No. 751,425. PATENTED FEB. 2, 1904.

H. WISMEYER.

COMBINED GOLD SEPARATOR AND AMALGAMATOR.

NO MODEL. APPLICATION FILED JUNE 3, 1903.

4 SHEETS—SHEET 1.

Fig. 1.

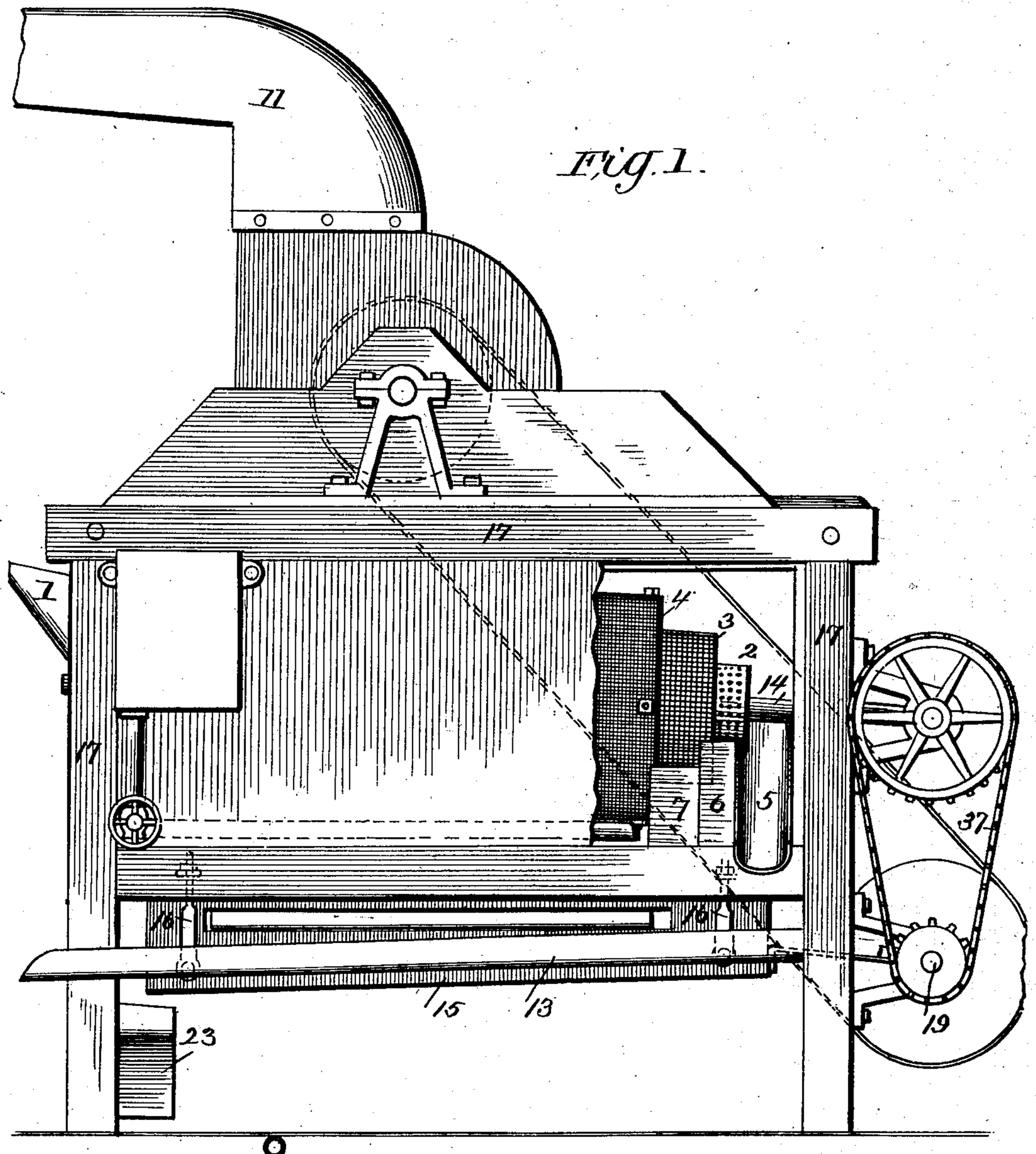

Fig. 7.

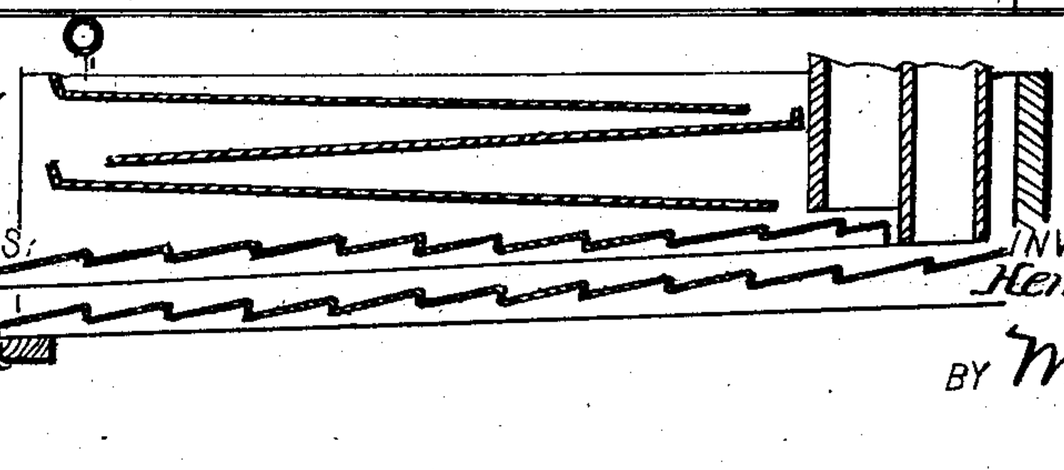

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Fig. 2.

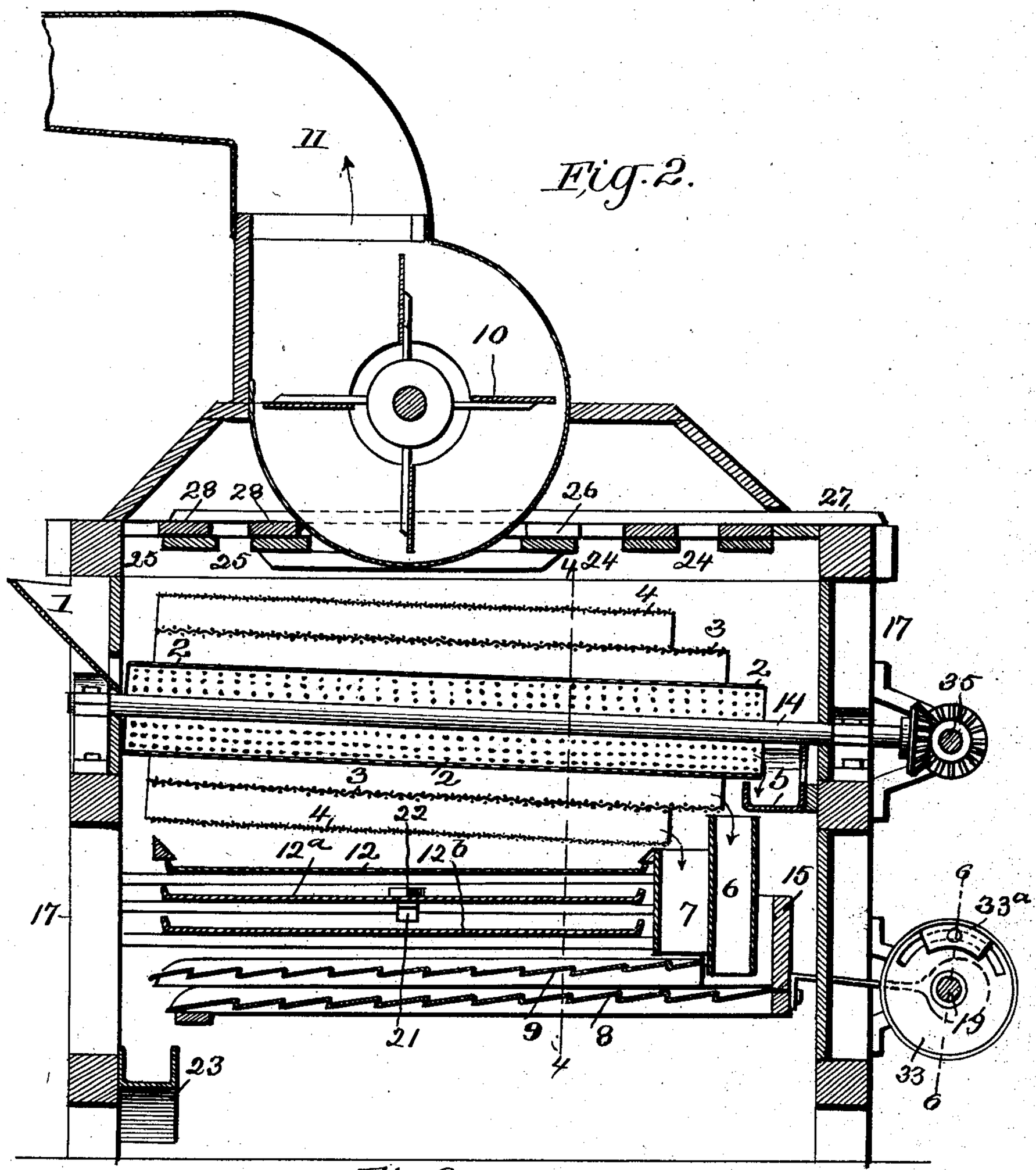
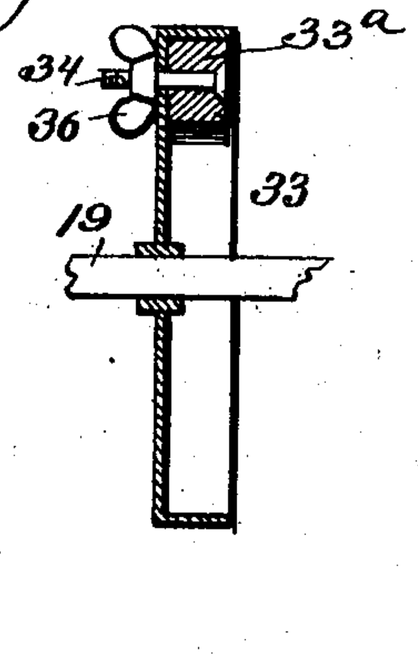


Fig. 6.



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4 SHEETS—SHEET 3.

Fig. 3.

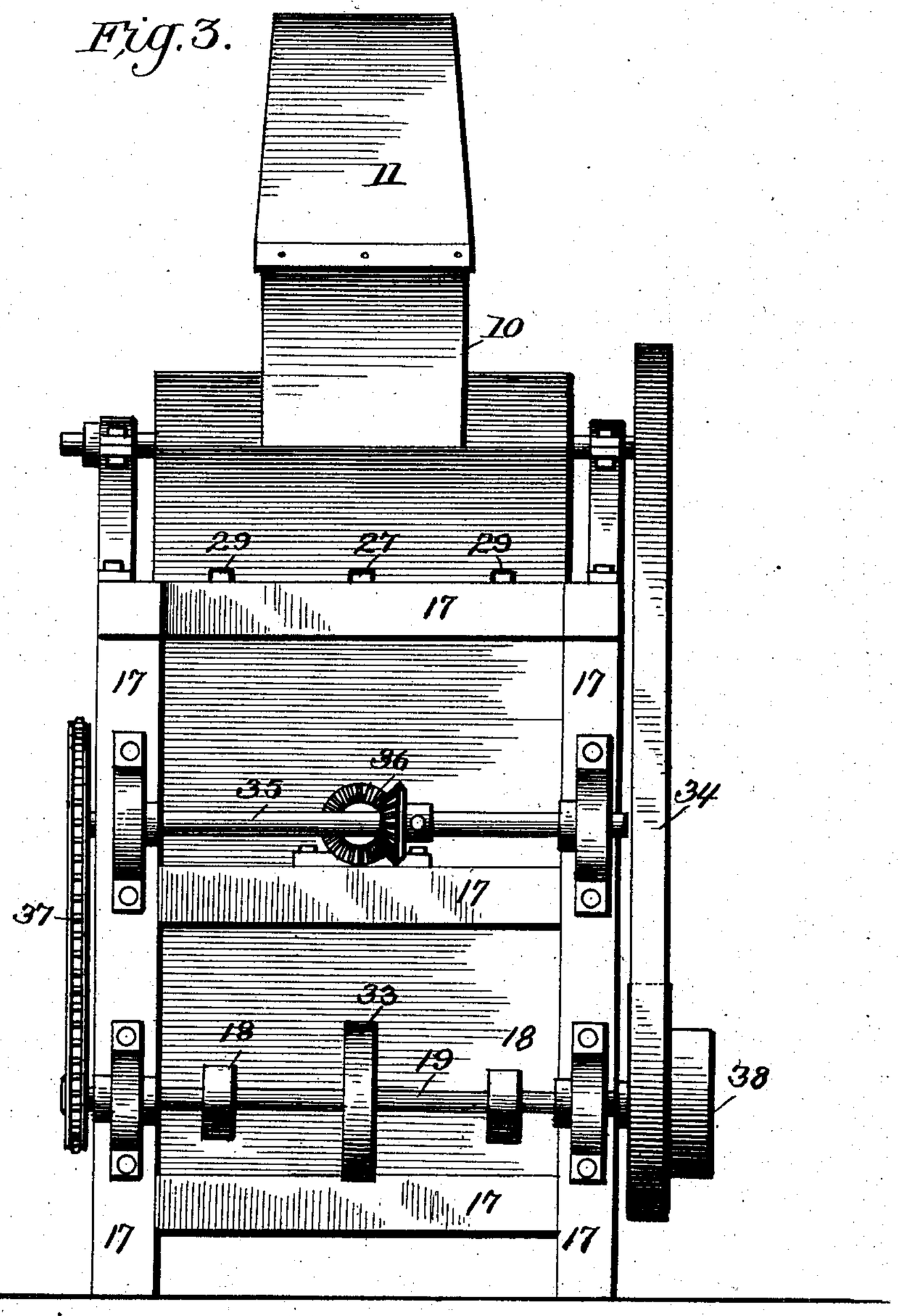

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Fig. 4.

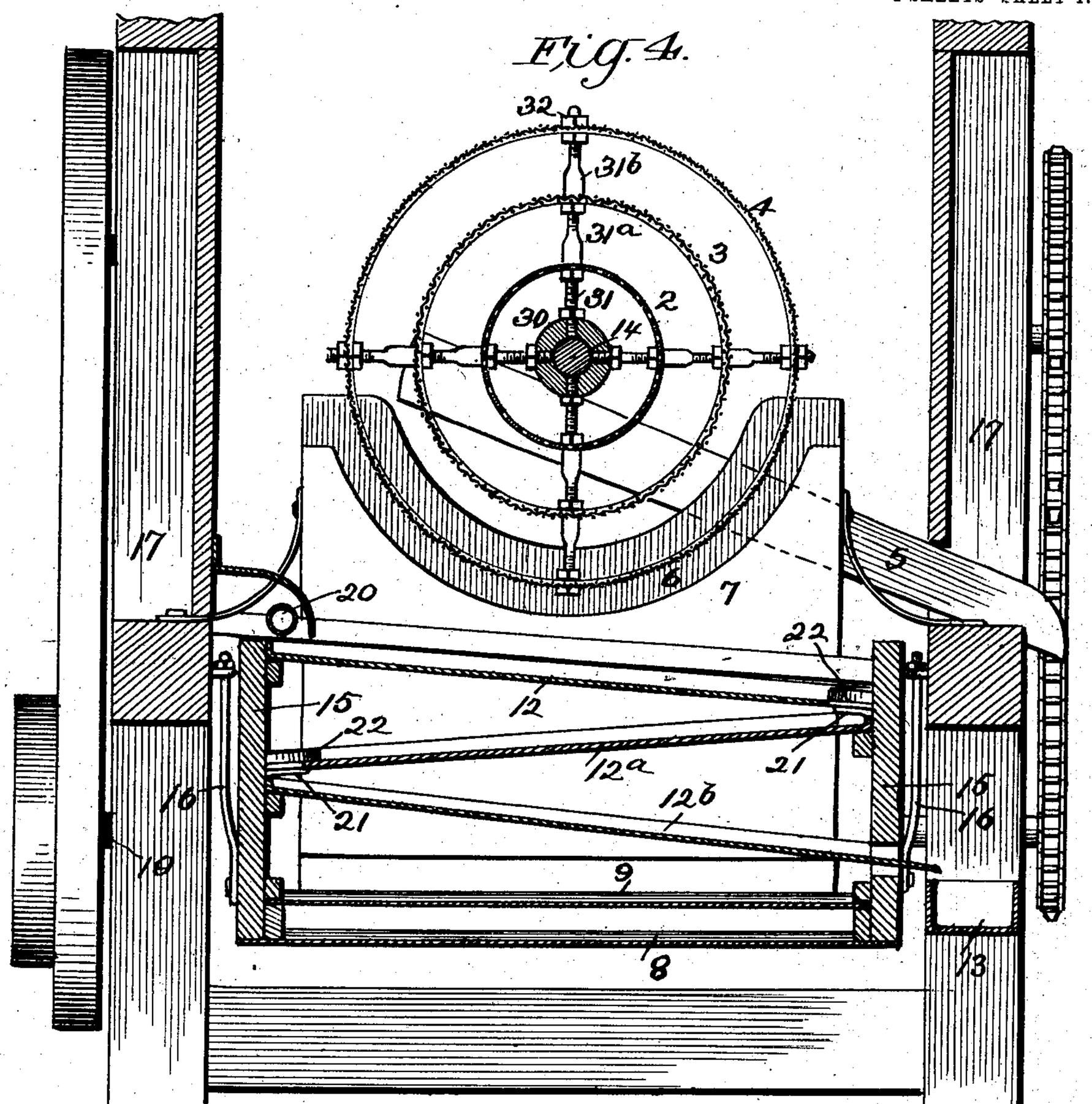
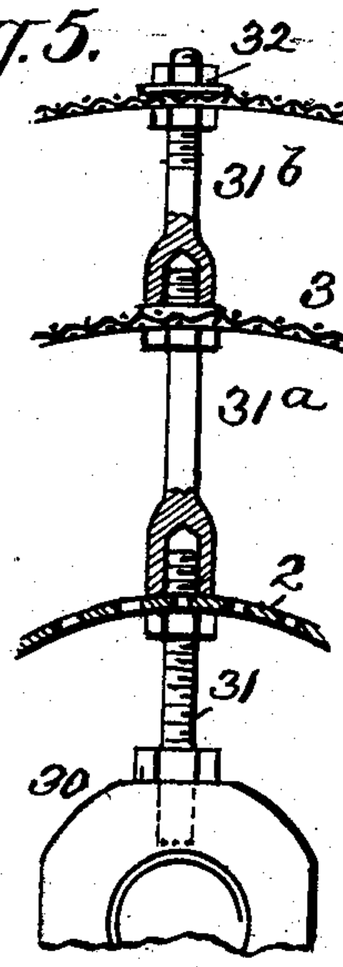


Fig. 5.



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No. 751,425. Patented February 2, 1904.

UNITED STATES PATENT OFFICE.

HENRY WISMEYER, OF EMPORIA, KANSAS.

COMBINED GOLD SEPARATOR AND AMALGAMATOR.

SPECIFICATION forming part of Letters Patent No. 751,425, dated February 2, 1904.

Application filed June 3, 1903. Serial No. 159,884. (No model.)

To all whom it may concern:

Be it known that I, HENRY WISMEYER, a citizen of the United States, residing at Emporia, in the county of Lyon and State of Kansas, have made certain new and useful Improvements in a Combined Gold Separator and Amalgamator, of which the following is a specification.

My invention is especially designed for separating free gold from black sand, quartz, or other foreign material with which it may be found associated in placers, also from comminuted ore, which has been artificially crushed to the required degree.

Free gold is ordinarily found associated with heavy black sand or sand and iron, the greater portion of the gold being in the form of thin light scales. In treating such material by means of the ordinary processes or machines much of the flour or float gold is lost, whereas it is chiefly separated and saved by my improved machine, it being carried off by a strong air-current, while the heavier particles of gold are received upon and saved by amalgamating-plates.

The details of construction, arrangement, and combination of parts are as hereinafter described, reference being had to the accompanying drawings, in which—

Figure 1 is mainly a side elevation of my improved machine, portions being broken away to show interior construction. Fig. 2 is a central vertical longitudinal section of the machine. Fig. 3 is an end view of the machine. Fig. 4 is a vertical cross-section on the line 4 4 of Fig. 2. Fig. 5 is a detail view of the supports for the three concentric perforated cylinders forming the separator proper. Fig. 6 is a detail cross-section on the line 6 6 of Fig. 2. Fig. 7 is a longitudinal section showing a modified arrangement of amalgamating-plates.

I will first indicate in general terms the principal course of the material being treated in the machine and then describe details.

The auriferous sand or other pulverized material is received from a hopper 1 (see Figs. 1 and 2) into the inner one, 2, of the three concentric perforated cylinders forming the separator proper, which is inclined slightly, as shown. The other two cylinders are indicated at 3 and 4. These three cylinders discharge three grades of products into as many separate conductors 5 6 7. The first conductor 5 is in the nature of a trough, which conveys the gangue outside the machine, while the conductors 6 and 7 deliver, respectively, onto combined riffle and amalgamating plates 8 and 9. The free and light gold scales or particles are carried off by strong upward air-current produced by the rotary fan 10, located at the top of the machine, and pass off through a tube 11 for subsequent concentration. Thus the main portion of the flour or float gold is saved by the air-current. Such particles of gold, or gold and quartz mechanically combined, which are too heavy to yield to the air-current are deposited upon the upper one, 12, of a series of plain or smooth amalgamating-plates. (See Fig. 4 and also Fig. 2.) Such portion of the gold as is not retained by the first plate passes on to the second, 12^a, and another portion passes therefrom to the third plate 12^b, and whatever material is not retained by the latter escapes into the trough 13.

The several cylinders 2 3 4 comprising the separator proper are graded in length, the inner one being the longest, the middle one, 3, being the next in length, and the outer one, 4, being the shortest. These cylinders are arranged concentrically with the shaft 14, to which they are rigidly attached by means which will be hereinafter described. The inner cylinder 2 is preferably constructed of sheet-steel and provided with numerous perforations. The second cylinder 3 and the outer cylinder 4 are made of wire-gauze differing in mesh, the inner cylinder 3 being the coarser of the two. The sand, gravel, or other foreign substances which are light and also too large or coarse to pass through the openings in the cylinder 2 are delivered into the inclined trough 5 and conveyed outside the machine. The material passing through the sides of the cylinder 2 are received by the inner cylinder 3, and such portion as cannot pass through the same laterally is delivered into the vertical conductor or trough 6 and falls directly upon the lower riffle and amalgamating plate 8. In the same manner such material as passes

laterally through the second cylinder 3 is received by the outer and fine-mesh cylinder 4. Such particles of gold as escape through the sides of this cylinder are chiefly taken up by the air-current, while the heavier ones fall upon the upper amalgamating-plate 12. The coarser material, which cannot pass through the sides of the cylinder 4, is delivered into the vertical conductor 7 and discharged directly upon the upper riffle and amalgamating plate 9. The several plain amalgamating-plates 12 12^a 12^b and the combined riffle and amalgamating plates 8 and 9 are supported in a box-frame 15, which is supported by adjustable hangers 16 (see Figs. 1 and 4) in the main frame 17 of the machine and receives a compound reciprocating motion by means of eccentrics 18, (see Fig. 3,) which are suitably mounted upon a rotating shaft 19, arranged in suitable bearings at one end of the frame 17. In other words, the frame 15, carrying the amalgamating and riffle plates, as well as the conductors 6 7, is reciprocated or shaken endwise in the frame 17. By inspection of Figs. 2 and 4 it will be seen that the plain amalgamating-plates 12 12^a 12^b are each inclined laterally or crosswise of the box or frame 15 and that the lower edge of each terminates a short distance from the adjacent side of the frame in order to allow the material to pass off the same. This transverse arrangement and inclination of the plates is preferred to any other, for the reason that the particles of gold falling upon the same are caused to make a longer traverse or path than would be otherwise possible—that is to say, as the frame 15 is reciprocated endwise the particles of gold which tend to slide down upon the inclined plates 12 12^a 12^b are caused to take a zigzag course, whereas if the plates were arranged at an inclination longitudinally of the frame instead of transversely they would tend to advance intermittently in a direct line. Above the highest portion of the upper amalgamating-plate 12 is arranged a water-discharge pipe 20, (see Fig. 4,) which in practice communicates with a water-reservoir forming an attachment of the machine or made separate therefrom, as the case may be. This pipe 20 is provided in its under side with a series of perforations which allow the escape of water in sufficient amount to wash off from the several plates such material as may not adhere thereto by reason of amalgamation. The several plates 12 12^a 12^b are supported in such manner that they may be readily removed by sliding them endwise out of the open rear end of the frame 15, whereby provision is made for the substitution of other plates as the progress of the work requires. In order to provide due support for these plates at their lower edges, they are cut out or provided with a lengthwise slot at that point, the central portion of each edge being supported by a small bracket 21. (See Fig. 2.) In order to prevent the materal passing over the edge of the plates from lodging on the said bracket 21, I apply a **V**-shaped diverter on the upper side of each of the plates, as will be readily understood. By this means the material is guided laterally on each side of the bracket 21. The riffle and amalgamating plates 8 and 9 are also preferably made removable endwise. They are constructed of copper properly silvered and discharge at their rear ends into a trough 23, arranged transversely of the frame of the machine. (See Fig. 2.)

In order to control the strength of the air blast or current, I provide slidable valves for regulating the size of the openings 24 and 25, (see Fig. 2,) which are located on opposite sides of the fan in the top portion of the frame of the machine. Thus the openings 24 from the right-hand side of the fan 10 are controlled by slidable valves 26, the same being provided with a handle 27, that extends laterally outside the air-chamber above the separator. The openings 25 on the left of the fan 10 are similarly provided with slidable valves 28, which are likewise provided with rods 29 (see Fig. 3) for adjusting them as conditions require. It will be understood that the air passing upward through the openings 24 and 25 is diverted laterally, so as to enter the fan-drum at the ends thereof.

By reference to Figs. 4 and 5 it will be seen that the several cylinders 2 3 4 are supported from a hub 30, forming a fixed attachment of the shaft 14. The several supports are arranged radially and constructed as follows: A screw-threaded rod or shaft 31 is inserted in the hub 30, and its outer end passes through the inner cylinder 2 and enters a socket in the second screw-threaded part 31^a. The latter in turn enters a similar socket formed in the third part 31^b. Jam-nuts 32 are applied to the several parts 31 31^a 31^b, so as to hold the cylinders 2 3 4 rigidly separated. It will be seen that since the several rods or shafts are screwed together they form practically one rigid bar. By this improved means the several cylinders 2 3 4 are not only rigidly connected and held equidistant, but adapted to be readily disconnected should occasion require.

In order to counterbalance the throw of the eccentrics, I provide the shaft 19 with an attachment (see Fig. 6) which is in the form of a rimmed wheel 33, having near its edge an arc-slot (see Fig. 2) through which passes a screw-bolt 34, which is attached to a weight 33^a and provided with a wing-nut 36. It will be understood that this weight is adjusted on the opposite side from the greatest projection of the eccentrics and that the slot permits due adjustment to be made. By this means the frame 15, with its attachments, is reciprocated without serious shake or jar of the main frame or other portions of the machine.

The fan-shaft 10^a is driven from the shaft 19 by means of a belt 34, running on pulleys

of suitable diameter. The separator-shaft 14 is driven from a transverse shaft 35, (see Figs. 2 and 3,) which is operatively connected therewith by bevel-gearing 36. The shaft 35 is driven from shaft 19 by means of sprocket and chain 37. A driving-pulley 38 (see Fig. 3) is applied to the shaft 19. It is to be understood, however, that any other suitable arrangement of gearing may be provided for driving the several shafts and parts connected therewith.

Fig. 7 shows amalgamating-plates inclined longitudinally of the shaking-frame 15 instead of transversely of the same, as in the preferred arrangement before described. In such case the water-discharge pipe will be located at the highest point of the upper plate and transversely of the frame of the machine and the lower amalgamating-plate will discharge into a trough fixed transversely at the end of the frame of the machine.

What I claim is—

1. The combined gold separator and amalgamator comprising the rotary separator proper consisting of a series of graded perforated concentric cylinders, a like series of conductors into which said cylinders respectively discharge, two riffle-plates arranged in the lower portion of the machine and receiving material from two of said conductors, a series of inclined amalgamating-plates arranged at an angle to each other and interposed between the separator and riffle-plates and supported in the same reciprocable frame with the latter, and a fan located above the separator, substantially as described.

2. The combination, with the rotary separator and amalgamating-plates located below the same, of a fan placed adjacent to the separator and passages leading from the separator-chamber to the fan-chamber and having independent valves controlling admission of air, substantially as shown and described.

3. The combination with the separator comprising perforated cylinders arranged concentrically and made of different lengths, of a reciprocating frame suspended below the separator and having two conductors which communicate with the respective cylinders, and two riffle-plates arranged one above the other and arranged for receiving discharge from the respective conductors in the manner specified.

4. The combination, with a separator, of a frame suspended below the same and adapted to reciprocate endwise, and a series of plain amalgamating-plates which are successively inclined in opposite directions transversely of the said frame and whose lower edges are spaced from the side of the frame to allow discharge of material at that point, substantially as shown and described.

5. The combination, with the rotary separator comprising a series of concentric perforated cylinders, of the shaking-frame arranged below the same and having inclined plain amalgamating-plates, and inclined riffle-plates, and two conductors which communicate with different cylinders of the separator and with the respective riffle-plates substantially as shown and described.

6. The combination with the rotary separator of a shaking-frame arranged below the same, riffle-plates superposed in the lower portion of said frame, vertical conductors arranged between the riffle-plates and different cylinders of the separator, and plain amalgamating-plates also arranged in said frame between the separator and the riffle-plates and inclined in the manner described, and a water-discharge pipe arranged at the highest point of the upper amalgamating-plate, substantially as described.

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