

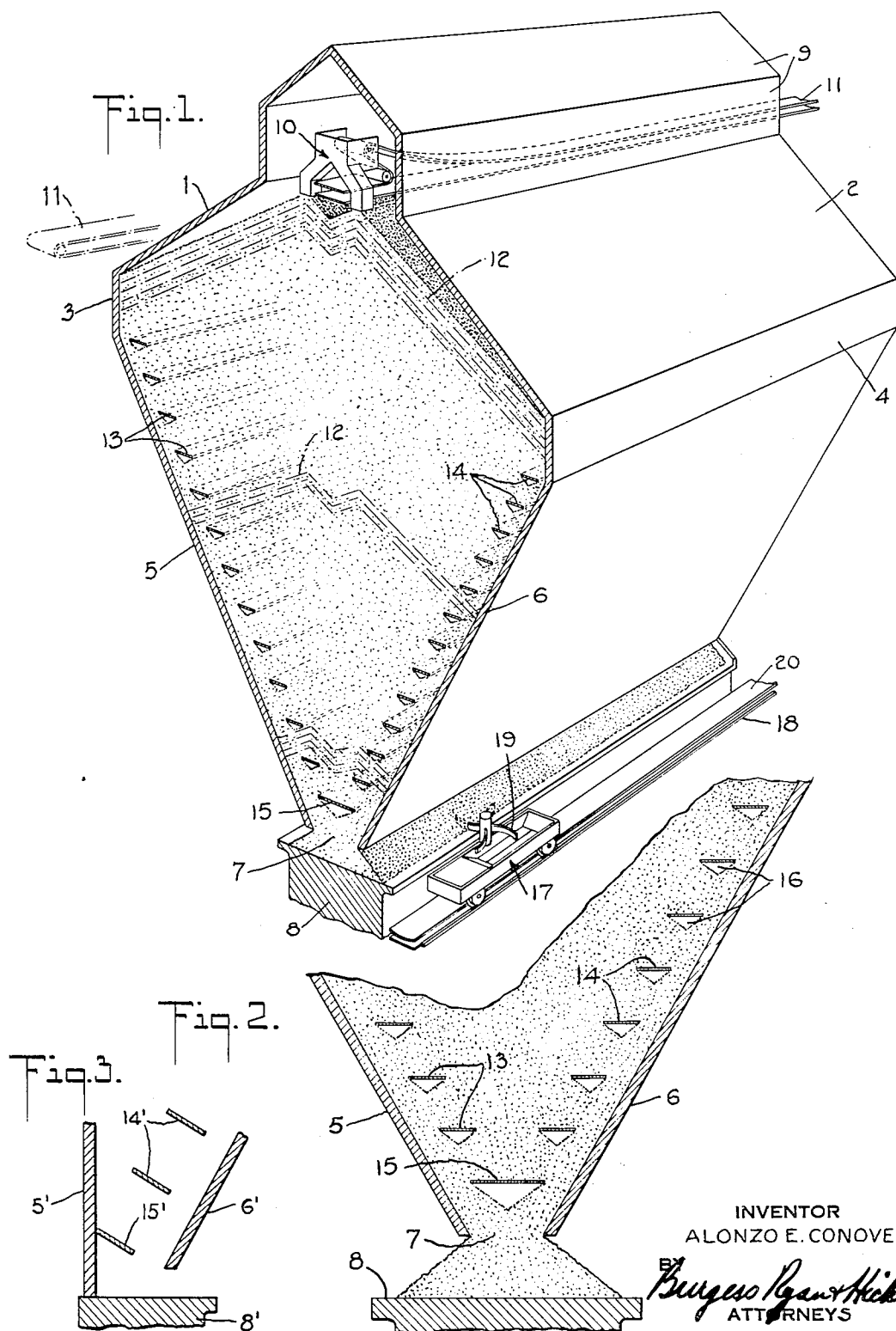
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BLENDING BIN

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BLENDING BIN

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This invention relates to the handling of ore, coal and other material requiring to be made available for use in a substantially uniform, blended condition representing an average of the varying assays of incoming supplies of the material.

It has heretofore been proposed to effect such blending by means of reclaiming apparatus designed to progressively attack and remove "slices" from the exposed end face of a pile of the material built up from a large number of layers of varying assay, each "slice" including material from all the layers.

The object of the present invention is to provide a hopper or bin structure whereby similar blending can be achieved automatically by gravity flow of the material and can be carried on continuously, that is, in such fashion that new material is fed into the top of the bin at a rate commensurate with its outflow at the bottom of the bin.

In general, the object is achieved by incorporating in a bin structure for layered material what amount to one or more gravity chutes which form the only escape passage or passages for the layered material and which chutes are of downwardly increasing cross section. By means of appropriate lateral inlets to the chutes, additional material may flow into them from all layers in the bin and effect the desired blending.

In the accompanying drawings, Fig. 1 is a broken out, perspective view of a bin incorporating one form of the invention; Fig. 2 is an enlarged cross section of the lower part of the bin of Fig. 1; and Fig. 3 is a broken out view in cross section illustrating a modification.

As will be apparent from an understanding of the principle of the invention, the shape of the bin may be widely varied and closed against the elements or not as may be suitable for the particular location. The illustrated structure, incorporates sloping roof sections 2 followed by vertical walls 3, 4 and then by converging walls 5, 6, so that the major part of the bin is of downwardly tapered section. At the bottom of the bin the wall spacing forms an outlet slot 7 below which is indicated a material receiving platform 8. As will be understood, the receiving platform is of such a width as to accommodate a pile of material which will itself serve to close the bin against continuous discharge except as the material is removed from the platform, as presently described.

The enclosure may be completed by an upper roof structure 9 which is indicated as housing a conventional travelling tripper 10 by means of which material fed to the tripper belt 11 is laid down in the bin in a great number of relatively thin layers 12, as in blending and reclaiming systems heretofore proposed.

In this form, what may be thought of as the discharge chutes are within the bin itself. They are defined on their outer sides by the bin walls 5, 6 and on their inner sides by series of vertically spaced, offset baffles or shelves 13, 14 supported within and extending the length of the bin. As more clearly illustrated in Fig. 2, the outer

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or remote edges of the baffles are spaced at progressively greater distances from the bin walls and the baffles are of such width as to prevent the vertical flow of material between the inner edge of one baffle and the outer edge of the one next below. Thus, for fine material the baffles should at least extend inwardly a distance such that the inner edge of each is vertically above the outer edge of the one next below. The bottom baffle 15 may be common to both series and, as will be recognized, serves to complete the blocking of the outlet against vertical descent and discharge of the material in the bin.

As the tripper fills up the bin with successive layers, they will build up more or less as indicated, the side slopes of the layers conforming to the angle of repose of the particular material being layered. If the baffles are horizontal, as indicated in this form, pockets 16 will form beneath the various shelves.

The control of the discharge of the material at the bottom of the bin and the reclaiming of the material can be variously organized and provided for but in this instance, and as is preferred, there is indicated a plough conveyor, consisting of a rotary plough feeder 17 mounted to travel back and forth on suitable tracks 18 adjacent platform 8 with its rotary plough 19 arranged to scrape material off the platform onto a conveyor belt 20. In this form, an identical feeder and belt will be provided on the other side of the platform 8.

As will be understood, removal of material from the platform opens up the bin outlet for the discharge of additional material; and, were there no baffles, it would be supplied by a vertical descent of a column of material along the central part of the bin, of more or less inverted conical section and there could be no constant blending. Due to the baffles, however, there can be no such direct vertical flow. On the contrary, the downward flow is initiated in the unobstructed paths afforded by the discharge chutes and this flow, as it starts, will be seen to consist of a column of layers as laid down in the bin. However, due to the downwardly increasing section of the chutes, every part of the column moves down into a space larger than it originally occupied. The effect is that of creating spaces at the edges of all of the layers, into which spaces material flows laterally into the chutes. And thus the layers originally comprising the columns of material within the chutes automatically pick up and carry along with them, material from other layers in the bin. In the result, an effective blending is achieved by the mere gravity flow of the material.

It will be understood that the first filling of the bin will be made up of a plurality of layers decreasing in thickness from the bottom to the top due to the increasing surface area over which each subsequent layer is spread. After the level of the material has reached the vertical walls 3 and 4, additional layers will spread over the top surface which will all be uniform in thickness. As material is simultaneously drawn out at the bottom and put in at the top, these layers will remain uniform in thickness provided the upper surface of the material in the bin does not fall below the vertical walls 3 and 4. As the blending operation proceeds any one individual layer progresses downward through the bin uniformly, gradually losing increments from its outside edges until it reaches the bottom shelf 15. All during this passage through the bin the layer maintains its relative position to all other layers and does not change in thickness. In other words, after the material initially put into the bin, filling it up to the bottom of the vertical walls, has been withdrawn, the bin will henceforth contain the maximum number of layers all of uniform thickness.

By correlating the discharge rate of the tripper and

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the recovery rate of the plough conveyor, the operation can be carried on continuously, once the bin has been filled.

In the modified form illustrated in Fig. 3, the bin has a vertical wall 5' which extends down to the platform 8' and a sloping wall 6' corresponding to the wall 6. The baffles 14' and 15' instead of being horizontal are set at an angle, preferably approximating the angle of repose of the material. With the baffles so arranged, a theoretically perfect blend is obtainable because none of the layers is blocked against outward movement in the chute section. In the form of Figs. 1 and 2, on the other hand, each baffle does present a projected surface normal to the slope of the layers of material and, hence, a theoretical though slight obstruction to outward flow of some of the layers.

In the light of the foregoing exemplification of the principles of the invention, the following is claimed:

1. A continuous blending bin having like side walls spaced to provide a vertical wall section and, extending below it, a downwardly tapering bin section terminating in a bottom outlet slot; vertically spaced series of baffles extending the length of the bin adjacent the walls of the downwardly tapering section of the bin; the spacing of the remote edges of the baffles from their adjacent bin walls progressively increasing downwardly of the bin; each baffle extending inwardly of the bin substantially to a point vertically above the outer edge of the baffle next below it; a bottom baffle common to the two series of baffles and spaced above and of a width to overlie the bottom outlet slot; material layering means mounted adjacent the top of the bin and adapted to fill the same with a multitude of layers of material to be blended; a material receiving platform beneath said bottom outlet slot; and feeder means positioned to recover material from said platform.

2. A continuous blending bin having a bottom outlet between the lower ends of upwardly diverging wall portions surmounted by vertical wall portions; a baffle overlying the outlet; and a series of vertically offset and vertically spaced baffles adjacent but spaced from each of the diverging wall portions; the spacing of the remote edges of the baffles from the respective walls progressively increasing downwardly of the bin; material layering means mounted adjacent the top of the bin and adapted to fill the same with a multitude of layers of material to be blended; and material receiving means mounted adjacent the said bottom outlet.

3. A blending bin having at least one non-vertical side sloped inwardly toward the bottom of the bin means for filling the bin with a multitude of layers of material to be blended; a series of vertically spaced baffles supported within the bin adjacent but spaced from the said non-vertical side and adapted to form, with said side, an unobstructed gravity discharge chute; the spacing of the outer edges of the baffles from the said side progressively increasing downwardly of the bin; each baffle extending inwardly of the bin substantially to a point vertically

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above the outer edge of the baffle next below; and discharge outlet means adjacent the bottom of the bin in material-receiving relation to the space between the said sloped side and the outer edges of the baffles.

4. A blending bin having adjacent but spaced from the inner side of one wall thereof a series of vertically spaced baffles; the spacing of the outer edges of the baffles from the said wall progressively increasing downwardly of the bin to form, with said wall, an unobstructed gravity discharge chute; each baffle extending inwardly of the bin substantially to a point vertically above the outer edge of the baffle next below means for filling the bin with a multitude of layers of material to be blended; the bin having a bottom outlet in material-receiving relation to the space between the said wall and the outer edges of the baffles.

5. A blending bin including means for filling the same with a multitude of layers of material to be blended and having at one side of the bin an unobstructed gravity discharge chute for layered material in the bin; the said chute being of downwardly increasing horizontal section and having a bottom outlet; said bin including a wall defining one side of the chute, the other side of the chute being defined by the edges of baffle means spaced from said wall and adapted to block flow of material to the outlet other than by way of the said chute.

6. A blending bin, means for filling the same with a multitude of layers of material to be blended, the bin incorporating a discharge chute of downwardly increasing horizontal section extending substantially throughout the height of the layered material in the bin and having an outlet at its lower end and a series of lateral inlets to the chute arranged one above the other substantially throughout its height.

7. The method of blending which comprises: establishing and replenishing to maintain a confined, single body of the material to be blended and in the form of a multitude of superimposed contiguous layers, and establishing a continuous gravity discharge stream of the material in the form of a descending column made up of portions of limited areas of substantially all of the said contiguous layers, while coincidentally and continuously augmenting the said stream by flowing limited quantities of each layer of the confined body of material laterally into the entire column, whereby an upper portion of the descending column reaches the bottom of the column along with material from all of the intervening layers.

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