No. 701,417. Patented June 3, 1902.

W. G. SWART & L. I. BLAKE.

APPARATUS FOR SEPARATING CONDUCTORS FROM NON-CONDUCTORS.

(Application filed Oct. 26, 1901.)

(No Model.)

Fig. 1.

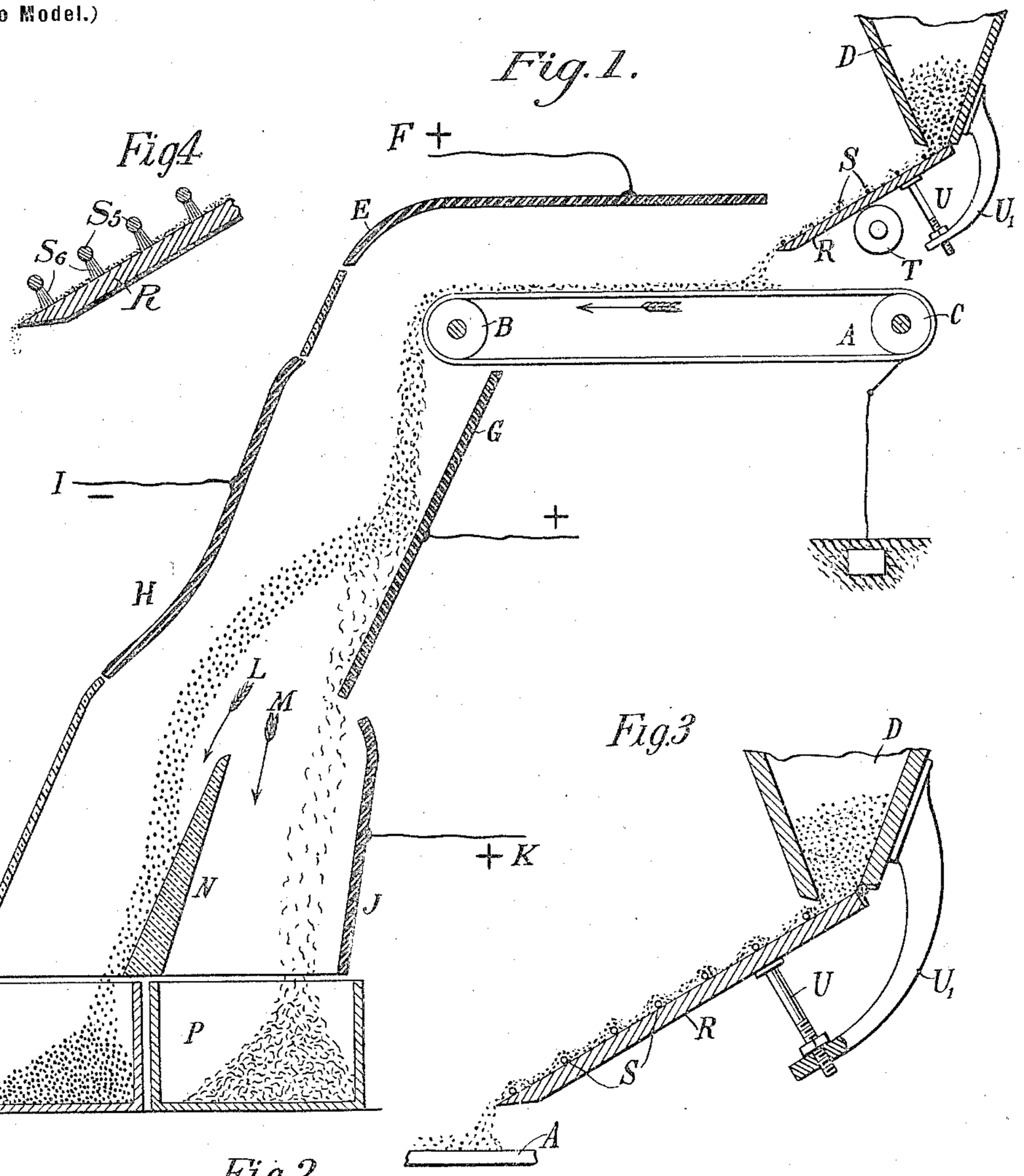
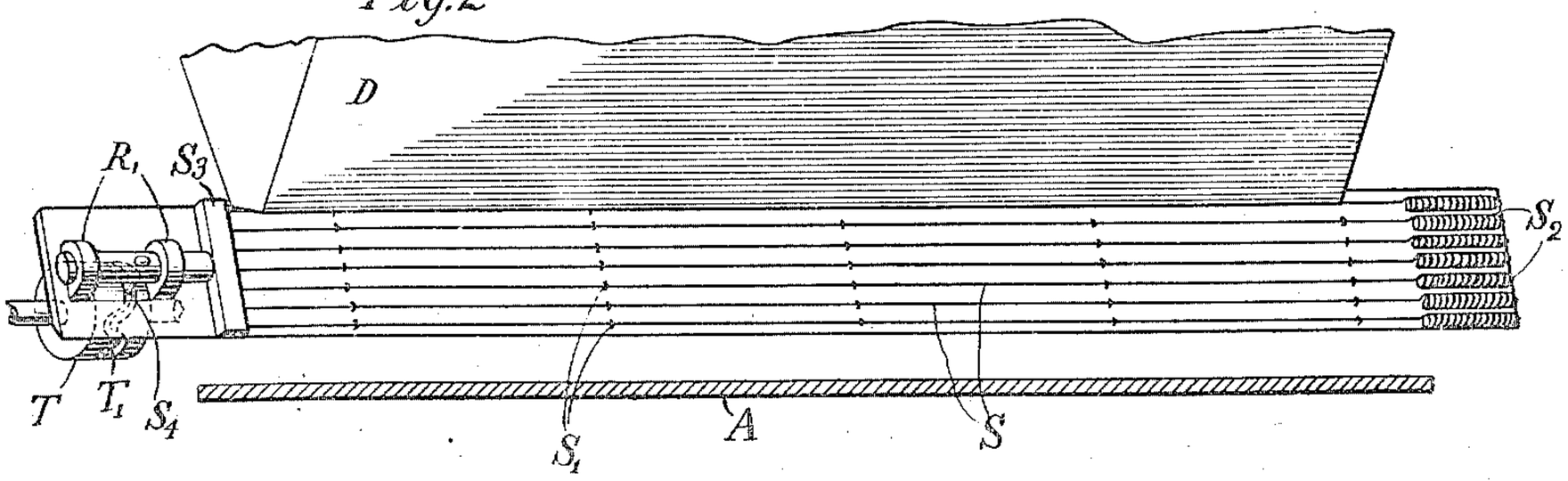


Fig. 2.



Witnesses:
Raphael Netter
Alexander Mitchell

Walter G. Swart Inventors
and Lucien I. Blake by
Frederick S. Duncan Atty

UNITED STATES PATENT OFFICE.

WALTER G. SWART, OF DENVER, COLORADO, AND LUCIEN I. BLAKE, OF LAWRENCE, KANSAS.

APPARATUS FOR SEPARATING CONDUCTORS FROM NON-CONDUCTORS.

SPECIFICATION forming part of Letters Patent No. 701,417, dated June 3, 1902.

Application filed October 26, 1901. Serial No. 80,058. (No model.)

To all whom it may concern:

Be it known that we, WALTER G. SWART, of Denver, county of Arapahoe, State of Colorado, and LUCIEN I. BLAKE, of Lawrence, county of Douglas, State of Kansas, have invented and discovered certain new and useful Improvements in Apparatus for the Separation of Conductors from Non-Conductors, of which the following is a specification, taken in connection with the accompanying drawings, annexed to and forming part of the same.

This invention relates to apparatus for the separation of particles or grains having different electrical conductivity, and relates more particularly to feeding apparatus therefor.

In the accompanying drawings, in which the same reference character refers to similar parts in the several figures, Figure 1 is a sectional diagrammatic view showing this apparatus. Fig. 2 is a view on a larger scale, showing the details of construction of the feeding device. Fig. 3 is a sectional view through the feeding device. Fig. 4 is a detail of the feed-board and feeding elements.

A is a flexible belt of conducting material mounted on the rolls B and C and driven by any desired means in the direction indicated by the arrow. This conductor-belt is grounded by the connection shown.

E is a conducting-plate of metal and arranged substantially parallel to the conducting-belt A at its discharge end. This plate is connected with a suitable source of positive high-tension electricity F. G is a similar conducting-plate also connected with a source of positive electricity, as is also J, which is connected with the source of electricity K. The conducting-plate H is connected with a source of negative high-tension electricity I. The partition or separating-diaphragm N directs the material into one of two receiving-boxes O and P.

It is desirable to feed the material to be separated upon the conducting-belt A in a very fine even stream, and as this belt has considerable width it is necessary in order to secure the best results that the material shall be equally distributed throughout the whole width of the belt. This result is secured by hinging the feed-plate R to the hopper D, in which the material is placed. This feed-plate is supported by the adjustable support U, which by moving the nut in contact with the bracket U′ adjusts the slope of the feed-plate R as desired. Upon the feed-board are mounted a series of feed-cords S, which pass the whole length of the board. These cords are mounted so that they have a movement relative to the board, and this may be accomplished by moving the board or by moving the cords while the board is stationary. This movement may be longitudinally of the cords, or it may be any other slight movement of the cords relative to the board. The cords may be arranged in any way upon the feed-board, so as to assist the movement of the material down the board. In the preferred form of this feeding device the cords are mounted to move longitudinally with respect to the stationary feed-board, and, as is seen in Fig. 2, the cords pass through a series of staples S′ in the board, and their more accurate movement is thus secured. At one end of each of the cords is secured a light spiral spring S^2, the free end of which is attached to the end of the feed-board. The other end of each of the cords S is secured to the feed-frame S^3, which is mounted to reciprocate in the guides R′, secured to the end of the feed-board. The pin S^4 in the feed-frame enters a cam-slot T′ in the cam T, which is revolved by any suitable means, and thus communicates a reciprocating movement of the feed-frame. The feed-cords S are thus reciprocated longitudinally of the feed-board, the springs S^2, secured at their opposite ends, always holding them stretched and allowing for this reciprocation.

In the operation of this apparatus the material is placed in the hopper D, and the feed-board R, which for this particular use is preferably of non-conducting material, is set at approximately the angle of repose of the material, so that the material upon it has a very slight tendency to feed down the board. This feed is, however, regulated by the feed-cords S. These cords are given a rapid movement with respect to the feed-board, and the result of this arrangement is that the material is constantly and evenly fed down along the feed-board in a uniform sheet, falling from the lower edge of the board in a very fine and

practically uniform stream. Owing to the proximity of the charged conductors to the feed-board, the feed-cords are preferably made in this instance of non-metallic material, such as twine, which effectually prevents any charging of these cords through induction from the adjacent conductors. Such a charging might be harmful in the operation of the apparatus. It is understood, however, that in many instances the cords may advantageously be constructed of metal, or light wooden rods, preferably faced with bristles, may be used, as is shown in Fig. 4. The feeding elements are formed in this instance of light rods S^5, which preferably are given a longitudinal reciprocation. These rods, which are preferably formed of wood or other non-conducting material, may be given, if desired, the facing of bristles S^6, which comes in contact with the feed-board and acts to feed the material along the same. The stream of material fed by this means upon the conducting-belt A is thereby charged and upon further contact with the charged plate G is separated into two parts L and M, according to the conductivity of the various particles, this action taking place as is more fully explained in patent to Blake and Morscher, No. 668,792, February 26, 1901. This feeding device may not only be used in connection with such a separating apparatus as has been described, but it is useful in many other connections where it is desired to secure a regular feed of finely-divided material in a constant stream. This device may therefore be employed in connection with milling apparatus, with coal-burning apparatus, and in many other ways. It is apparent to those skilled in this art that many modifications may be made in this apparatus. The exact mode of constructing the feeding device is unimportant, and the exact means for securing the relative movement of the feed-cords with respect to the feed-board is not essential. Many modifications might be made in this apparatus by those skilled in this art without departing from the spirit of this invention.

What we claim to be new and what we desire to secure by Letters Patent is therefore set forth in the appended claims:

1. A conducting-belt, a charged conducting-plate mounted substantially parallel to said belt at the discharge end of the same, a similarly-charged conducting-plate below said end of said belt, an oppositely-charged metallic conducting-plate mounted near the discharge end of said belt and means to collect the separated particles, and a feeding device comprising a hopper, a feed-board adjustably mounted with respect to said hopper, a series of non-conducting feed-cords mounted to move relatively to said feed-board and means to move said feed-cords with respect to said feed-board.

2. Apparatus for the electrical separation of particles comprising an electrically-charged portion and a feeding device adjacent said charged portion comprising a feed-board, means to adjust the slope of said feed-board, means to supply material to the upper end of said feed-board, a series of non-conducting cords mounted on said feed-board and means to move said cords relatively to said feed-board.

3. Apparatus for the electrical separation of particles comprising an electrostatically-charged portion, and a feeding device arranged adjacent said charged portion comprising an inclined feed-board, a series of non-conducting feeding elements mounted on said feed-board and means to move said feeding elements relatively to said feed-board.

4. Apparatus for the electrical separation of particles comprising an electrostatically-charged portion, and a feeding device arranged adjacent said charged portion comprising an inclined feed-board, a series of non-conducting feeding-cords mounted on said feed-board and means to move said cords with respect to said feed-board.

5. In a feeding device, a hopper, a feed-board hinged to said hopper, means to adjust the inclination of said feed-board, a series of feed-cords mounted on said feed-board, said feed-cords passing through a series of guiding-staples secured to said feed-board, each of said feed-cords being yieldably connected at one end to said feed-board, a feed-frame to which the other end of each of said feed-cords is connected, a cam, and a cam-follower engaging said cam secured to said feed-frame to reciprocate said feed-cords.

6. In a feeding device, an inclined feed-board, means to adjust the inclination of said feed-board, the discharge edge of said board being substantially horizontal, a series of horizontal feed-cords mounted on said feed-board and means to reciprocate said feed-cords with respect to said feed-board.

7. In a feeding device, an inclined feed-board, means to supply material to said feed-board, a series of feed-cords mounted on said feed-board and means to move said feed-cords longitudinally relatively to said feed-board to uniformly feed material down said feed-board.

8. In a feeding device, a horizontally-inclined feed-board and a series of relatively-movable horizontal feed-cords.

9. In a feeding device, an adjustable inclined feed-board at substantially the angle of repose of the material fed over said board, a feed-cord mounted on said board and means to move said cord relatively to said board to feed material down said board.

10. In a feeding device, an inclined feed-board, means to adjust the inclination of said feed-board to substantially the angle of repose of the material fed over said board, a series of feed-cords mounted on said board, and means to move said cords relatively to said feed-board to feed said material down said feed-board.

11. In a feeding device, an inclined feed-

board, means to adjust the inclination of said feed-board to substantially the angle of repose of the material fed down said board, elongated feeding elements mounted on said board to coöperate therewith, and means to longitudinally reciprocate said feeding elements to feed material down said board.

12. In a feeding device, an inclined feed-board at substantially the angle of repose of the material fed down said feed-board, elongated feeding elements mounted on said feed-board, and means to longitudinally move said elements to feed material down said feed-board.

13. In a feeding device, an inclined feed-board, the discharge edge of said feed-board being substantially horizontal, a horizontally-arranged elongated feeding element mounted on said feed-board substantially parallel to the discharge edge of the same, and means to longitudinally move said feeding element to feed material down said feed-board.

14. In a feeding device, an adjustable inclined feed-board having a horizontal discharge edge, a feed-cord mounted on said board substantially parallel to the discharge edge of the same, and means to move said cord relatively to said board to feed material down said board.

WALTER G. SWART.
LUCIEN I. BLAKE.

Witnesses as to the signature of Walter G. Swart:

H. F. SWIGGETT,
C. B. ST. JOHN.

Witnesses as to the signature of Lucien I. Blake:

BEDFORD MCKEEN,
P. C. JEANS.