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APPARATUS FOR MAKING CARBON LAMELLAE, CARBON DISCS, CARBON SHEETS AND THE LIKE

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FIG. 1

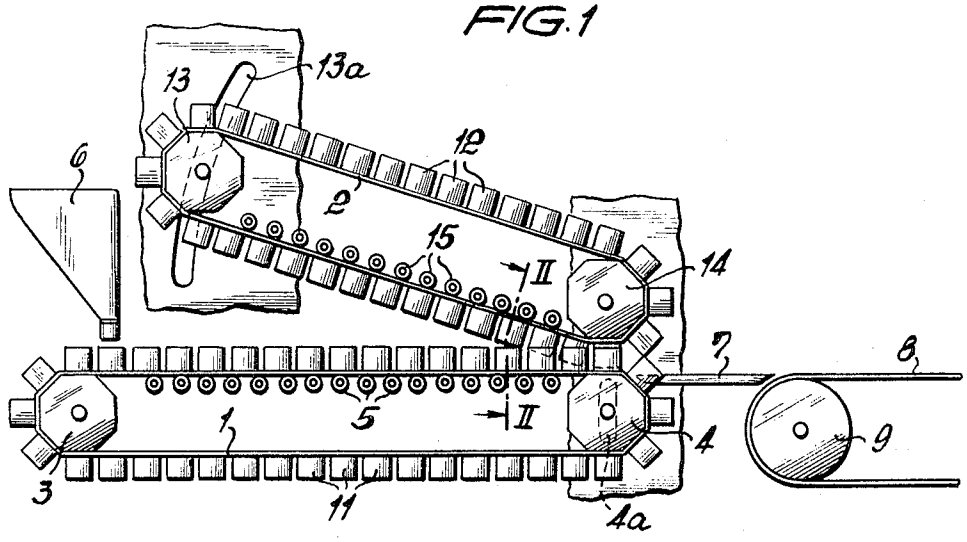


FIG. 2

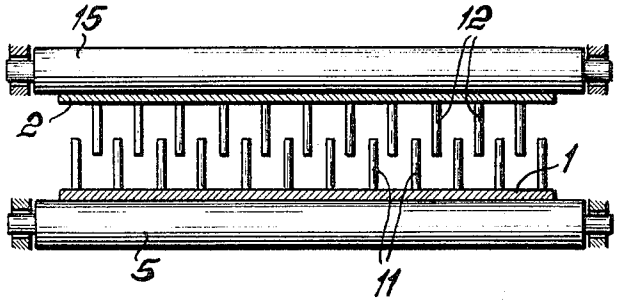
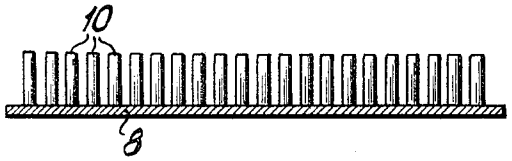


FIG. 3



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ABSTRACT OF THE DISCLOSURE

Apparatus for compacting material such as coal dust and coal slag and mixtures thereof and the like, while forming the material into lamellae in which two conveyor belts are arranged to run in converging relation so material deposited therebetween will be compacted and at least one belt has laterally spaced longitudinal ribs upstanding therefrom so as to divide the material as it is being compacted into the desired lamallae.

The present invention relates to an apparatus for making carbon lamellae, carbon discs, carbon sheets or the like, from coal dust, coal slag, or a mixture of coal dust and coal slag.

An important advantage of grate coking consists in that also residues obtained in connection with coal mining such as coal dust and coal slag can be used as starting material. In order for these materials to prepare lumpy coke, the starting material has to be prepressed into pieces. In this connection, it has proved particularly advantageous to carry out this method by making the pieces in the form of lamellae or sheets or foils, i.e. in the form of parts having the cross section of a relatively long rectangle. These lamellae are, during the grate coking, placed on edge or upright so that the heat required for the coking operation will be able to enter the parts to be coked over a large surface and that the gases freed in this connection can easily escape. However, the production of this lamella shape causes difficulties. Lamellae arranged transverse to the direction of movement of the conveyor belt could be produced by means of cogged cylinders or broad-faced steel gear while, however, the height of the lamellae would be rather low in comparison with the thickness thereof. Moreover, these lamellae would have to be shaped similar to the teeth of a rack which means they would have to be wider at the foot than at the head in order to be able to pull the cogged cylinders out of the shaped lamellae without difficulties. The manufacture of narrow high lamellae is not possible with this method.

A further possibility of producing the desired lamellae consists in advancing the feeder belt intermittently and during the stopping of the feeder belt to produce the lamellae by means of a press. With this operation, however, there exists the danger that the lamellae are pressed too tight which is undesirable.

It is, therefore, an object of the present invention to provide an apparatus for making lamellae of a cross section in the shape of a long rectangle, which will overcome the above mentioned drawbacks.

It is an other object of this invention to provide an apparatus for making lamellae of coal residues in a continuous process.

It is still another object of this invention to provide an arrangement as set forth in the preceding paragraphs which will permit keeping the pressure exerted upon the material being shaped into lamellae within admissible limits.

These and other objects and advantages of the invention

will appear more clearly from the following specification in connection with the accompanying drawing, in which:

FIG. 1 diagrammatically illustrates a side view of an apparatus according to the present invention.

FIG. 2 is a vertical section through the conveyor belts near the rear deviating rollers, said section being taken along the line II—II of FIG. 1.

FIG. 3 is a vertical section through the belt of the grate coker with carbon lamellae thereon.

According to the present invention, the coal dust or coal slag, or a mixture of coal dust and coal slag, is spread over an endless conveyor belt and is consolidated by being subjected to the pressure of ribs. The device according to the invention for carrying out this method is characterized by the provision of a second conveyor belt provided with ribs extending in longitudinal direction of the belt while the second belt is arranged above the first conveyor belt and forms therewith an acute angle. The first belt is provided with lateral walls for confining the sides of said belt. When the device is in operation, the ribs of said second endless belt gradually enter the material deposited in a substantially uniformly thick layer on the lower conveyor belt and thus form lamellae between adjacent ribs which at the same time are compacted to such an extent that they will be able to withstand the transport of the ribs into the adjacent grate coker.

Referring now to the drawing in detail, the arrangement shown therein comprises a lower conveyor belt **1** which is passed over deviating or returning rollers **3, 4** which have an octagonal circumferential contour. The arrangement furthermore comprises an upper conveyor belt **2** which passes over rollers **13, 14** which likewise have an octagonal circumferential contour. The upper conveyor belt is equipped with laterally spaced ribs **12** which stand out from the belt in vertical direction thereto. These ribs gradually enter a substantially uniform layer of starting material on lower conveyor belt **1** and while forming lamellae compact the same so that they will be able to withstand the further transport to the grate coker. This compacting effect will be further improved when also the lower conveyor belt **1** is provided with laterally spaced ribs **11** which, similar to the ribs **12** of the upper conveyor belt **2**, extend in longitudinal direction of the belt. In this way, grooves are formed on lower belt **1** which extend in longitudinal direction thereof and which are charged with coke slag or coal dust from a bin or funnel **6**. The arrangement of the ribs of upper belt **2** is such that one rib each of the upper belt will be able to enter between two ribs of the lower belt **1** so that the material charged onto the lower belt will have no possibility of escaping toward the sides. In this way, a better compacting of the lamellae under substantially uniform pressure will be assured.

It will be seen that ribs **11** and **12** on conveyor belts **1** and **2** are made up of short sections in substantially end to end relation so as to form substantially continuous ribs extending over the entire length of the straightened out sections of belts, whereas when the belts pass over the end rollers the sections of the ribs will separate as shown in the drawings. In the drawings, the individual sections of the ribs are shown slightly spaced from each other for the sake of clarity but the sections, in fact, are in substantially end to end abutment to prevent the escape of material laterally of the belts.

The reaction pressure exerted by the compressing of the fuel layer upon the conveyor belts can with short conveyor belts be absorbed by the belt itself. However, when the conveyor belts have a greater length, it is advantageous to support the belts by supporting rollers **15** over at least those areas over which the pressure is exerted upon the belts. The diameter of the supporting

rollers will, of course, depend on the width of the belt. Generally, it may be relatively small inasmuch as the occurring pressures also have to be within moderate limits in view of the desired degree of compactness. Just for purposes of example, the compacting pressures may be from 50 to 300 kilograms per square centimeter.

The lower conveyor belt **1** is past the deviating roller **4** followed by a bridge **7** over which the finished lamellae **10** (see FIG. 3) move onto the grate belt **8** of the coking grate, said grate belt **8** likewise being an endless belt passing over deviating rollers **9**, only one of which is shown.

The angle formed by the conveyor belts **1** and **2** with each other may be adjusted on the basis of experience. With some fuel types, this angle may be about 30°. However, with other types of fuels, it may be desirable to change this angle in one or the other direction. For this reason, it is advantageous to provide means which will allow an adjustment of the angle of inclination of belt **2** with regard to belt **1**. To this end, the framework supporting deviating roller **13** may be provided on each side of deviating roller **13** with an arcuate slot **13***a* in which the supporting shaft for roller **13** may slide and be adjusted.

Inasmuch as the distance between the deviating rollers **4** and **14** greatly influences the compacting pressure, it is advantageous also to provide means for varying the distance between rollers **4** and **14**. To this end, the framework supporting deviating roller **4** may be provided with a short arcuate slot **4***a* similar to slot **13***a* in which the shaft supporting roller **4** may be adjusted.

While the conveyor belts may generally consist of any suitable material as, for instance, rubber, inasmuch as said belts are subjected to no special stresses by high temperatures or the like, so called plate belts have proved particularly useful in this connection. This is due to the fact that this type of belt lends itself particularly easily to the mounting of the longitudinal ribs.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction and arrangement shown in the drawing but also comprises any modifications within the scope of the appended claims.

What we claim is:

1. An apparatus for making lamellae, especially discs and sheets of residues obtained when mining coal, which includes: first endless conveyor means adapted to receive and convey material to be pressed into lamellae, and second endless conveyor means arranged above and in the same vertical longitudinal plane as said first conveyor means while being inclined with regard to said first conveyor means so as to form an acute angle therewith, said conveyor means running in such direction that the sides thereof facing each other move in converging relation toward the end of said conveyor means which are closest to each other, said second conveyor means being provided with laterally spaced segmented rib means upstanding therefrom and extending in the longitudinal direction thereof and being operable in cooperation with said first conveyor means to compact and form material on said first conveyor means into lamellae as the said material approaches that end portion of said conveyor means which are closest to each other.

2. An apparatus according to claim **1** in which said first conveyor means is also provided with segmented rib means upstanding therefrom and extending in the longitudinal direction of said first conveyor means and laterally offset from the said rib means of said second conveyor means so that the rib means of said second conveyor means mesh with the rib means of said first conveyor means at those end portions of said first and second conveyor means which are closest to each other to thereby compact and form material on said first conveyor means into lamellae.

3. An apparatus according to claim **1** which includes support means respectively supporting at least those portions of said first and second conveyor means which cooperate with each other in compacting and forming the material on said first conveyor means into lamellae, said support means including rollers about which said conveyor means pass.

4. An apparatus according to claim **1** which includes means associated with said second conveyor means and operable to vary the inclination thereof relative to said first conveyor means.

5. An apparatus according to claim **2** which includes means associated with said second conveyor means and operable to vary the inclination thereof relative to said first conveyor means.

6. An apparatus according to claim **1** in which said first and second conveyor means are designed as plate belts.

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U.S. Cl. X.R.

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