Nov. 26, 1935. H. M. CHANCE 2,022,585

SEPARATING PROCESS

Filed Aug. 12, 1933

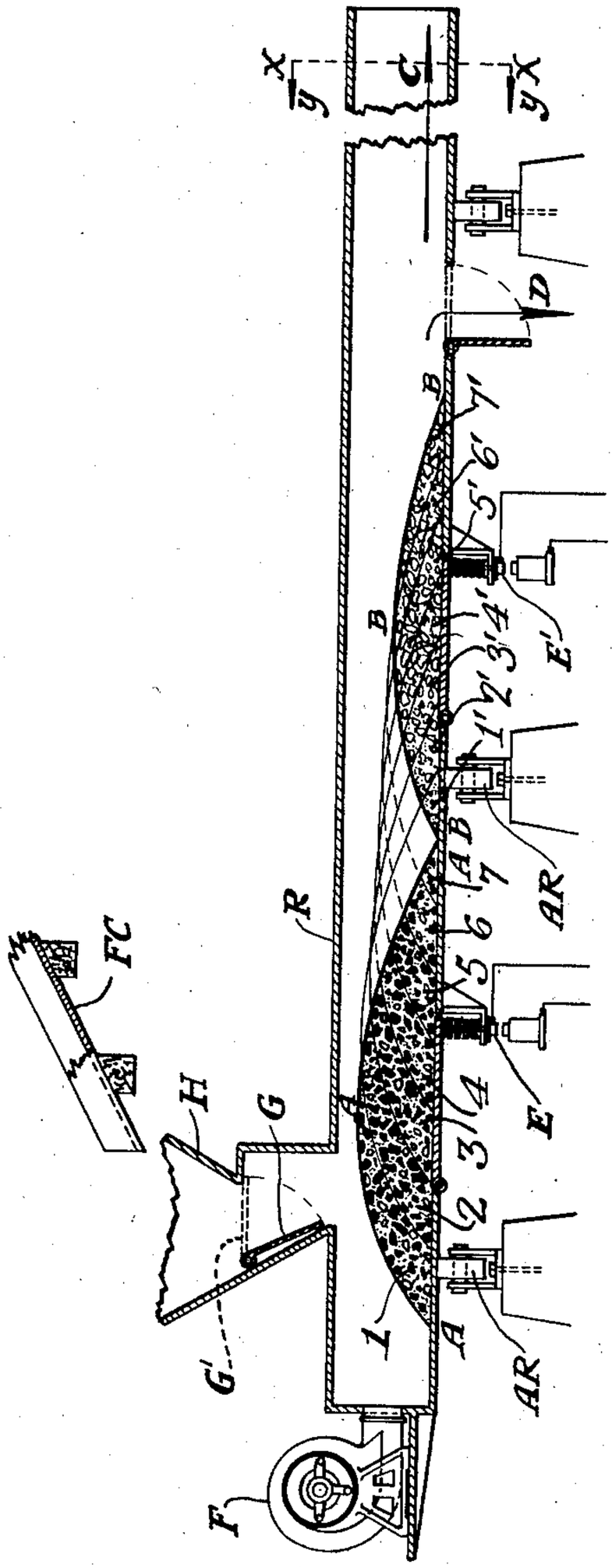

FIG. I

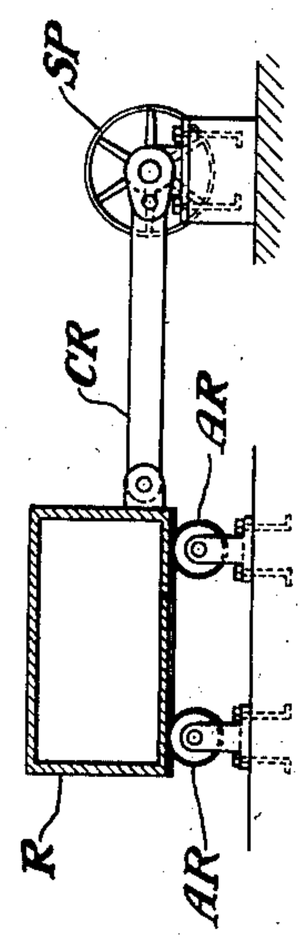

FIG. II

WITNESSES
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SEPARATING PROCESS

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1 Claim. (Cl. 209—1)

My invention consists of a method and apparatus for separating materials of differing physical character, such as differences in size and shape of the individual particles, in their external texture whether smooth or rough, and/or hard or soft, in their specific gravity or weight, in their electrical conductivity and/or magnetic permeability, in their surface tension and in their porosity and/or density.

To separate such materials into a plurality of separate products, each of which will consist of those of similar or like character, I subject a body of such material to the action of a fluid medium moving in a path of travel which brings it into contact with said body, whereby motion is imparted to the particles of a portion of said body, those most easily movable by said medium attaining a higher velocity than those less easily movable.

Those particles having the higher velocity travel away from those moving at slower speed, and quickly reach the desired region of discharge from which they are separately removed. The slower moving particles having accumulated in the separating receptacle can be separately removed from it. If desired, an intermediate "middlings" product can be separately recovered, and retreated for more complete separation.

In the drawing, Fig. I illustrates diagrammatically a vertical elevation and partly cross-section of a receptacle in which such separation can be made, and Fig. II a cross-sectional and end elevation of the receptacle shown by Fig. I, at the line XX looking in the direction indicated by the arrows Y, Y.

The separating receptacle R is shown as an enclosed rectangular conduit closed at one end, but open at the other, but is intended diagrammatically to illustrate a conduit of any desired shape or size.

It is equipped with a feed hopper H equipped with feed gate G which may be closed as indicated by the dotted lines H', and with a compressor, pump, or pressure producing device F shown diagrammatically as a fan, driven by power from any extraneous source whereby the fluid medium is introduced at any desired pressure and/or velocity.

Fig. I is also utilized to illustrate the described sequence of operation of the method in carrying out my invention which will now be described.

Commencing with the feed hopper H filled with materials to be separated the feed gate G closed, the receptacle R empty, and an unlimited supply of said materials available from the auxiliary feed chute FC, adjusted at the angle of repose of said materials, so that materials from FC will gravitationally flow into H to keep it full, the operation is as follows: the compressor F is started, the gate G is opened to establish the desired rate of feed, the materials then fall into R and rapidly build up a mass of materials which obstruct the flow of the medium, until a pile of materials indicated by the curved line A—A—A accumulates, whereupon the feed gate G is closed or partly closed.

The velocity of the medium now begins to act upon the accumulation A—A—A, eroding and carrying away the first layer numbered with the numeral 1 carrying the lighter material away at high velocity and leaving the heavier material between the top line of the accumulation A—A—A and the line separating section marked 1 from section marked 2, a small portion of which is eventually left within the secondary accumulation B—B—B and marked 1'.

Each of the layers 2, 3, 4, 5, 6 and 7 are in turn removed, the lighter material passing over accumulation B—B—B at high velocity and passing out of R as indicated by the arrow C, while the more slowly moving material accumulates in the layers 1', 2', 3', 4', 5', 6' and 7', slow moving material that passes beyond this accumulation dropping through the gate opening as indicated by the arrow D.

Electric contacts are shown by E and E', located in operative relation to the floor of the receptacle R at points where the floor is flexible or at movable gates in said floor so that the desired weight of the accumulated feed will complete or break electric connection E, indicating that the feed should be cut off. The electric connection E' may be used to release a latch and open a door in the floor of the receptacle to effect discharge of the refuse. The electric make or break E may also be used to effect closing of the feed gate G, all of which will be understood by those skilled in the art of automatic electric control and is not claimed as new or patentable by applicant except in combination with the particular invention disclosed herein.

While oscillation either longitudinal or transverse of the separating receptacle R is not essential it may assist in effecting separation by the fluid medium, by preventing the materials from becoming compacted and thus more difficult to move, the antifriction rollers AR, AR, are diagrammatically used to illustrate a means to permit transverse agitation by power transmitted

by connecting rod CR, from a pulley shown diagrammatically as a source of power and marked SP.

The separating receptacle R is shown as an oblong rectangular box mounted upon supporting rollers AR, AR, which may be used to impart sidewise oscillating movement to the structure, but is not essential to efficient operation of the separator and is not claimed as a part of my invention for the receptacle may be rigidly mounted, and as shown may be fixed in space with no provisions for sidewise or longitudinal oscillation. The fan may therefore be rigidly attached to the separating receptacle as shown by the drawing. As indicated by the break in the box near its right hand end, the box may be made long enough to have several doors similar to that shown by D for the removal of slow moving material which may thus be dropped into another similar receptacle to recover any of the lighter material which accompanies the heavier slow moving material in its plunge through the door D.

All of which is more fully described in the following claim:

The method of separating materials of different character which comprises building up a heap of a mixture of said materials, directing a stream of flowing gaseous medium against a side of said heap and confining said stream to pass over and beyond the heap of materials, allowing the force of said stream to erode away the side of the heap against which it is directed and carry the eroded away materials over the heap, said carried off materials receiving a velocity from the force of said stream proportional to the ease with which the separate materials may be moved, said stream being of sufficient strength to merely carry the material which receives a low velocity over the heap to the other side thereof, but carrying the material which receives a high velocity along with the stream, collecting the material which acquires a low velocity at a point beyond the initial position of said heap greater than the dimension of the base of the heap in the direction of flow of the stream whereby the heap is completely turned over at least once and collecting the material which acquires a high velocity at a more distant point from the heap, thus separately recovering the materials of different character.

HENRY M. CHANCE.