

(No Model.)

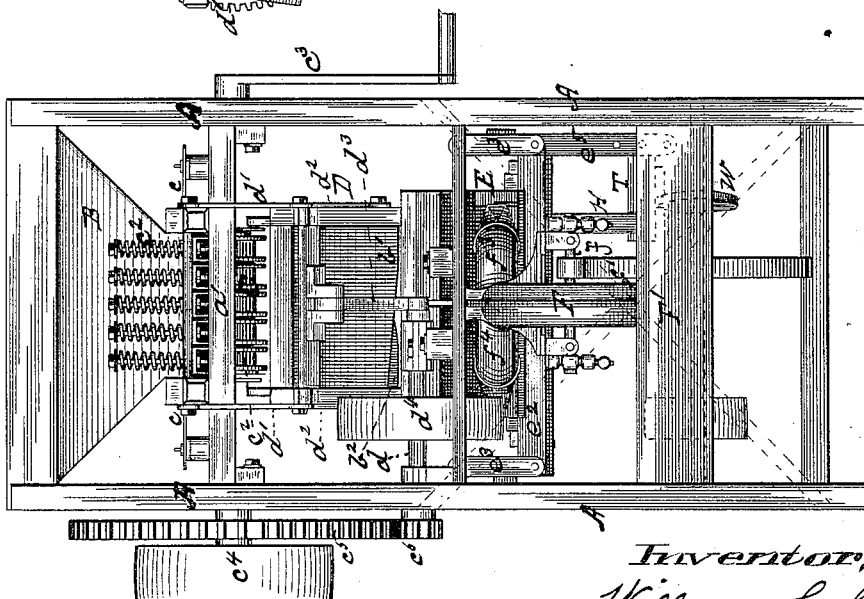
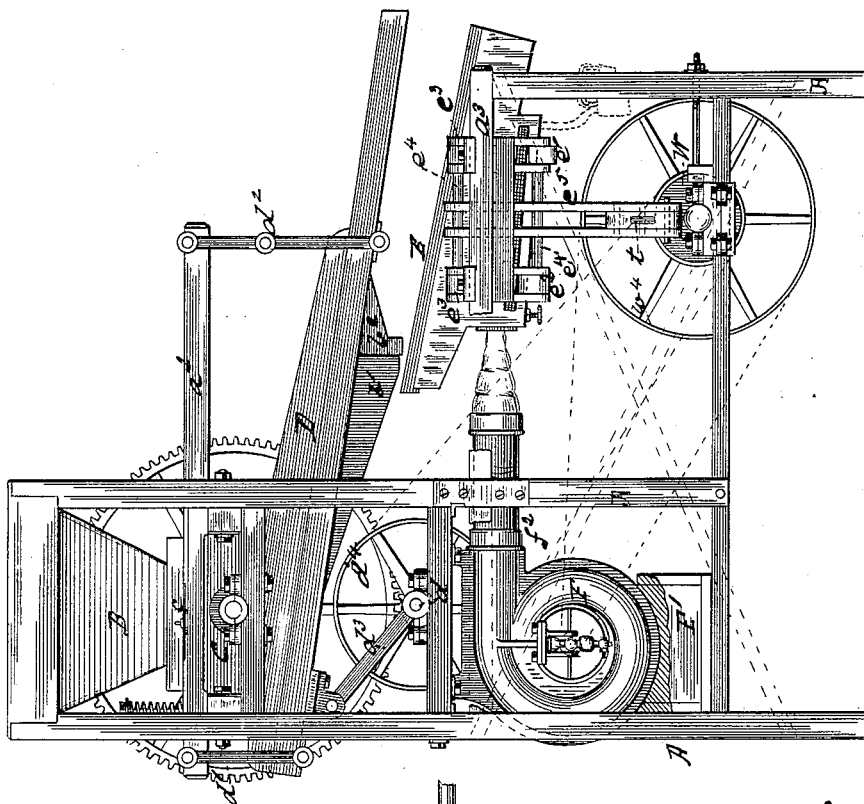
3 Sheets—Sheet 1.

W. L. CARD.

MACHINE FOR ELIMINATING METALS FROM THEIR MATRICES.

No. 347,868.

Patented Aug. 24, 1886.



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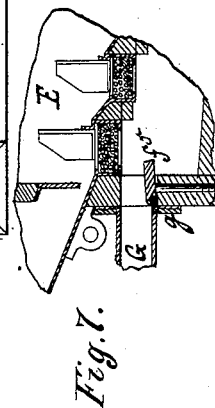
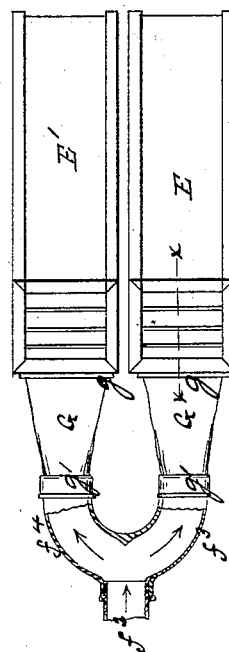
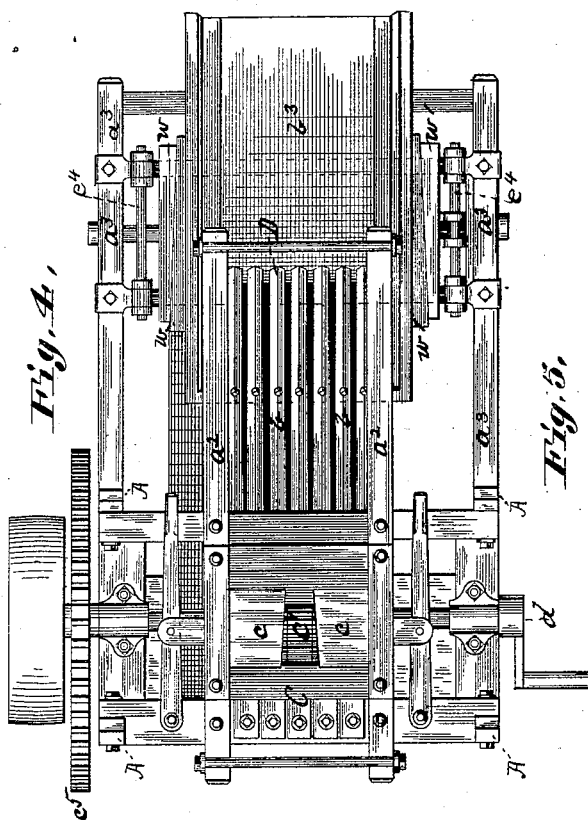
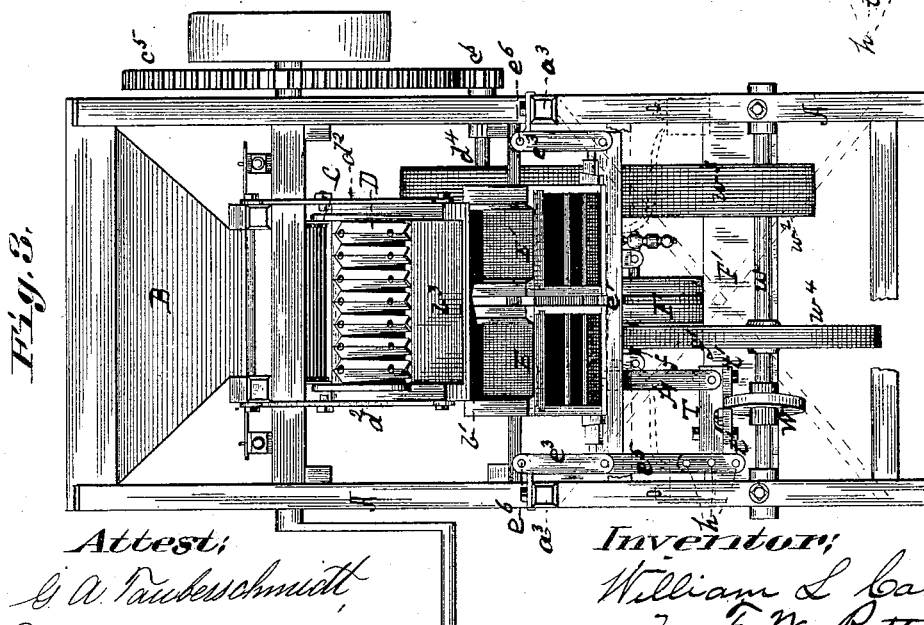
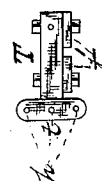


Fig 6



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3 Sheets—Sheet 3.

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Fig. 8.

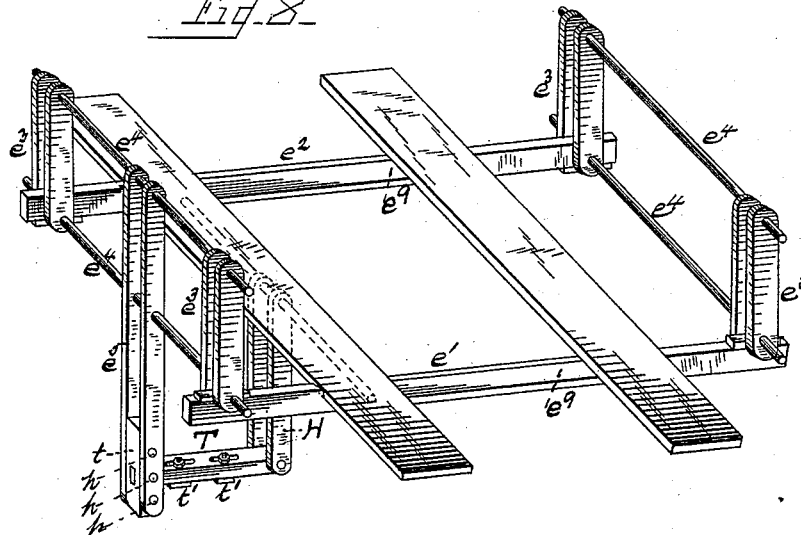


Fig. 9.

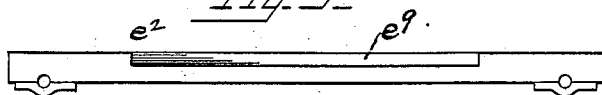


Fig. 10.

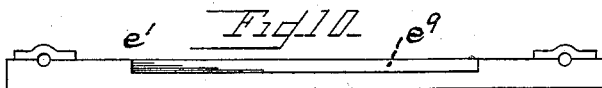


Fig. 11.

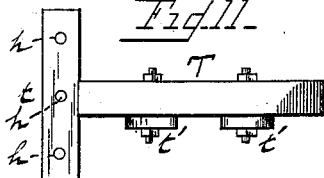


Fig. 12.



Witnesses

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UNITED STATES PATENT OFFICE.

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MACHINE FOR ELIMINATING METALS FROM THEIR MATRICES.

SPECIFICATION forming part of Letters Patent No. 347,868, dated August 24, 1886.

Application filed March 26, 1886. Serial No. 196,733. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM L. CARD, a citizen of the United States, residing at La Crosse, in the county of La Crosse and State of Wisconsin, have invented certain new and useful Improvements in Machines for Eliminating Metals from their Matrices; and I hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, in which—

Figure 1 is a rear elevation of a machine embodying my invention. Fig. 2 is a side elevation. Fig. 3 is a front elevation, and Fig. 4 is a top or plan view, of the same, the hopper having been removed. Fig. 5 is a top view detached of the separators or ore-beds and the branch pipes and flexible connection leading from the blast-fan to the ore beds or separators. Figs. 6 and 7 are detail views. Fig. 8 is an enlarged perspective view of the vibrating frame for the separator. Fig. 9 is a detached view of the upper, and Fig. 10 a similar view of the lower, bar of said frame. Fig. 11 is a side elevation, and Fig. 12 a bottom view, of the frame T or wobbler-frame, and its adjustable wobbler-blocks.

Like letters refer to like parts wherever they occur.

My present invention relates to the combination of a series of coacting devices, whereby placer-dirts or other auriferous earths may be pulverized, screened, and separated by a continuous operation, and to the relative construction of the individual elements, whereby the said combination is rendered possible and effective.

As is well understood placer-gold is found in a great variety of matrices—such as disintegrated and decomposed rock, clay, black sand, gravel, or mixtures of these and other matters—while the gold itself ranges from flour (or very fine) gold to scale gold, flake gold, shot gold, and nuggets. Where, as is frequently the case, all grades as well as the extremes in both gold and matrix are found in the auriferous earth to be treated it is evident that the violence of the vibration of the machine and the volume and force of the blast necessary to separate the coarser and heavier

particles of matrix and gold, will result in carrying much of the fine gold into the tailings, notwithstanding the different gravities of the components. It is evident, therefore, that in order to obtain the best results, a complete machine should embrace means, first, for reducing the matrix as far as practicable to uniform sizes and with as little expenditure of power as possible; second, for sorting the material, so as to confine the materials within ranges, upon which it is practical to use a blast of given volume and force; and, third, means for treating two or more grades of material in a single machine.

The object of my present invention is to provide a machine which shall fulfill these stated conditions or requirements; and to this end, broadly stated, it consists in a machine for eliminating precious metals from their matrices, comprising a screen having bars with crowning central ridges, sloping sides, and intervening slots which gradually increase in width from head to tail of the screen, and a series of separators having pockets containing shot or equivalent material, and, also, in details of construction, whereby said separators and screens may be effectively combined and caused to coact, substantially as will hereinafter more fully appear.

I will now proceed to describe my invention more specifically, so that others skilled in the art to which it appertains may apply the same.

In the drawings, A indicates a suitable frame for the support of the several operative devices; B, the hopper of pulverizer C; D, the screen for sorting or sizing the crushed and pulverized material; E E', the separators or ore-beds, and F the fan for creating a blast.

Any suitable pulverizer may be employed, but that preferred by me is of the general construction described in application, Serial No. 196,735, filed of even date herewith—that is to say, having feed-gates *c*, (see Fig. 4,) just below the hopper and over the crushing and pulverizing roller *c'*, and a concave made up of a series of spring-actuated sections or fingers, *c''*. (See Fig. 1.) The shaft of roller *c'* may be provided with a crank-arm, *c'''*, or a band-pulley, *c''''*, or both, and may be geared by

means of suitable pinions, c^b , with the shaft d , which vibrates the screen.

The pulverizer is arranged at one end of the machine and supported by the uprights A and cross-timbers a' of the frame A, with its delivery-spout over the upper end of the sorting or sizing screen D.

D indicates the screen, which is suspended below the pulverizer, preferably in a slightly-inclined position, and from the horizontal arm or jib a' , by the pivoted links d' d^2 , and is vibrated longitudinally by a link or rod, d^3 , from a crank on the shaft d , said shaft receiving its power from the roller-shaft, as hereinbefore specified, or in any suitable manner.

I prefer a screen of an adjustable character, and have chosen for purposes of illustration the devices which form the subject-matter of an application, Serial No. 197,091, filed by me March 27, 1886, wherein the screen-bars b have raised or crowning upper surfaces, and are adjustable laterally, so that the screen-openings (or openings between the bars) may be made more or less divergent from head to tail of said screen. If a detail description of said screen is desired, reference may be had to application No. 197,091, as above noted.

Beneath the screen-bars are a series of chutes, corresponding in number to the number of grades into which it is desirable to separate the material and to the number of ore-beds or separators employed. In the present instance two leaders or chutes are shown, the first, b' , (see Figs. 1, 2, and 3,) which collects the material from the upper half or two-thirds of the screen and delivers it to the separator E, (for the finer material,) and the other, b^2 , which collects it from the lower half or one-third and delivers it to the separator or ore-bed E' , (for the coarser material.) The limitation of the number of screen-chutes and separators is only a question of practicability. Extending beyond the screen-bars and over the separators or ore-beds $E E'$ is a table or incline, b^3 , for receiving the gangue or refuse which escapes over the screen and directing it out of the machine.

The screen D, as before specified, delivers into the ore-beds or separators $E E'$, which may be of any character adapted to separate the precious metal from the earthy matter; but, as in many districts water is unobtainable, I have a preference for dry or air-blast separators, and for purposes of illustration have selected one of that class; and, furthermore, in order to indicate the best means now known to me, I have selected (for purpose of illustration only and not for limitation) that special separator or ore-bed which forms the subject-matter of application Serial No. 196,732, filed by me of even date herewith, wherein the ore-bed is composed of a series of pockets filled with shot or equivalent material, and is vibrated laterally of the bed or longitudinally of the pockets by suitable mechanism. Specific illustration and descrip-

tion thereof, if desired, may be found in the case referred to, but is omitted here, as its specific detail of construction forms no part of the present case, and is not herein claimed.

Two or more of the above separators, or any equivalent thereto, are used, and if said separators be dry or air-blast separators, the following devices for combining and operating the same are preferred—that is to say, I employ a separator frame or bed composed of cross-timbers e' e^2 , having inclined depressions or bevel edges e^b , for the reception of the given numbers of separators or ore-beds, ($E E'$, &c.,) and suspended by links or pivoted hangers e^3 from the longitudinal bars a^3 , so as to be capable of lateral vibration. The links or hangers e^3 are connected by the pivot-rods e^4 ; and in addition to the four (4) corner or suspension hangers e^3 there are two hangers, e^5 , placed centrally (see Figs. 2 and 8) at one side of and sufficiently elongated to embrace at their lower ends the \perp -frame T, (see Fig. 8 and detached views of same in Figs. 6, 11, and 12,) while another pair of hangers, H, (see Figs. 3 and 8,) are used to embrace and support the frame T in a horizontal position just above the cam or wobbling wheel W on the counter-shaft w . On the under side of the \perp -frame T are two friction-blocks, t' t' , with slotted bolt-holes for adjustable bearing against the side faces of the cam or wobbling wheel W, for the purpose of taking up the wear from time to time. The vertical cross-piece t of the frame T has three holes, h —one in the horizontal central plane of the frame T, one above, and the third below, said frame—and the two long central hangers, e^5 , which embrace the head t of the said frame T, are correspondingly perforated, so that if the coupling-pin was placed in the upper holes the ore-beds would have greater lateral movement than if said pin was placed in the lower holes. The pivots e^6 of the hangers being fixed points, while the frame T has a positive movement from the wobbling wheel or cam, it follows that varying the distance from the pivots e^6 to the point of connection of the hangers with the frame T will vary the throw of the bed or frame.

The ore-beds are placed in the longitudinally-inclined depressions of the separator-frame, and secured by means of wedges w' w' , which form a ready means of not only securing the ore-beds effectively, but also of readily detaching the beds when cleaning up. The counter-shaft w , which carries the wobbler W and imparts motion to the ore-bed frame, may be provided with a band-wheel, w^2 , through which it is driven by a belt, w^3 , from a band-wheel, d^4 , on the shaft d , and may be provided with a second pulley or band-wheel, w^4 , by which, through a belt, f' , it drives the fan-shaft f of fan F. In lieu of the band-wheel and belts any other known driving mechanism may be employed.

F indicates a fan, by means of which a regulated blast of any desired volume and force

may be obtained, and said fan may be arranged at the rear of the machine below the pulverizer C, and supported on a box, F'. Said box may have lids on the two sides of the fan, and be adapted for storing the tools necessary for use about the machine. The pipe f^2 , leading from the mouth of the fan, is divided up into a number of branches corresponding to the number of ore-beds or separators employed. In the present instance the branches are f^3 , leading to the ore-bed E, and f^4 , leading to the ore-bed E', and the connections between said branches and the vibrating ore-bed are of a flexible character.

G indicates the flexible tubes, each of said tubes being secured at one end to the separator (E or E') by a flange, g , and provided at the other with a re-enforced sleeve or collar, g' , which is simply pulled over the end of branched air-pipe and up against the shoulder of the branched pipe, where, if properly fitted, it will remain without necessity of further attachments.

If desired, the branch pipes f^3 and f^4 may each be provided with a valve for controlling the volume of the blast; but when the separator is provided with a valve (see f^5 , Fig. 7) it is unnecessary.

The devices being of the general character and arrangement hereinbefore specified will operate as follows: The placer-dirt or auriferous earth being fed to the hopper B and thence to the pulverizer C, which is set in operation by power suitably applied, is crushed and triturated and delivered in a pulverized condition on the upper end or head of the screen D, which latter is vibrated longitudinally from the shaft d through link or rod d' . The crushed and pulverized material passes downward over the inclined screen D, the spaces between whose bars b gradually increase from head to tail of the screen, so that the grade of material which escapes through the screen between the bars for the first half or two-thirds of the length of the screen falls into the leader or chute b' , and is carried to the ore-bed or separator E, while that which escapes through the screen between the bars at the lower half or third screen falls into the leader or chute b'' , and is delivered into the ore-bed or separator E', and the gangue or refuse which escapes over the screen falls upon inclined shelf or table b^3 , and thence into the tailings beyond the machine. These ore-beds E and E' have a lateral vibrating motion imparted to them, as before specified, and each ore-bed is prepared according to the material or grade of the material passing over each—an ore-bed of finer material where the material to be treated is fine, and of coarser material where the material to be treated is coarser—so as to obtain greater or less resistance in the ore-bed, all as is fully described in my application, Serial No. 196,732, hereinbefore referred to. It is of course understood that the valves f^5 of the separators (or their equivalents in the branches f^3 f^4) have been

set to regulate the volume of air passing to each ore-bed, according to the character of the material to be treated on each ore-bed. The gangue or refuse from the ore-beds will flow from the ends of said bed into the tailings or matters rejected by the screen.

It is not necessary to go into a detail description of the operation of the ore-beds, as the same is well understood so far as it relates to jiggers and air or wet and dry machines now in use, and so far as regards the operation of the preferred form of dry separator it can be ascertained from the description in application Serial No. 196,732, hereinbefore referred to.

As the construction of the screen causes the flat metal or flake metal to pass the screen near the head thereof with the fine matrix, &c., from which it is most readily separated, such a screen has special value in combination with a plurality of any kind of separators, and as the character of separators shown will, owing to the vibration and the material with which its pockets are filled to form the permeable mobile mass or ore-bed, readily separate the flake metal from the coarser matrix, it is evident that a plurality of such separators have special value when combined with any screen which does not deliver the flake metal until it also delivers coarse matrix; and, further, as the particular form or class of screen described is adapted to grade by size and shape the shot or other mobile permeable mass with which the pockets of the separator are to be charged, it is evident the screen itself has additional valuable features in combination with the special class of separators chosen for purposes of illustration. Therefore,

Having thus described the nature, operation, and advantages of my invention, what I claim, and desire to secure by Letters Patent, is—

1. A machine for eliminating metals from their matrices, comprising a grading-screen composed of bars having centrally raised or crowning upper surfaces, and slots which increase in width from head to tail of the screen, and a plurality of separators arranged with such relation thereto that a different grade of material is delivered to each separator from said screen, substantially as and for the purposes specified.

2. A machine for eliminating metals from their matrices, comprising a plurality of vibrating separators having pockets containing shot or like graded material to form a permeable mobile mass or ore-bed, and a grading-screen arranged to deliver a different grade of material to each separator of the series, substantially as and for the purposes specified.

3. A machine for eliminating metals from their matrices, comprising a plurality of separators having pockets containing shot or like material, and a grading-screen having slots which increase in width from the head to the

tail of the screen, substantially as and for the purposes specified.

4. The combination, with the vibrating separator-frame, of pendent hangers projecting
5 below the frame, a wobbler-frame supported below the separator-frame, and a wobbler, substantially as and for the purposes specified.

5. The combination of a vibrating separator-frame, pendent hangers projecting below the
10 frame, a wobbler-frame supported below the

separator-frame, adjustable bearing-blocks for the wobbler, and a wobbler, substantially as and for the purposes specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 20th day of 15 March, 1886.

WILLIAM L. CARD.

Witnesses:

ALBERT BLAIR,
GEO. WALKER.