

No. 859,024.

PATENTED JULY 2, 1907.

A. H. STEBBINS.  
ORE CONCENTRATING MACHINE.

APPLICATION FILED MAY 11, 1906.

2 SHEETS—SHEET 1.

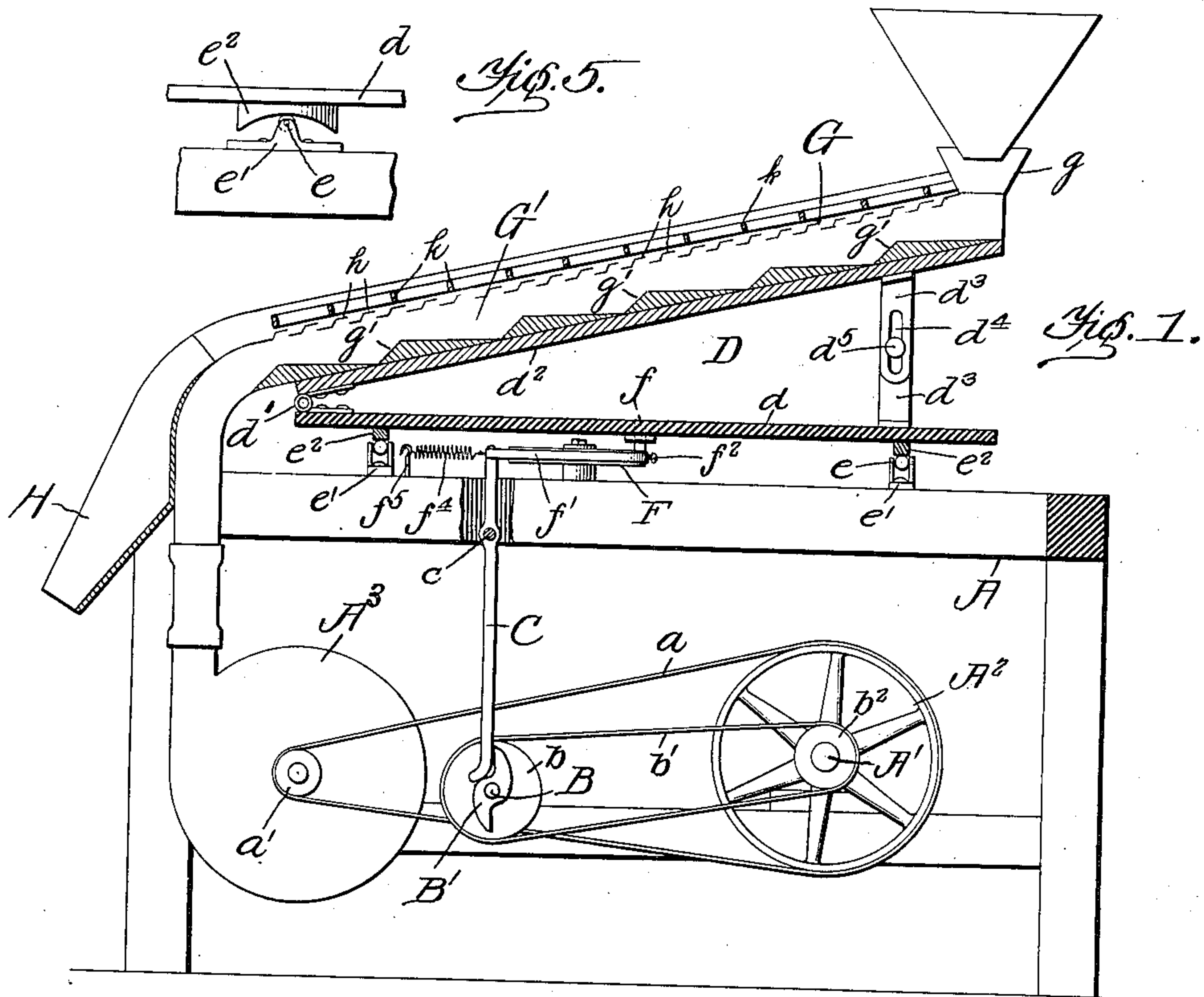
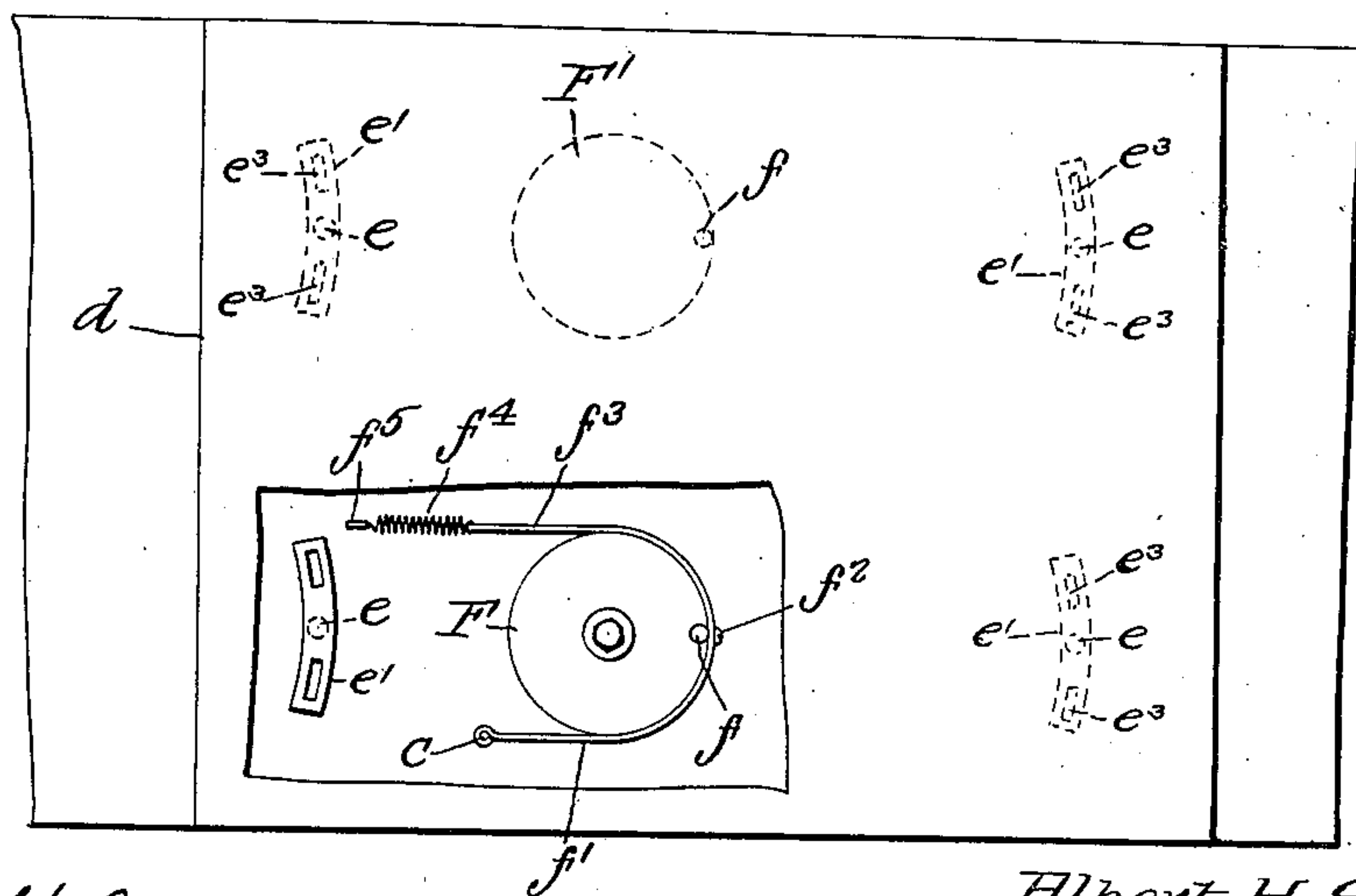


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

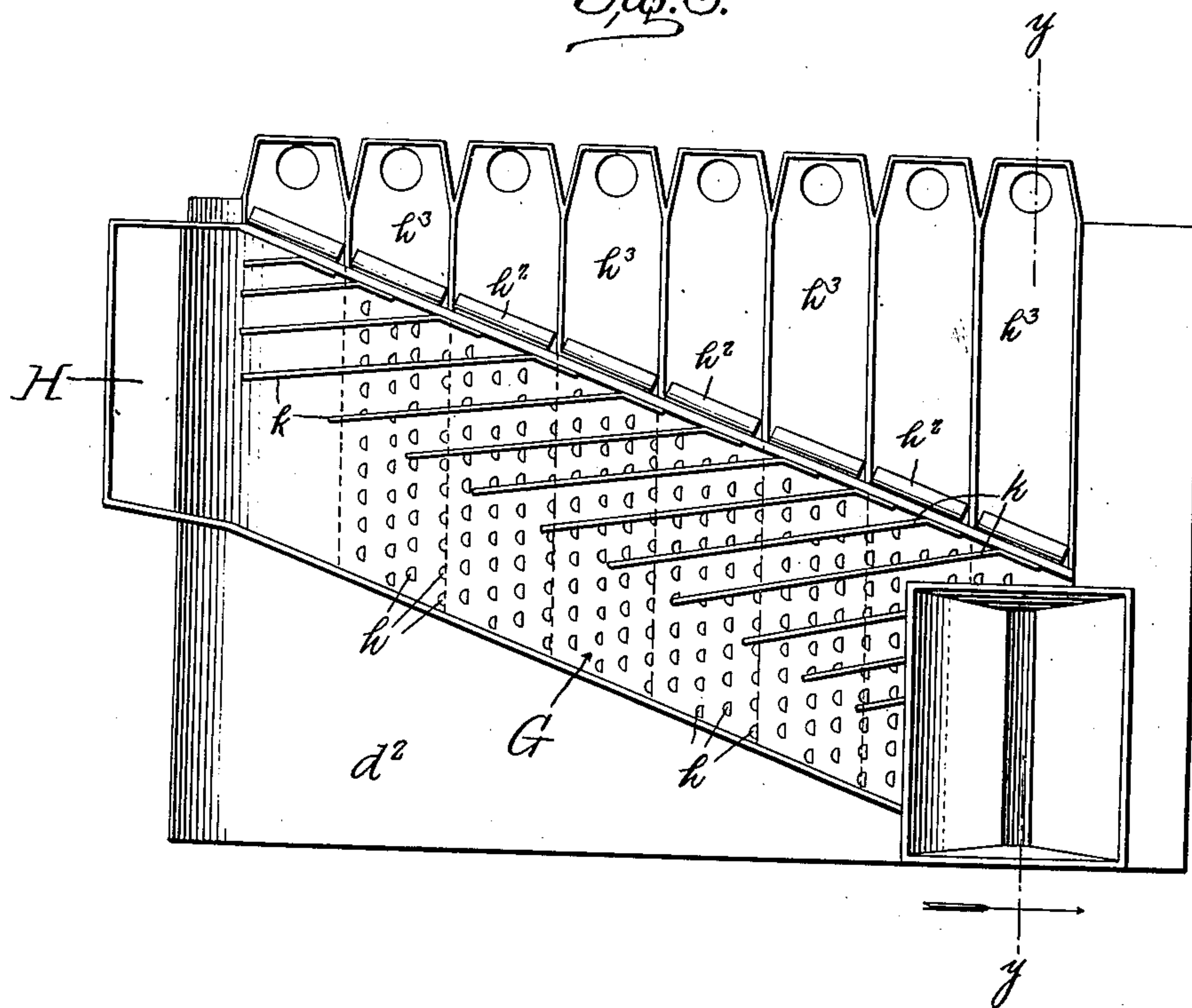
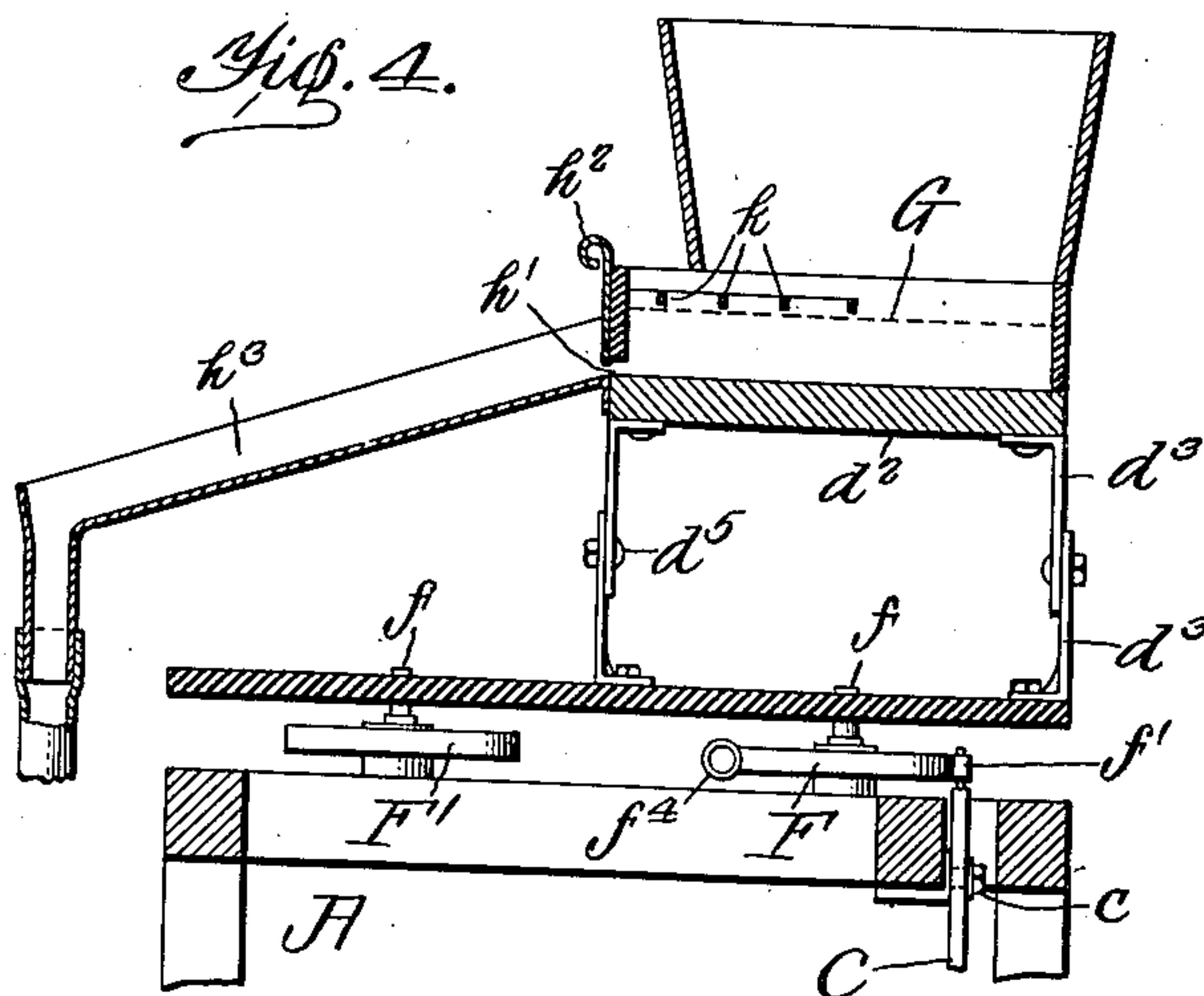


Fig. 4.



Witnesses

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# UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LITTLE ROCK, ARKANSAS.

## ORE-CONCENTRATING MACHINE.

No. 859,024.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed May 11, 1906. Serial No. 316,240.

*To all whom it may concern:*

Be it known that I, ALBERT H. STEBBINS, a citizen of the United States, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented certain new and useful Improvements in Ore-Concentrating Machines, of which the following is a specification.

The invention to be hereinafter described relates to ore concentrating machines and, more particularly, to that type wherein finely divided or comminuted material is subjected to a shaking motion while traveling over a concentrating surface, whereby such material becomes stratified, the heavier particles, which constitute the values, sinking to the bottom, and the lighter particles, which constitute the waste, rising to the top, so that the thus stratified particles may be readily supported.

The object of the present invention is to provide a machine of the general character stated, wherein desired motions may be imparted to the concentrating surface as the material passes over it, such surface being preferably inclined diagonally upon a suitable table and adapted to have currents of fluid, such as air, for instance, directed thereover and through the material as it gradually moves down the surface.

The invention consists of the parts and combinations to be hereinafter described and then definitely pointed out in the claims.

In the drawings, Figure 1 is a side elevation, part being in section, of the machine embodying the present invention. Fig. 2 is a plan view of the top of the main frame with the table removed. Fig. 3 is a plan of the parts shown in Fig. 1. Fig. 4 is a section on line  $y-y$  of Fig. 3, and Fig. 5 is a detail of the lifting bearings which give vertical movement to the concentrating surface as it is moved transversely.

The main frame A of the machine may be of any suitable or desired character and have supported thereon in suitable bearings a main shaft  $A'$ , from which the remaining parts of the machine derive motion. Mounted upon the main shaft  $A'$  is the pulley  $A^2$  which has a belt connection  $a$  to a pulley  $a'$ , which drives a fan in a suitable casing,  $A^3$ , see Fig. 1. Also suitably mounted on the main frame is a shaft B carrying a pulley  $b$  which has a belt connection  $b'$  with a pulley  $b^2$  on the main shaft  $A'$ . Mounted upon the shaft B are certain cam devices  $B'$  which act upon the lower end of the lever C mounted on the frame at  $c$  and having its upper end projecting above the top of the main frame.

Disposed above the main frame is the table which is designated as a whole in Fig. 1 by D. This table comprises a base portion  $d$  to which is pivoted at  $d'$  a supporting platform  $d^2$  and disposed between the base and platform of the table are the adjustable links  $d^3$ , one of which has a slot  $d^4$ , by which, in connection with the set screw  $d^5$ , the inclination of the platform

with relation to the base may be readily changed as desired. The table D is appropriately supported upon the top of the main frame A and preferably by roller bearings. In the present illustration of the invention, see Fig. 5, the roller bearings consist of the small rollers  $e$  held in suitable brackets  $e'$  secured to the main frame, and projecting downward from the base  $d$  of the table are lifting bearings  $e^2$ , whose under bearing surface is shown in Fig. 5 as formed on the arc of a circle. The lifting bearings  $e^2$  are, as seen in Fig. 1, disposed transversely of the table D, so that if the table D should be moved transversely of itself, the lifting bearings, acting upon the rollers  $e$ , will cause the table D to be given a vertical movement. It has been found that such vertical movement is particularly desirable in some characters of ore in order to give the material a lifting tendency, especially, at the end of its vibrating or agitating movement. The brackets  $e'$ , carrying the rollers  $e$ , are preferably adjustable, as shown by the slots  $e^3$ , Fig. 2, whereby this vertical movement may be brought about at any desired point of the transverse travel of the table, as will presently appear. For instance, if it is desired to give the table a lifting action as it moves transversely in one direction, the brackets  $e'$  will be adjusted so that the travel of the lifting bearing over the roller  $e$  would be to the left in Fig. 5, but said brackets  $e'$  can be adjusted towards one or the other end of the lifting bearings so as to cause a downward movement of the table as it approaches one end of its transverse travel. These adjustments and results are obvious and result merely from changing the position of the brackets  $e'$  with relation to the lifting bearings  $e^2$ .

Mounted upon the main frame A are the crank disks  $F$   $F'$ , each disk being provided with a pin  $f$ , projecting upward into a hole in the base,  $d$ , of the table D. Connected to one of the crank disks, as  $F$ , is a strap  $f'$ , which is attached also to the end of the lever C. This strap is suitably connected to the crank disk by a pin  $f^2$ , and at its opposite end  $f^3$ , it is connected to a spring  $f^4$ , whose remote end is engaged by a pin  $f^5$ , projecting from the main frame.

It is obvious, of course, that changes might be made with respect to the details of arrangement, but from the general construction described as embodying a form of the present invention, it will be noted that as the cam device  $B'$  rotates and strikes the end of the lever C, it will cause the crank disk  $F$  to oscillate on its bearings, and through the pin  $f$  this motion, which is in the arc of a circle, will be transmitted to the table D, the two crank disks  $F$   $F'$  acting as parallel link motions to give the table D a short vibrating movement transversely of itself in the arc of a circle, the table, at such times, riding upon the ball bearings  $e$ .

Mounted upon the inclined supporting platform  $d^2$  of the table D is the concentrating device, consisting of



a perforated surface G, the perforations of which, as shown in Fig. 1, are offset so as to direct currents of air or other fluid, not only through said surface, but substantially parallel thereto, such currents being provided  
5 by a fan device, such as that already described and as shown in Fig. 1.

Below the concentrating surface G is the air or fluid chamber G' into which the air or fluid blasts are forced. It has been found in practice that the material coming  
10 down the concentrating surface from the hopper g will have a tendency to pile up in some parts along the concentrating surface, and the air or fluid will at once seek to escape through the lines of the least resistance. To avoid this contingency and compel the air or fluid cur-  
15 rents to pass with substantial uniformity through the concentrating surface the lower wall of the chamber G' is provided with the abrupt inclines g' so that the air or other fluid, striking these abrupt inclines, will be forced upwardly through the concentrating surface.

20 Disposed transversely of the concentrating surface and directly above the same, are a series of riffles h, Figs. 1 and 3, and as the stratification of the material takes place, the heavier particles will lodge above these riffles and, by the transverse agitating movement of the  
25 concentrating device, will gradually move towards the concentrate discharge openings to one side of the device, as seen in Figs. 3 and 4 at h', said openings being preferably controlled by means of sliding doors h<sup>2</sup>. As the concentrates emerge from the openings h' they find  
30 their way into the concentrate chutes h<sup>3</sup>, from which they are appropriately collected, as shown in Fig. 4.

Extending obliquely across the riffles h are a series of retaining or screening bars k which serve to guide the upper strata or waste material away from the concen-  
35 trate openings h' and finally enable it to be discharged over the discharge end H of the concentrating device, Figs. 1 and 3.

It will be noticed in Fig. 3, for instance, that the concentrating device containing the surface G is arranged  
40 diagonally of the supporting platform of the table, and that the riffles h extend transversely of such surfaces G, but not at right angles to the sides thereof. Material placed in the hopper g and traveling down the concentrating surface G will thus have its concentrates lodge  
45 above the riffles h, and the circular, transverse agitation given to the table D and the concentrating device will cause the concentrates to gradually move to the openings h' for their discharge, the rising and falling move-  
50 ment given by the lifting bearings being of particular use in some kinds of ores to further agitate and keep in motion the ore bearing mass. It will be noticed that the rising and falling movements of the table D are se-

cured by virtue of its transverse agitating movement under the influence of the parallel motion devices, as best seen in Fig. 2.

Variations may, of course, be made in the details of structure within the scope of the present invention and different forms of concentrating devices may be employed in connection with the table and its agitating instrumentalities.

Having thus described my invention what I claim and desire to secure by Letters Patent is:

1. In an ore concentrating machine, the combination of a main frame, a table comprising a base and a supporting platform, means for adjusting the inclination of the plat-  
65 form to said base, ball bearings between the table and main frame for supporting said table, parallel motion devices disposed between the table and main frame to give to the table short motions in the arc of a circle trans-  
70 versely of the table, a lever connected to one of said parallel motion devices, and a cam for vibrating said lever.

2. In an ore concentrating machine, the combination of a main frame, a table comprising a base and a supporting platform adjustable in inclination with respect thereto, a lever and intermediate device for giving the table a trans-  
75 verse circular motion to and fro, and lifting bearings for giving the table a short vertical motion as it moves transversely.

3. In an ore concentrating machine, the combination of a main frame, a table comprising a base and supporting platform, rollers and lifting bearings disposed between the  
80 table and main frame to support and give the table a vertical movement, a crank disk mounted on the main frame and having a pin engagement with the table, a lever connected with said crank disk, and cam devices for vibrating  
85 said lever to cause the table to move in a transverse circular path.

4. In an ore concentrator, the combination of a main frame, a table having an inclined supporting platform, a concentrating surface mounted on said platform, means for  
90 giving the table and concentrating surface a transverse circular vibratory motion and devices for giving to said table and surface a vertical movement as they are moved transversely.

5. In an ore concentrator, the combination of a main  
95 frame, a table having an inclined supporting platform, a concentrating surface mounted on said platform, riffles extending transversely of said surface, means for giving the table and concentrating surface a transverse circular vi-  
100 bratory motion and devices for giving to said table and surface a vertical movement as they are moved transversely.

6. In an ore concentrating machine, a main frame, a table comprising a base and supporting platform movably  
105 mounted on said frame and mechanism for imparting to said table a combined transverse circular and rising and falling motion.

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

ALBERT H. STEBBINS.

Witnesses:

W. F. BLACKWOOD,  
J. E. LEAS.