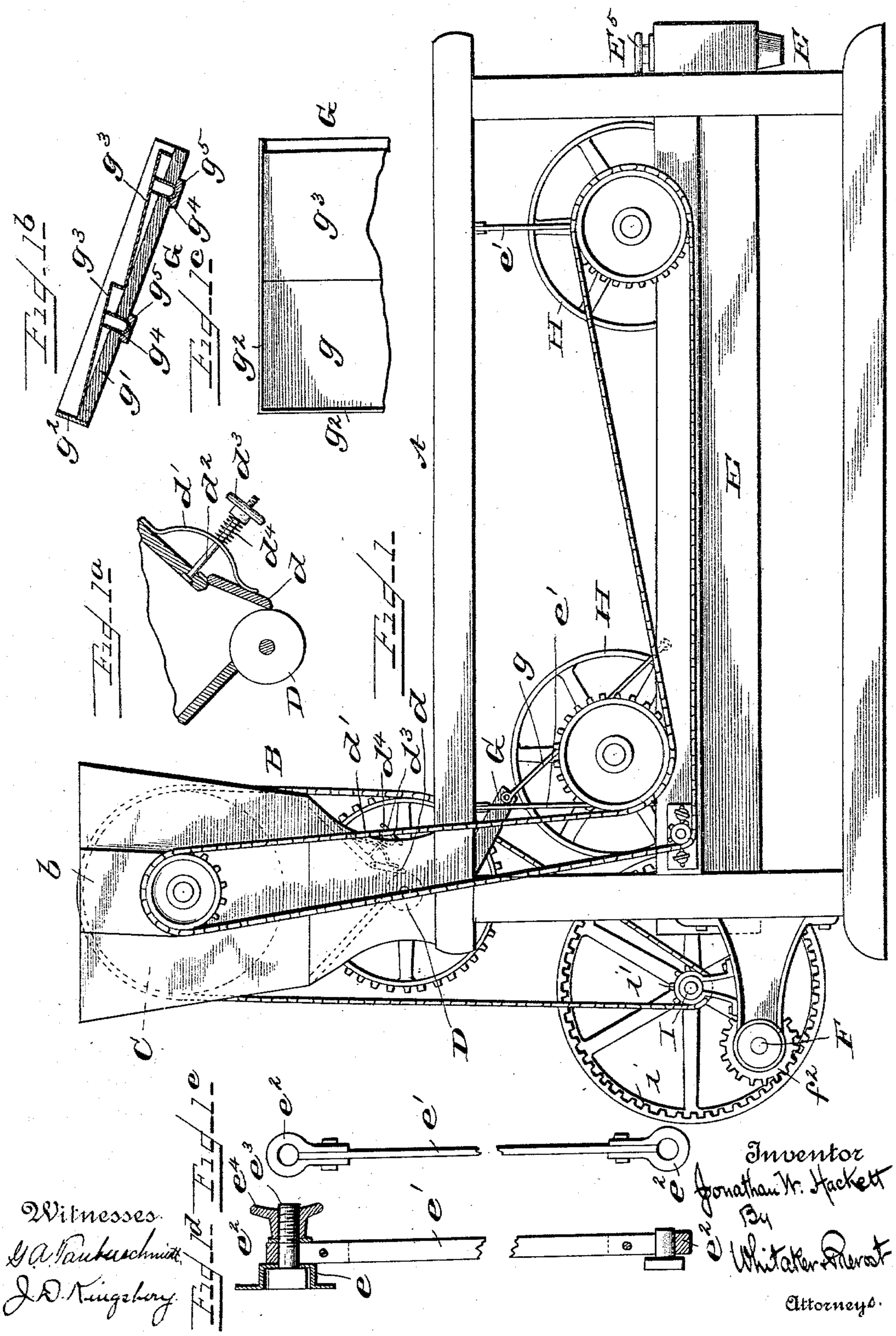
(No Model.) 3 Sheets—Sheet 1.

J. W. HACKETT.

AMALGAMATING APPARATUS.

No. 561,952. Patented June 9, 1896.



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(No Model.) 3 Sheets—Sheet 2.

J. W. HACKETT.

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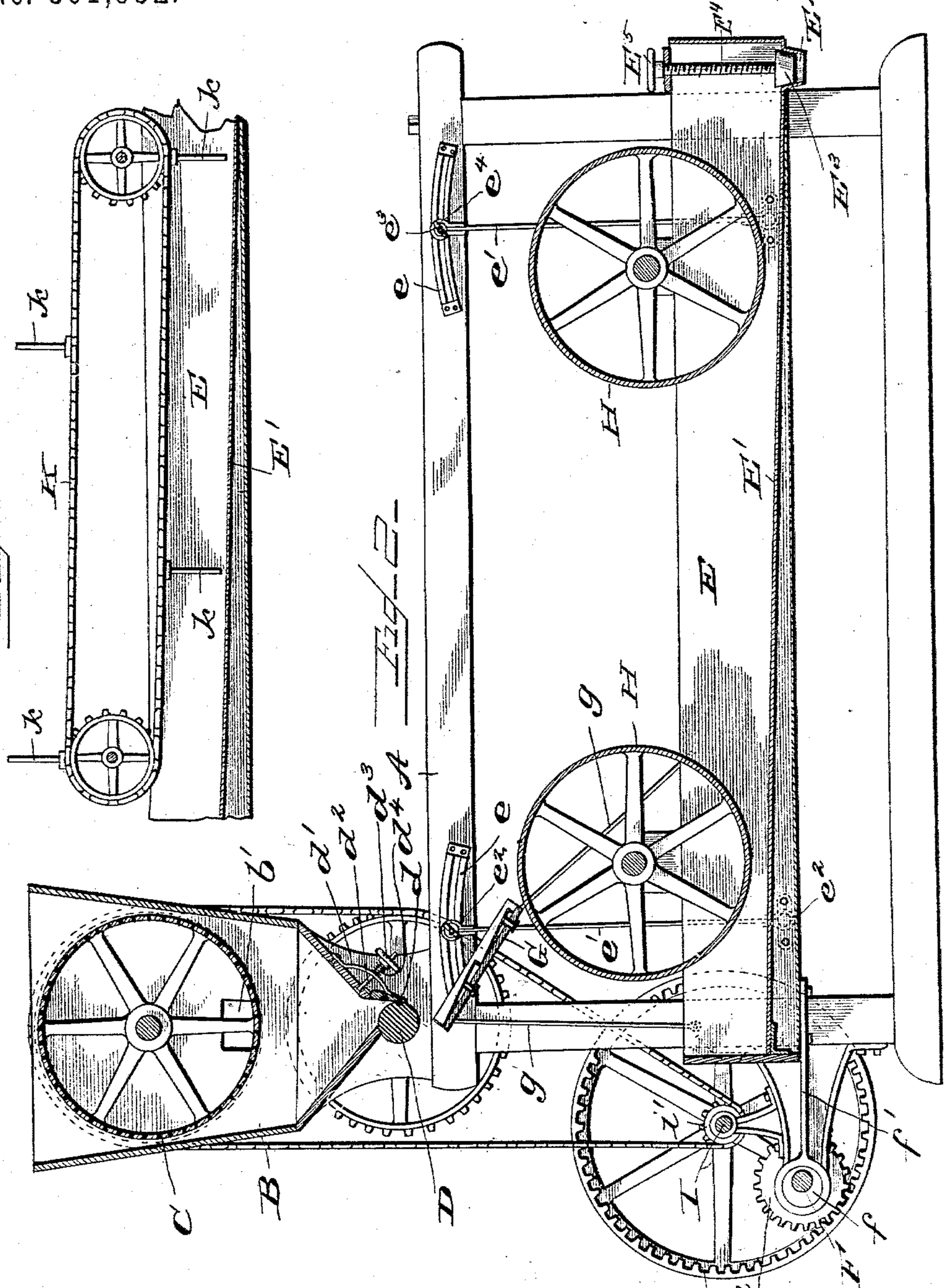

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J. W. HACKETT.

AMALGAMATING APPARATUS.

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Fig. 3.

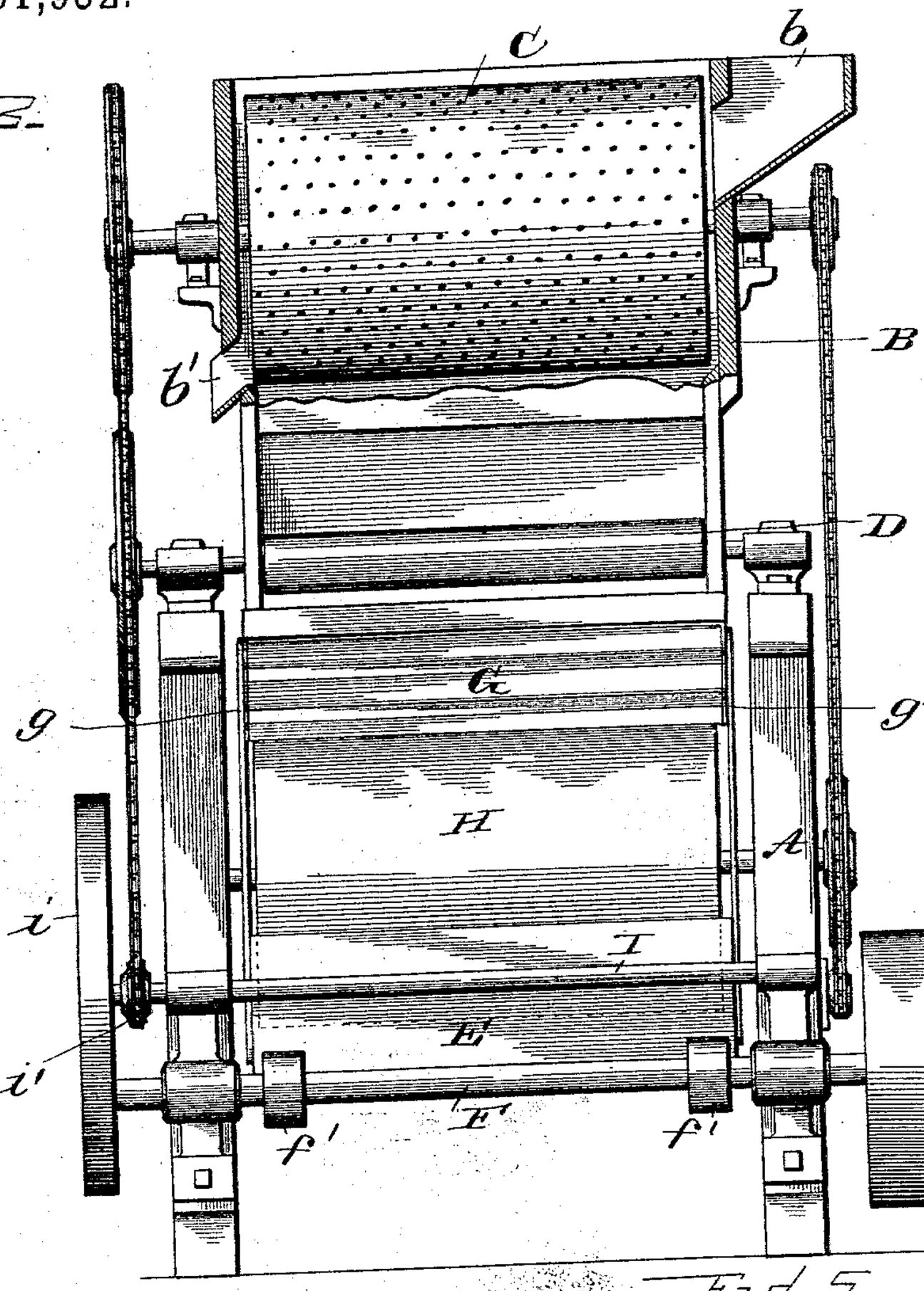


Fig. 4.

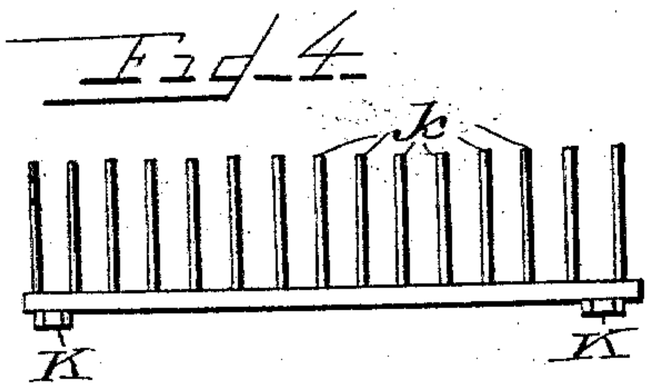
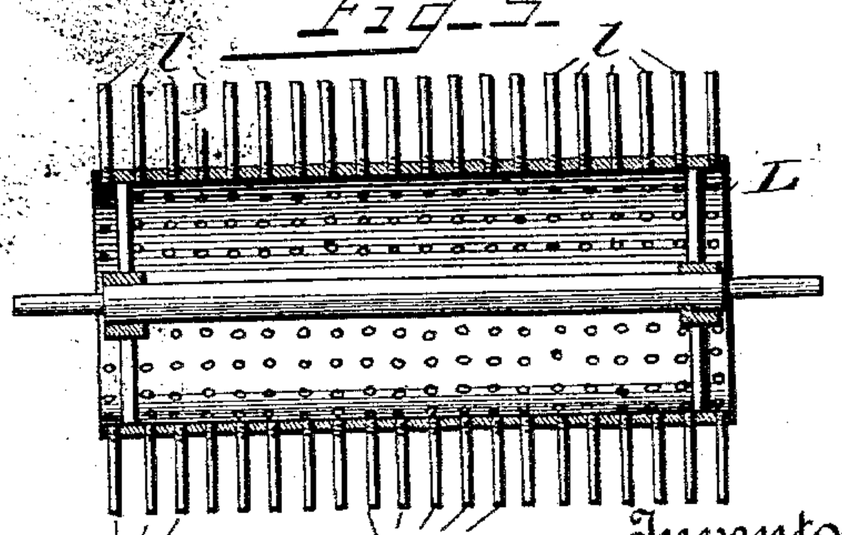


Fig. 5.



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UNITED STATES PATENT OFFICE.

JONATHAN W. HACKETT, OF CHARLESTOWN, INDIANA.

AMALGAMATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 561,952, dated June 9, 1896.

Application filed March 22, 1895. Renewed April 3, 1896. Serial No. 586,131. (No model.)

To all whom it may concern:

Be it known that I, JONATHAN W. HACKETT, a citizen of the United States, residing at Charlestown, in the county of Clark and State of Indiana, have invented certain new and useful Improvements in Amalgamating Apparatus; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the novel features hereinafter described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention, and said invention is fully disclosed in the following description and claims.

Referring to the said drawings, Figure 1 represents a side elevation of my improved amalgamating apparatus. Fig. 1^a is a detail sectional view illustrating the feeding-hopper and adjustable gate for the same. Fig. 1^b is a sectional view of the magnetic riffle-board. Fig. 1^c is a partial top plan view of the same. Fig. 1^d is a sectional view of one of the spring-hangers for the reciprocating pan and its supports. Fig. 1^e is a side elevation of one of said hangers. Fig. 2 represents a vertical longitudinal section of the machine. Fig. 2^a is a detail view, partly in section, showing a different form of apparatus for agitating the contents of the pan and removing the gold therefrom. Fig. 3 is an end view of the machine, partly in section. Fig. 4 is a detail view of one of the rakes shown in Fig. 2^a. Fig. 5 is a sectional view of a modified form of roller for removing gold from the pan.

In the drawings, A represents the main framework of the machine, which supports the receiving-hopper B, located at one end of the machine and provided with a rotary screen C.

b represents a chute through which the ground, crushed, or powdered ore is fed into the interior of the rotary screen, and *b'* represents a discharge-chute at the opposite side of the hopper through which the coarse material not capable of passing through the rotary screen is discharged from the machine. (See Fig. 3.) In the lower part of the hopper there is a narrow delivery opening or slit in which is located a feeding-roller D, positively operated by suitable driving mechanism. One edge of the delivery-opening is provided with a pivoted gate *d*, which is forced into engagement with the feed-roller D by means of a spring *d'*, (see Fig. 1^a,) secured to a part of the hopper and engaging said gate. In order to vary the tension of this spring and thus regulate the feed of the roller D, I provide a bolt d^2, which is secured to the hopper and passes through the spring *d'*, and an adjusting-nut d^3 is provided on the bolt d^2 to adjust the tension of the spring *d'*. I may place a coiled spring d^4 on said bolt between the nut d^3 and spring *d'*, if desired, as shown in the drawings, Fig. 2, but this is not essential, as the nut might engage the spring *d'* directly.

A reciprocating separating-pan E is suspended by spring-hangers in the main frame of the machine. Upon a horizontal bar of the frame plates *e e* are secured, as shown in Fig. 2, provided with segmental or curved slotted portions. Each of the hangers consists of a piece of spring-steel or other material *e'*, (see Figs. 1^d and 1^e,) at each end of which are the bearing-collars e^2 e^2, riveted or otherwise secured thereto.

The separating-pan E is provided with trunnions which are engaged by the bearing at the lower end of each hanger, and the upper end of each hanger is engaged by a bolt e^3, having its head in rear of the slotted portions of one of the plates *e* and its stem extending through said slot and the bearing of the hanger and provided with a wing-nut e^4 for clamping the hanger in the desired position. It will be seen by reference to Fig. 2 that by moving the hangers to different positions in the slotted supports *e e* the movements of the pan and its position can be changed and regulated. The pan E is reciprocated upon said hangers by means of one or more eccentrics *f* (or cranks) on a shaft F, which is the driving-shaft of the machine, said eccentrics being provided with straps and eccentric-rods *f'*, (preferably of spring material,) which are connected to the pan E.

G represents what I term the "magnetic riffle-board," which is supported in an inclined position beneath the feed-roller D by means of rods *g g*, secured to the pan E. This board is shown in detail in Figs. 1^b and 1^c, and consists of a base-board *g'*, preferably of wood,

surrounded on its rear end and sides by a rim of metal g^2. Upon the board g are two sheet-steel casings g^3, arranged in step form, as shown, and beneath each of these casings is a transverse row of magnets g^4, arranged as close together as desired, the said magnets being preferably set in a mortise or mortises in the board g and held in position by strips g^5, secured to the under side of said board.

A pair of separating-rollers H H are supported upon shafts mounted in bearings provided on portions of the main frame, so as to bring the lower parts of said rollers into the pan E and adjacent to the bottom thereof, as shown in Fig. 2. The pan E has its bottom and sides lined with copper and amalgamated with mercury in the usual manner, and I prefer to provide the pan with a removable false bottom E′, supported in a slightly-inclined position by a flange or web secured to the inner walls of the pan, so that the bottom may be removed to facilitate the removal of the gold. The rollers H H have their exterior surface covered with or composed of copper, also amalgamated, and the said rollers are driven simultaneously by means of sprocket-chain gearing, as shown in Fig. 1, or in any other desired manner, from the main driving-shaft. At one end the pan E is provided with a delivery-orifice E^2, fitted with a valve E^3, operated by a screw-shaft E^4 and hand-wheel E^5 from the top of the pan, as shown in Fig. 2.

The main or driving shaft F is provided in this instance with a pinion f^2, which meshes with an internal power-multiplying gear i on a shaft I, which is provided with a sprocket-wheel i', connected by a sprocket-chain with sprocket-wheels for driving the revolving cylinder-screen C and the feed-roller D.

The operation of the machine is as follows: The ground or crushed ore, either wet or dry, is fed into the chute b and conducted to the interior of the rotary screen C. The fine material falls through the screen into the lower part of the hopper and the coarser particles are discharged from the screen through chute b'. The fine material will be fed positively by the roller D upon the magnetic riffle-board, which reciprocates with the pan E. The effect of the magnetic riffle-board is to hold any particles of iron or other magnetic ore and allow the other portions to pass on and fall upon the roller H and thence into the pan E. The magnetic particles may be removed from time to time from the riffle-board in any desired way. When the material reaches the pan E, the particles of gold will be attracted by the amalgamated surfaces of the pan and rolls H H, and said material will be gradually fed from one end of the pan to the other by the inclined bottom and will be acted upon successively by the rolls H H. From time to time or continually, as desired, portions of the material which have passed the two rollers will be discharged through the outlet E, and the outflow can be regulated as desired. The machine can be used with dry material or the material may be mixed with water, which will ordinarily assist in the separation of the gold.

I sometimes prefer to remove the rollers H H and substitute therefor the traveling rake shown in Fig. 2^a. This consists of sprocket-chains K K, supported on suitable shafts, which are mounted in the bearings for the rollers H H, said sprocket-chains carrying a series of rakes k, formed as shown in Fig. 4. The teeth of each of these rakes are composed of copper and amalgamated in the usual manner. The rake is driven in any preferred way, as by sprocket-chain, and is made to travel from the inlet end of the pan E to its outlet end while in the pan. This rake will thoroughly agitate the material in the pan and the slender rake-teeth will be effective in catching fine particles of float-gold. I may find it advisable to stop the outflow for a time, operate the rake as just described, and then remove the rake and insert the rollers H, so as to secure the best results and to remove all the gold from the material. I may also employ, instead of the rollers H, rollers provided with pins or teeth, as shown in Fig. 5, in which L represents the roller, provided with a series of screw-threaded apertures, and l l represent the teeth, preferably screwed into said apertures, so as to be removable, if desired. By employing this form of roll I can use it with or without the teeth or pins, as preferred.

It will be understood that the pins or teeth are of copper, as is the surface of the roll, and both are amalgamated in the usual manner.

What I claim, and desire to secure by Letters Patent, is--

1. In an amalgamating apparatus the combination with the feeding devices, of a reciprocating pan provided with amalgamated surfaces, movable devices provided with amalgamated surfaces supported independently of said pan but movable therethrough, and a magnetic riffle-board supported upon said pan, beneath said feeding devices, substantially as described.

2. In an amalgamating apparatus the combination with the feeding devices, of the separating-pan, provided with amalgamated internal surfaces, a series of rollers having amalgamated surfaces adapted to be removably supported in operative relation with said pan, and an endless carrier provided with rakes having amalgamated teeth adapted to be supported removably in operative relation with said pan and driving apparatus for operating said rollers and said carrier whereby said rollers and rake may be used interchangeably, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

JONATHAN W. HACKETT.

Witnesses:
C. L. BOTTORFF,
W. H. WATSON.