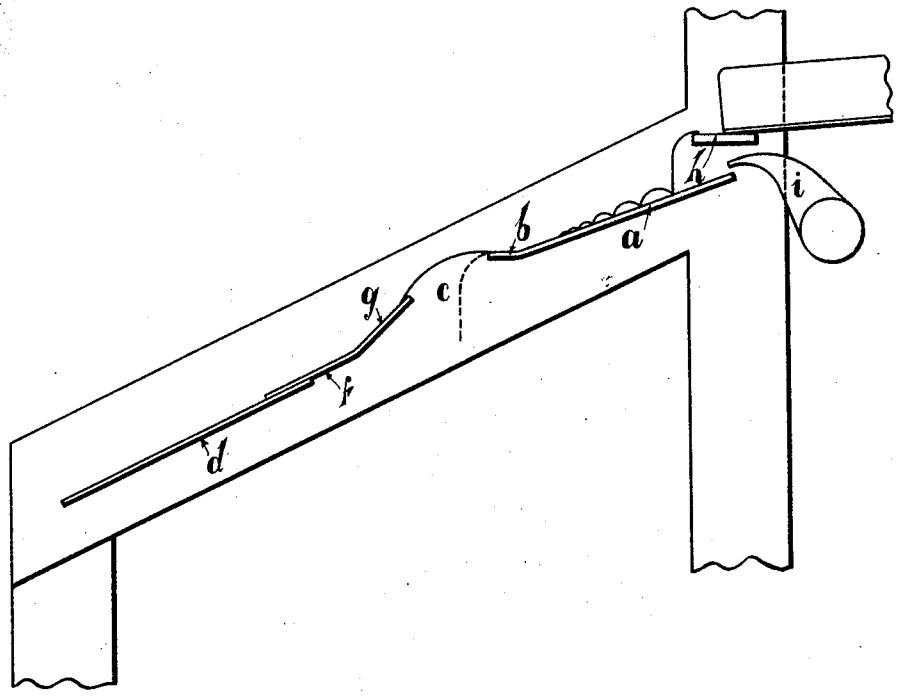
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W. H. BERRISFORD

APPARATUS FOR SEPARATING COAL FROM DIRT AND LIKE FOREIGN SUBSTANCES

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Inventor
William H. Berrisford
by Hobbs & Jennes
Attorneys

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WILLIAM HENRY BERRISFORD, OF STOKE-ON-TRENT, ENGLAND.

APPARATUS FOR SEPARATING COAL FROM DIRT AND LIKE FOREIGN SUBSTANCES.

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This invention relates to improved means for separating dirt, bone and the like from coal and particularly coal of the smaller type, such as nuts and the like after it has been passed through screens of suitable mesh whereby the coal is sorted to various sizes, but which still retains along with it the usual dirt and bone, the object being to provide a simple and improved apparatus for the purpose.

My invention has particular reference to that type of known device wherein the coal containing a proportion of dirt or bone is fed by a jigger into a more or less horizontal step and pushed on to the upper of a series of declining smooth plates of glass or other suitable material arranged at an effective angle, such plates either being in the same plane or in different planes or in planes having a slight angle with relation to each other but in all cases being provided with a gap between the lower end of one plate and the upper end of the other. As the coal, with the dirt and bone is fed on to the upper plate whose surface is wholly in one plane it leaps or slides down the plate and the quicker travelling coal leaps over the gaps in the separator whilst the dirt or bone travelling at a slower speed passes through the gaps. The foregoing is at any rate the object of plates arranged as described but hitherto the separating device has not been successful for the reason that in some of the known machines the material is subjected to a sliding action only, or to a bouncing action only, and in some cases the bouncing action is reduced to a slide and then the material is caused to bounce again in contact with a second plate. This second bounce interferes with the effect of the first bounce.

With the object of eliminating the defects of the known types of apparatus previously referred to my invention consists in subjecting the material to be separated to one collision with a declining plate, and bringing it as quickly as possible to a sliding action by bending or curving the lower end of the plate upwardly with relation to its general surface prior to the materials being separated at the gap.

A further feature of my invention consists in employing in conjunction with the first plate a straight, bent or upwardly curved plate at the lower side of the gap so that its upper edge normally lies between the two means of the parabolic curves described by the coal and dirt after leaving the bent lower edge of the upper separator plate. A modification of this last named arrangement consists of a succeeding plate adjacent the first plate having a surface in one plane or having its upper edge bent or curved upwardly, said plate being wholly adjustable to narrow or widen the separator gap.

A further feature of my invention consists in the combination with upper plates arranged as described of a jet device for directing a current of air down the surface of the upper plate or a succeeding plate or plates if desired, to keep it clear or free from dust.

My invention will be fully described with reference to the accompanying drawings which shows a side elevation of an apparatus constructed in accordance with my invention.

In the aforesaid type of apparatus and in carrying out my invention I direct the lower end of the upper plate *a* upwardly with respect to the general surface of the plate at an angle as at *b* or by curving it so that the coal and dirt are brought more into close contact with it before reaching the gap *c* between the plate *a* and the succeeding plate *d* and consequently the coal has a better chance of jumping the gap *c* by taking a greater parabolic curve whilst the dirt or bone by describing a lesser parabolic curve passes through the gap. To further assist in this operation I arrange the upper end of the second plate *d* with an adjustable portion *f* which is bent at an angle in an upward direction as at *g* though it may be curved upwardly and its upward edge terminate at a little distance below the upper edge of the upwardly-directly portion of the upper plate *a*. In other words the upper edge of the second plate is adjusted to lie between the parabolic paths described by the coal and dirt, such paths being shown as to the one in full line and as to the other in a broken line in the drawing. Instead of employing an adjustable plate, the second plate *d* may be bent or curved in the manner previously described at its upper end and such plate be wholly adjusted to increase or decrease the width of the gap.

The customary intake and exhaust valves

Any number of plates arranged as aforesaid may be employed since where the materials are not completely separated at the first gap they may pass on and become separated at the second or following gap. Or again materials passing through any of the gaps may still be mixed to some extent. These may fall on to other plates constructed the same as the first set, but arranged below the latter and be declined in the same or in an opposite direction.

In conjunction with plates arranged as aforesaid I employ at the top of the first plate a step *h* of the known type either arranged horizontally or slightly declined to which the materials to be separated are first fed in fairly regulated quantity and pushed over its front edge on to the upper separator plate *a* by a jigging action. I may also, if desired, employ one such plate or step opposite each gap to receive the partly separated material and push the latter off as before by a jigging action on to the next series of separator plates.

It has been found by continued experiments that coal is more resilient than dirt and will bounce when dirt will not. Colliding the material to be separated by dropping it off the step *h* causes the coal to rebound as shown by full lines in the drawing and to travel down the plate *a* more quickly than the dirt which only rebounds to a lesser extent as indicated by the broken lines. Experiment has shown that if the sliding surfaces are long enough the quickly travelling coal, if the feed is quick enough, catches up the dirt sliding down in front which belongs to the feed impulse immediately prior and so the difference in speed would become neutralized and the object defeated. The declining planes are therefore made as short as possible whilst the line of motion of the coal and dirt is made uniform. It is to this end that the lower edge of the declining plane is bent upwardly as described to finally reduce the motion of the recently fallen coal and dirt to one in which they travel at various speeds in a uniform direction. The bend or curve has also a distinct breaking or retarding action on the dirt which is in more intimate contact with the surface of the declining plate than the coal.

In conjunction with separator plates arranged as described I arrange to pass over the surface of the separator plate and particularly the upper one, a current of air which is directed by a jet device *i* located beneath the step *h* so that the air discharged practically passes along the full length of the plate *a* so freeing such plate from dust and increasing the efficiency of the apparatus.

I am aware it has previously been proposed in some forms of separator devices to bend the plates upwardly at their lower ends but this is in apparatus in which the materials to be separated have a purely sliding action and that in another case declining plates have been provided at their lower ends with an entirely separate plate of stone or slate directed upwardly and designed to retard the materials to be separated and that in conjunction with such a separate plate a straight plate has been employed to adjust the width of the separator gap. In this latter case also the materials are separated by a purely sliding action.

What I claim as my invention and desire to secure by Letters Patent is:—

In a coal separator, an upper inclined plate having its lower end portion bent upwardly, a lower inclined plate, a slidable inclined plate having its main part adjustably secured against the said lower plate and being slidable in the plane of the lower plate, said slidable plate having its upper end portion bent upwardly and being adapted to vary the width of the gap between the upper and lower inclined plates, a substantially horizontal feed plate for the coal secured above the top of the upper inclined plate, and an air jet device arranged between the feed plate and the upper plate and delivering a blast of air downwardly over the said inclined plates and the gap between them.

In testimony whereof I have hereunto set my hand.

WILLIAM HENRY BERRISFORD.