2.

J. A. HEDGE.
AMALGAMATOR.

No. 596,968.

Patented Jan. 4, 1898.



UNITED STATES PATENT OFFICE.

JAMES A. HEDGE, OF LOS ANGELES, CALIFORNIA.

AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 596,968, dated January 4, 1898.

Application filed August 10, 1896. Serial No. 602,344. (No model.)

To all whom it may concern:

Be it known that I, JAMES A. HEDGE, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Amalgamators, of which the following is a specification.

My invention relates to certain improvements upon an amalgamating-machine invented by me and described and claimed in an application for Letters Patent of the United States, filed May 8, 1896, Serial No. 590,739.

My invention relates particularly to improvements in the construction of the cylinder of such machine whereby the operation of cleaning the amalgam from the cylinder is greatly facilitated.

My invention also relates to an improved arrangement of the amalgamating-plate, over which the material passes before it reaches the cylinder, whereby I am enabled to force the pulp under pressure across the surface of a series of quicksilver-baths.

My invention also relates to means whereby I adapt the machine for use as a placer-machine.

My invention also relates to means whereby the placer material is first thoroughly scoured, is then delivered upon a screen and the fine material washed through the screen and with the water passed to the amalgamator, while the coarser material, comparatively dry, passes above the amalgamator and to a set of riffles, which receive the discharge from the amalgamator, so that the same water serves to wash the fine material from the gravel and to liquefy the fine material, so that it readily passes through the amalgamator, and after being discharged from the amalgamator operates to sluice the gravel over the riffles. By this arrangement great economy of water is secured, which is essential in placer-mining in Southern California and many other dry countries.

My invention comprises the various features of construction and combinations of parts, which are hereinafter fully set forth and claimed.

The accompanying drawings illustrate my invention.

Figure 1 is a perspective front elevation of my improved amalgamator adapted for placer-

mining. Fig. 2 is a fragmental sectional view illustrating my improved amalgamating-plate arranged to cause the pulp to pass over quicksilver-baths. Fig. 3 is a fragmental sectional view illustrating my improved scourer and mixer. Fig. 4 is a perspective view showing my improved arrangement of cylinder whereby the amalgamating-wings can be quickly and conveniently removed from the cylinder, so that cleaning up can be performed without difficulty. In this view the parts are shown detached and slightly separated from each other. Fig. 5 is a fragmental detail of the balanced shaking-screens and the cam-shaft for operating the same. Fig. 6 is a vertical longitudinal section of the machine. Fig. 7 is a fragmental side elevation looking from that side of the machine which is at the rear in Fig. 6. Fig. 8 is a fragmental view, partly in section, illustrating the flexible connection between the water-supply pipe and the rocking spray-pipes.

A represents my improved mixer and scourer, which comprises a case or hopper A', having its bottom *a* made semicylindrical. (See Fig. 3.) In this hopper is arranged a mixing-cylinder B, which is provided with series of tangential projecting flexible wings B', which are arranged to fit closely within the semicylindrical portion of the case. This cylinder is arranged to revolve in a direction opposite the direction in which the wings project. In Fig. 3 the arrow indicates the direction of rotation. In the front side of the hopper is provided a discharge-opening *a'*, which is controlled by means of an adjustable gate *a''*, which may be slipped up and down to regulate the discharge from the opening, as required. Below the mixer is arranged an inclined screen C, which is supported by means of a frame C', arranged upon upwardly-projecting spring-supports D, so that the screen is practically balanced and is free to swing back and forth.

As shown in the drawings, I have provided two screens C and C'', arranged one above the other, so as to more readily separate the coarse material from the fine. Above the screen C, I arrange a series of jet or spray pipes E, which are provided in their under faces with suitable jet-apertures *e*, and are supported and journaled at each end in a

suitable frame E'. The jet-pipes, as shown, are practically U-shaped and have the tops of their side members projecting outward and passed through the members of the frame E'.

5 To one end of each jet-pipe I secure a lever e' , which projects upward above the frame. A suitable connecting-bar F is arranged connecting the levers with each other, and by means of a pitman-rod F' the connecting-bar
10 is attached to a crank f , which is secured to the shaft b of the mixer-cylinder.

G represents a suitable supply-pipe which is connected with a source of water-supply. (Not shown.) Each jet-pipe is connected
15 with the source of water-supply by means of a length of flexible hose G' and is controlled by means of an independent valve g , so that the jet-pipes may be rocked or partially rotated without affecting the supply-pipe. By
20 means of the independent valves the supply of water to each jet-pipe can be regulated to suit the requirements—that is to say, a strong spray may be discharged through the upper jet-pipes and a light spray discharged from
25 one or all the rest, or vice versa.

Below the screens C and C', I arrange an inclined amalgamating-plate H, which is preferably made of one integral plate bent to form series of steps h , and between each step
30 I form a trough h' , arranged to receive a bath of quicksilver h'' . In order to cause the material to be forced under pressure into contact with each quicksilver-bath, I provide an adjustable gate I, extending longitudinally
35 along each trough and provide at each end an upwardly-projecting bolt I', which passes through a screw-eye i' , secured to the side wall of the sluice-box. Upon each bolt is
40 screwed a butterfly-nut i , so that by screwing the nut upon the bolt the gate can be raised or lowered to carry its bottom edge nearer to or farther from the quicksilver-bath.

In practical operation each gate is lowered until the water and pulp will stand to a depth
45 of two and one-half or three inches above the surface of the quicksilver-bath, so that the material will pass under pressure over such bath and be forced into intimate contact therewith, thus to amalgamate most of the
50 free gold before it reaches the amalgamating-chamber J. In the amalgamating-chamber I arrange an amalgamating-cylinder J', which is made upon the same principle as that shown in my former application. By my former
55 construction, however, considerable difficulty was experienced in cleaning up on account of the means which I employed for holding the wings rigidly in position at the central portion of the cylinder. By my present in-
60 vention I have entirely obviated this difficulty and have so arranged the device that when the wings are removed from the cylinder there are no projections left upon the cylinder, so that no difficulty is experienced
65 in cleaning the amalgam from the surface thereof.

By my present invention I form the outer

heads j of cast metal, each provided with a projecting flange similar to that shown in my former application, excepting that in these
70 heads the slots j' , which receive the ends of the strips K, are not cut through to the outer faces of the flanges, but form pockets into which the reduced ends K' of the strips closely fit. These amalgamating-strips are flexible,
75 and in order to hold them rigidly in position at the mid-length of the cylinder and yet avoid leaving any projections upon the cylinder when the wings are removed for the purpose of cleaning up I provide an annular
80 ring L, which is provided in its inner face with a series of radial slots L', adapted to receive and chamber the wings. By this means when one head of the cylinder is removed, as shown in Fig. 4, the ring L can be slipped
85 endwise off of the cylinder, possibly carrying with it a portion of the wings K. When the ring is removed from the cylinder, the wings can be removed from the ring and from the cylinder, leaving the outer surface of the
90 cylinder perfectly smooth and ready to be cleaned. By making the ring L to fit tightly upon the cylinder when it is removed therefrom it will scrape the greater portion of the amalgam from one end of the cylinder, thus
95 to facilitate the cleaning up.

Below the amalgamating-chamber J, I arrange a sluice-box M, which is provided with series of steel riffles M'. These riffles are
100 made of thin strap-steel set edgewise, and by reason of the upper surface being very narrow coarse gold in rolling across such surface cannot gain sufficient momentum to carry it
105 across the space intervening between one riffle and the next, as is the case where the riffles are made of wood and have a broad upper surface. A suitable chute N is arranged to conduct the coarse material dis-
110 charged from the screens C and C' down to the riffles M'.

The amalgamating-cylinder J' is provided with a band-wheel J'' and also with a crank J''', whereby the cylinder may be rotated. Upon the other end of the shaft of the cylinder is secured a power-wheel J'', (shown in
115 dotted lines in Fig. 6,) and upon the end of the shaft b of the mixer-cylinder is secured a power-wheel b' . Suitable means, such as the sprocket-chain O, connects the power-wheel j'' with the power-wheel b' , so that the rota-
120 tion of the cylinder rotates the mixer. On the other end of the mixer-shaft is secured a power-wheel b'' , which is connected with a power-wheel P upon a cam-shaft P'. Upon this shaft is secured cams p , and upon the
125 frame C' of the screens are secured suitable projections $c c$ with which the cams engage, thus to carry the screen back and forth as the cam-shaft revolves.

In practice the water-pipe G is connected
130 with a suitable source of water-supply, (not shown,) and by means of a hose g' water is introduced into the mixer A. A suitable screen (not shown) may be arranged upon

the mixer to screen out the coarse boulders and to allow the finer material and gravel to pass down into the chamber A', where the rotating flexible wings B' engage therewith and scour the material against them and against the bottom of the chamber, after which it is discharged through the opening a' and passes onto the screen C. The screen being constantly swung to and fro by reason of the cams engaging with the projections on the frame carries the material down beneath the jet-pipes E. The valves are turned to cause water to discharge through the jet-pipes, and by means of the pitman F' and connecting-bar F the pipes are swung back and forth, while the screen is also swung back and forth, thus subjecting the material upon the screens to a thorough washing, which separates all the fine material from the coarse and causes the fine material, together with the water, to pass through the screen C onto the screen C'. Here a second separation takes place, and only the very fine material passes through the screen C' and is received upon the amalgamating-plate H. As the material passes down the plate H it is intercepted by the gates I, which project into the troughs H' a sufficient distance to intercept the flow of the pulp between the bottom of the gate and the surface of the quicksilver-bath. The pulp then rises behind the gate until sufficient pressure is accumulated to force the material beneath the gate, whence it passes to the next step and to the next trough, and so on until it reaches the cylinder J', where any particle of fine gold remaining is amalgamated in the manner described in my before-mentioned application for Letters Patent. From the amalgamating-chamber the tailings pass to the sluice M and downward over the riffles, carrying the coarse material discharged from the screens C and C' and conducted to the riffles by means of the chute N.

Thus by my improved arrangement great economy of water is secured, since only enough water need be used to thoroughly wash the fine material from the coarse material and allow it to readily pass through the amalgamator, while the coarser material, comparatively dry, passes down to the riffles, where the same water which liquefies the fine material operates to sluice the coarser material over the riffles, and any coarse gold in the coarse material will be caught by the riffles. Where water is very scarce the tailings may be turned into settling-tanks and the water pumped again to an elevated reservoir and used over and over.

Now, having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an amalgamator, the combination set forth of an amalgamating-cylinder provided at each end with a projecting flange having therein slots to receive the ends of radial amalgamating-strips; such strips, forming wings for the cylinder; and a retaining-ring pro-

vided upon its inner face with radial slots adapted to seat the wings, and arranged upon the cylinder between its ends and having the wings seated in the slots. 70

2. In an amalgamator, the combination set forth of an amalgamating-cylinder having flanged heads of greater diameter than the cylinder and provided with slots adapted to seat therein the ends of amalgamating-strips; suitable amalgamating-strips arranged upon the cylinder and having their ends seated in the slots; and a retaining-ring arranged upon the cylinder between the ends thereof and adapted to hold the strips firmly in position. 75 80

3. In an amalgamator having an amalgamating-cylinder and removable radial strips forming wings for the cylinder, the combination therewith of a retaining-ring arranged upon the cylinder and having radial slots opening from the inner face of the ring, and having the wings seated therein. 85

4. In an amalgamator, the combination set forth of an inclined screen; an amalgamating device arranged below such screen; suitable means for feeding upon such screen the material to be amalgamated; suitable means for spraying water upon the material to wash the fine material through the screen to the amalgamator; riffles arranged below the amalgamator to receive the discharge therefrom; and a chute for conducting the coarse material from the lower end of the screen to the riffles. 90 95

5. In an amalgamator, the combination set forth of a mixer and scourer; an inclined screen arranged to receive the material discharged therefrom; an amalgamating-plate arranged to receive the material which passes through the screen; an amalgamating-cylinder arranged to receive the material discharged from the amalgamating-plate; a series of riffles arranged to receive the material discharged from the amalgamator; a chute arranged to conduct to the riffles the coarse material discharged from the screen; and suitable means for spraying water upon the material while it is passing over the screen. 100 105 110

6. In an amalgamator, the combination set forth of a mixer and scourer; an inclined screen arranged to receive the discharge therefrom; a series of rockingspray-pipes arranged above the screen and connected with a source of water-supply; an inclined amalgamating-plate arranged to receive the material which passes through the screen, and provided with series of troughs for quicksilver; gates arranged to project into the troughs; a rotatable amalgamating-cylinder arranged to receive the discharge from the amalgamator; a chute arranged to conduct to the riffles the coarse material discharged from the screen; a power-wheel arranged upon the shaft of the amalgamating-cylinder; a power-wheel arranged upon the shaft of the mixer and scourer; and suitable means connecting the power-wheel of the cylinder with the power-wheel of the mixer and scourer. 115 120 125 130

7. In an amalgamator, the combination set

forth of an inclined surface over which is
passed the material to be amalgamated; a
suitable frame; a series of U-shaped spray-
pipes having their outwardly-projecting ends
5 journaled in the frame and their lower mem-
bers arranged extending across and above the
inclined surface; a suitable lever attached to
one end of each spray-pipe; a connecting-bar
connecting the levers; suitable means for ac-
10 tuating the connecting-bar to rock the spray-
pipes; a water-supply pipe; and a length of
flexible hose connecting each spray-pipe with
the water-supply pipe.

8. An amalgamator comprising a scourer;
a separator arranged to separate the fine ma- 15
terial from the coarse; an amalgamating de-
vice arranged to receive the fine material and
the water from the separator; riffles arranged
to receive the discharge from the amalga-
mator; and suitable means for conducting 20
the coarse material from the separator to the
riffles.

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Witnesses:

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