No. 775,965. PATENTED NOV. 29, 1904.

T. A. EDISON.

DRY SEPARATOR.

APPLICATION FILED MAY 4, 1903.

NO MODEL.

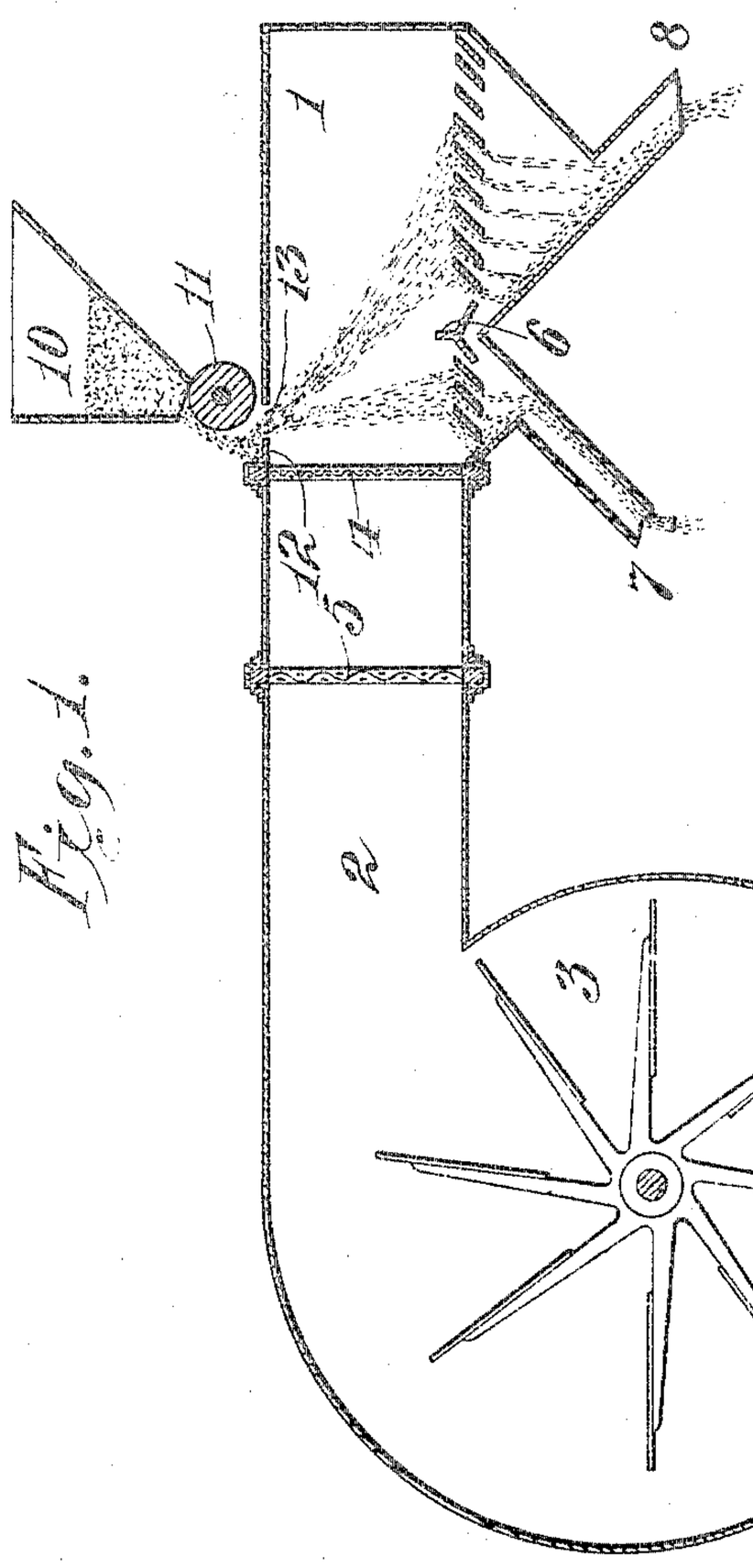

Fig. 1.

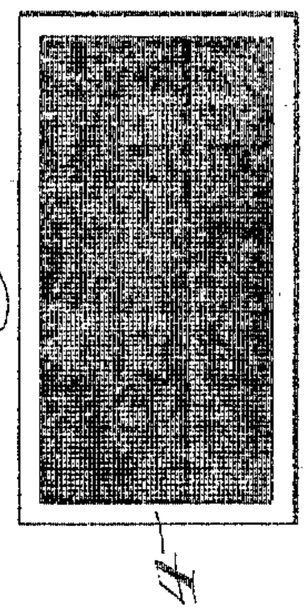

Fig. 3.

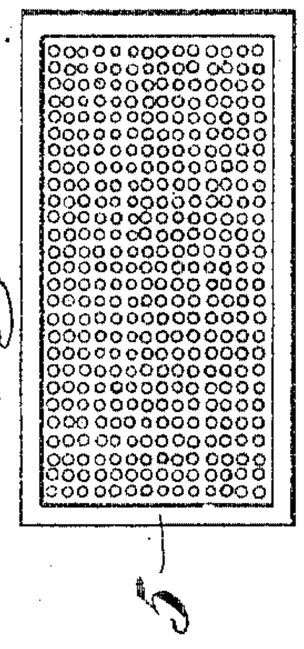

Fig. 2.

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No. 775,965. Patented November 29, 1904.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF LLEWELLYN PARK, NEW JERSEY.

DRY SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 775,965, dated November 29, 1904.

Application filed May 4, 1903. Serial No. 155,553. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, a citizen of the United States, residing at Llewellyn Park, Orange, in the county of Essex and State of New Jersey, have invented a certain new and useful Improvement in Dry Separators, of which the following is a description.

My invention relates to improvements in dry separators of the type in which a stream of falling granular material is subjected to the effect of a blast of air, by which the trajectory of the falling particles is changed and the lighter particles carried over a dividing-board, so as to be thereby separated from the heavier particles.

The device has been specially designed for the separation of free gold from loose or uncemented gravel; but it can be effectually utilized in any connection where granular materials of different specific gravities require to be separated.

The object of the invention is to provide a simple, cheap, and efficient device for the purpose.

In order to secure the best results in practical operation, it is necessary that the blast of air should be continuous and uniform or of equal velocity in all portions, because otherwise the falling particles would not be uniformly acted on. Heretofore one of the principal difficulties encountered in the actual operation of dry separators has been the fact that the blast is retarded at the sides by friction with the walls, producing irregularities in separation. It is also essential that the material should be presented to the action of the blast in the form of a very thin stream only a few particles thick and of the full width of the blast. It is also important, but not strictly essential, that the material should be brought to rest immediately before entering the blast in order that all the particles will have the same uniform and very low velocity when they enter the blast. In this way the blast has a much better opportunity of acting on the falling particles than if the velocity of the particles was higher. Finally, it is also important that the material supplied to the apparatus should be as uniform in size as practicable, the best results being secured when the largest particles are not more than twice as large as the smallest particles. The possible variation in the size of material depends to a certain extent on the character of the gold being treated. When the gold is in nugget form, there may be a wider difference in the size of the material than when the gold is in the form of scales and wires. A variation of two to one may be considered an average and may be increased or diminished as required by the special forms in which the metal occurs.

My improved separator and the method followed in its operation utilize these features of construction and operation, all as I shall presently describe.

In the drawings, Figure 1 is a longitudinal sectional view of one form of apparatus in which my invention may be embodied. Figs. 2 and 3 are slightly-enlarged views of the coarser and finer pressure-equalizing screens or diaphragms.

In all the above views corresponding parts are represented by the same reference-numerals.

The separation is effected in a chamber 1, into which leads a flue 2 of the same cross-sectional form and supplied with a blast of air from a fan 3. At the rear end of the flue 2 and dividing the same from the separating-chamber 1 is a fine screen or diaphragm 4, made preferably of wire and carried by a separate frame, (see Fig. 3,) so as to be readily removed. The fineness of this screen may vary ordinarily between fifty to seventy mesh per linear inch. Instead of using a wire-mesh screen a diaphragm of sufficiently uniform open-mesh cloth, like cheese-cloth, may be used. Located in the wind-flue between the fan and the fine screen 4 is preferably a coarse screen or diaphragm 5, Fig. 2, also carried in a separate frame. The proportion of open to closed area in this screen depends somewhat on the character of the material being operated on. For instance, with very fine material the area of the openings in the front screen may be only ten per cent. of the total area; but as the material increases in size the area of the screen-openings should be increased up to fifty per cent. for material of maximum diameter. The distance between the two

screens may also vary considerably, but should be sufficient to permit the individual jets passing through the openings of the front screen to coalesce before reaching the back screen, so as to pass through the back screen practically as a single blast, thus forming what may be termed a "pressure-equalizing" chamber. In practice good results have been secured when the two screens are from eighteen inches to two feet apart. I find in operation that the coarse back screen effects a general or rough equalization of the blast, tending to equalize its velocity at all points, and that the fine back screen completes the equalization, so that the blast which passes through the separating-chamber is very uniform, its velocity and pressure being the same at all points and being entirely free from swirls or eddies.

Mounted in the separating-chamber is a deflecting-board 6, and leading from the chamber on both sides of the deflecting-board are chutes 7 and 8 for carrying off the separated materials, in the preferred case the free gold and gangue, respectively. The bottom of the separating-chamber is formed of inclined slats facing away from the direction of the blast and by means of which the formation of eddy-currents in the chamber is overcome.

Material in granular form is supplied to a hopper 10, provided on its bottom with a roller-feed 11, extending the entire width of the hopper, so as to remove material from the hopper in the form of a wide, uniform, and thin stream. Below the roller-feed is an angle-iron 12, forming a ledge on which the material can accumulate and come to actual rest. As material is continuously added to this stationary mass it displaces material from the bottom thereof and results in the passage through the opening 13 and into the blast of a thin wide stream of material, entering the blast at a uniform and very low velocity and under the very best conditions for accurate separation. The ledge 12 may be omitted, if desired, so that the material passes directly from the roller-feed into the blast.

The feeding of the material directly from the roller-feed into the blast, however, is not so desirable as when a checking-shelf is used, because the material has the opportunity of acquiring some velocity before reaching the blast, and consequently passes more rapidly through the blast than when first brought to rest.

In operation, knowing the size of the material to be separated, the speed of the fan is first regulated so as to give the desired deflection, carrying the gangue over the dividing-board. Obviously the speed of the fan will vary according to the size of material. When the capacity of the blast is thus adjusted, a front screen is selected and placed in position, which will secure the desired equalization of pressure. In practice I contemplate using different machines for the several sizes of material, so that a machine can always be worked on material of approximately the same size and will require no change either in the speed of the fan or character of the front screen. The material falling very slowly through the uniform blast and in a wide thin stream will be deflected by the blast and the gangue carried over the dividing-board, passing off through the chute 8. In the case of a mixture of free gold and loose and uncemented gravel, assuming the largest particles to be no larger than twice the size of the smallest particles, a very perfect separation can be secured, since the specific gravity of gold is about six times that of the gravel. Even in the case of two materials which closely resemble each other in specific gravity a perfect separation can be obtained, (assuming the material to be first carefully sized,) for the reason that the regular and uniform blast acts on all of the particles uniformly. In actual practice and operating under practical conditions as to capacity, &c., I have been able to recover more than ninety-eight per cent. of the gold in a concentrate representing less than one-quarter of one per cent. of the total material, and this result was secured when the particles of material varied to the extent of two to one.

Having now described my invention, what I claim as new therein, and desire to secure by Letters Patent, is as follows:

In a dry separator, the combination of a blast-tube substantially uniform in cross-area, means for producing an air-blast through said tube, a screen pressure-equalizing diaphragm across the whole area of the tube, a second and finer screen-diaphragm placed farther from the blast-inlet and at a distance beyond the first-mentioned diaphragm sufficient to form in the tube a pressure-equalizing chamber, a feed-opening in the top wall of the tube immediately in the rear of the finer screen and extending across the tube, means for feeding pulverulent or granular material in a thin, uniform, vertical sheet falling across the whole area of the tube, and receptacles for the grades produced, substantially as set forth.

This specification signed and witnessed this 27th day of April, 1903.

THOS. A. EDISON.

Witnesses:
FRANK L. DYER,
CLOYD M. CHAPMAN.