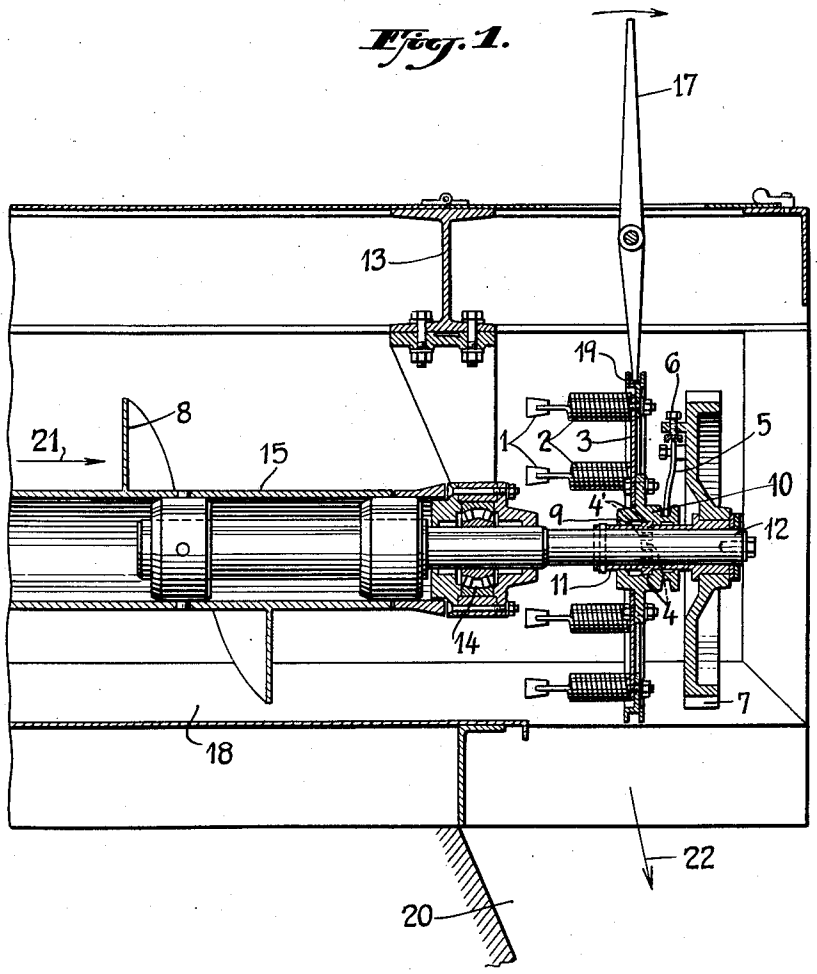
Jan. 6, 1959 J. J. MARTIN 2,867,385

DEVICE FOR DISINTEGRATING STRANDS OF FUEL

Filed March 27, 1957 2 Sheets-Sheet 1

Fig. 1.



INVENTOR.
JOHANNES JOSEF MARTIN.
BY K. B. Mayr
ATTORNEY.

Jan. 6, 1959 J. J. MARTIN 2,867,385

DEVICE FOR DISINTEGRATING STRANDS OF FUEL

Filed March 27, 1957 2 Sheets-Sheet 2

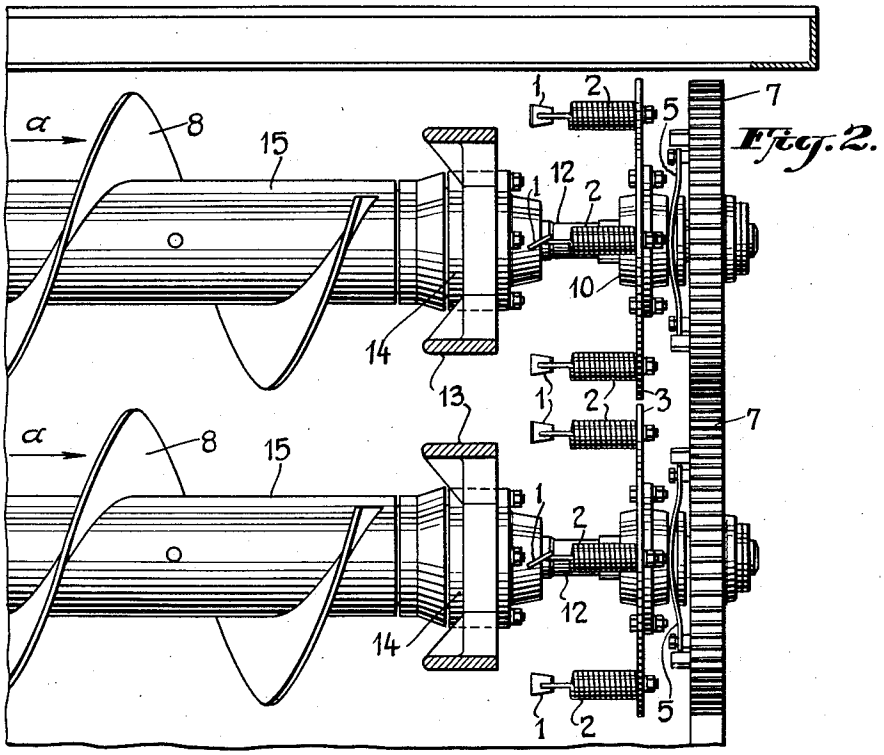


Fig. 2.

Fig. 3.

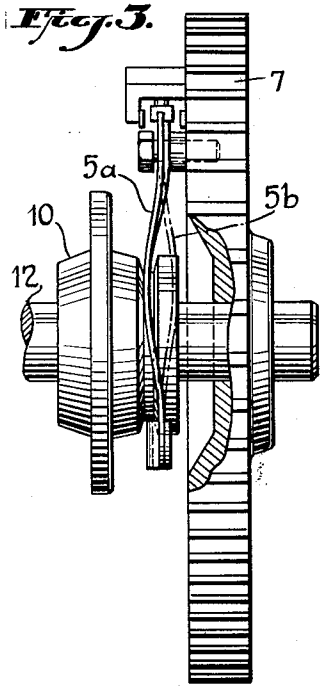
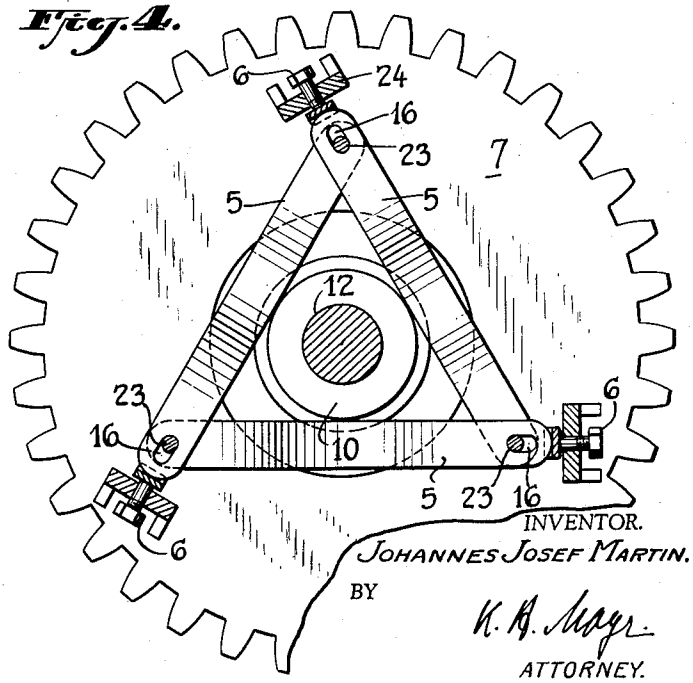


Fig. 4.



INVENTOR.
JOHANNES JOSEF MARTIN.
BY
K. A. Mayr
ATTORNEY.

United States Patent Office

2,867,385

Patented Jan. 6, 1959

2,867,385

DEVICE FOR DISINTEGRATING STRANDS OF FUEL

Johannes Josef Martin, Munich, Germany

Application March 27, 1957, Serial No. 648,948

Claims priority, application Germany April 18, 1956

8 Claims. (Cl. 241—32)

The present invention relates to a device for disintegrating or dividing a strand of fuel as is discharged from a coal bin, for example, by a screw conveyor.

The device according to the invention includes disintegrating members which are individually mounted on arms supported by a drive shaft whose rotation axis is parallel to the direction of the axial movement of the fuel strand.

If the fuel contains sticky matter it is compacted in the screw conveyor to form a continuous strand. The disintegrating members act like peeling knives on the strand of fuel entering the device, i. e. they scrape off the surface layer of the fuel mass.

An apparatus of the type described above is likely to become jammed or blocked by foreign bodies contained in the fuel strand, such as pieces of wood, wire, bolts, fishplates, etc., so that the apparatus may be severely damaged.

It is an object of the present invention to provide an improved apparatus for disintegrating a strand of fuel which apparatus eliminates the shortcomings of the conventional devices by safeguarding the disintegrating members or peeling knives against overload. This safeguard is effected according to the invention in two stages. Minor and temporary irregularities are met by flexibly connecting the peeling knives with their support arms, for example, by means of coil springs. If the elastic deflection of the peeling knives is insufficient to overcome the obstruction, the axial pressure of the fuel strand and/or of the obstructive bodies acting on the disintegrating mechanism is used for suddenly interrupting the drive of the device.

The novel features which are considered charactertistic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of an embodiment thereof when read in connection with the accompanying drawing in which:

Fig. 1 is a vertical longitudinal section of a disintegrating device according to the invention;

Fig. 2 is a top view of an apparatus according to the invention, including a plurality of devices of the type shown in Fig. 1;

Fig. 3 is a large scale side view of a detail of the device according to the invention;

Fig. 4 is a front view of the detail shown in Fig. 3.

Like parts are designated by like numerals in all figures of the drawing.

Referring more particularly to the drawing the fuel, i. e., coal, is transported from a bin, not shown, by means of a screw conveyor **8** in the direction of the arrow **21** and is in a rather compact form before reaching the dividing or disintegrating device at the right end of the conveyor **8**. After disintegration of the fuel strand the coal drops into a shaft **20** in the direction of arrow **22**, the shaft leading, for example, to a furnace. The screw conveyor **8** includes a hollow shaft **15** which is

supported in a bearing **14** connected with a duct **18** by means of a bracket **13**. The disintegrating device includes a shaft **12** extending into the hollow shaft **15**. The shaft **12** supports a carrier having arms **3** individually carrying disintegrating members which are in the form of peeling knives **1**. If desired, a disk may be provided instead of the arms **3**. The shaft **12** is driven by means of a drive wheel **7** and is connected with the carrier by a clutch which will be described later.

The knives **1** are individually connected with the arms **3**, or a disk, by means of coil springs **2** which afford yieldingly giving way of the knives **1** to an obstruction. Depending on the type and size of the obstructive bodies a pressure component may be produced in the axial direction of the movement of the fuel strand which is too great to be absorbed by the coil springs **2**. To cope with such an increased overload an additional safeguard is provided in the disintegrating device according to the invention. An excessively increased pressure acting in the axial direction of the fuel strand actuates a clutch which is located in the interior of the hub **10** supporting the arms **3** or forming part of a disk carrying the springs **2**. The clutch comprises claws **4'** which preferably extend radially from a sleeve **11** mounted on the shaft **12** and which are adapted to be inserted into corresponding gaps **4** provided inside the hub **10** upon axial movement of the hub to the left in Fig. 1. If the hub is moved to the right the claws **4'** move out of the gaps **4** and can rotate freely in an interior annular groove **9** surrounding the sleeve **11**. The sleeve **11** is rigidly connected with and driven by a wheel **7** which may be a gear wheel or a sprocket wheel depending on the available drive means.

The clutch **11**, **4'**, **4**, **10** is actuated by means of leaf springs **5** which are supported by the drive wheel **7** and individually confined within a space which is smaller than the lengths of the individual springs for bending the springs to form a bulge adapted to snap in axial direction of the drive shaft between positions **5***a* and **5***b*, shown in Fig. 3.

The middle portions of the springs **5** extend into an annular groove on the outside of the hub **10**. By confining the springs into a space which is shorter than the lengths of the unstressed springs the springs are bent and yield to pressure which acts at a right angle to the planes of the springs in a snapping manner, i. e., the springs tend to escape the bending stress by assuming a configuration which corresponds to the length of the spring. The drawing shows the clutch in engaged position whereby the bulges of the springs extend to the left (**5***a* in Fig. 3). The clutch provided between the hub **10** and the drive wheel **7** is disengaged when the middle portions of the leaf springs are pressed to the right until the springs snap into the right end position **5***b* shown in dash-dot lines in Fig. 3. The leaf springs take along the hub **10**, when moving to the right so that the gaps **4** move out of engagement with the claws **4'**, interrupting the drive of the peeling means **1**, **2**, **3**.

The pressure exerted by the leaf springs **5** in axial direction is adjustable. For this purpose pins **23** are provided on the drive wheel **7**, each pin extending through apertures provided at the superposed ends of two springs **5**. The illustrated embodiment comprises three pins **23** and three leaf springs **5**. An elongated hole **16** is provided on at least one end of each spring. One end of each spring abuts against an adjusting screw **6** screwed in a suitable boss **24** on the wheel **7**. By manipulating the adjusting screws **6** the size of the bulge of the springs can be changed for adjusting the pressure needed for acting against the bulge of the springs for snapping the springs from one extreme position into the opposite extreme position.

A particular advantage of the device according to the

invention is that, if a plurality of devices are used, only the device is cut out in which the obstruction occurs. All the other comminuting devices continue to operate normally.

To re-engage the clutch after it has been automatically disengaged, the carrier for the knives 1 need only be pushed to the left which can be done by a rod or by means of a lever 17 which is pivoted to the frame of the apparatus and which has an end extending into an annular groove in a rim 19 provided on the carrier. The position of the lever 17 indicates whether a fuel strand is moving normally or whether there is an irregularity. The lever 17 may be used for actuating a switch for remote indication of the position of the individual devices.

It is a particular advantage of the invention that the safeguard means for the comminuting device require very little space. The use of leaf springs responding to axial pressure makes it possible to make the comminuting device very short.

What is claimed is:

1. A device for dividing up or disintegrating fuel masses after they have been fed thereto by a conveyor, said device comprising a rotatable drive shaft whose rotation axis is substantially parallel to the direction of movement of the fuel masses entering the device, a carrier member extending at a right angle from and being axially movable on said shaft between two extreme positions, said carrier member having a side facing the entering fuel mass, a plurality of disintegrating members flexibly connected with said carrier member and extending from said side substantially parallel to the rotation axis of said shaft and in a direction opposite to the direction of movement of the fuel mass for effecting disintegration of the fuel mass in a plane located substantially at a right angle to the direction of movement of the fuel mass, clutch means operatively associated with said carrier member and with said shaft for rotation of said carrier member by said shaft when said carrier member is in a predetermined axial position on said shaft and for permitting free rotation of said shaft relatively to said carrier member when the latter is axially moved out of said predetermined position by the fuel mass entering the device, said carrier member having a hub portion axially movable on said shaft and forming one half of said clutch means, said hub portion having a circumferential portion, a radial recess in said circumferential portion, a leaf spring extending into said recess, and an element extending radially of said shaft, said leaf spring having an end rigidly connected with said element distant from said shaft, said leaf spring being initially bent to retain said carrier member in either one of its extreme axial positions.

2. A device for dividing up or disintegrating fuel masses after they have been fed thereto by a conveyor, said device comprising a rotatable drive shaft whose rotation axis is substantially parallel to the direction of movement of the fuel masses entering the device, a carrier member extending at a right angle from and being axially movable on said shaft between two extreme positions, said carrier member having a side facing the entering fuel mass, a plurality of disintegrating members flexibly connected with said carrier member and extending from said side substantially parallel to the rotation axis of said shaft and in a direction opposite to the direction of movement of the fuel mass for effecting disintegration of the fuel mass in a plane located substantially at a

right angle to the direction of movement of the fuel mass, clutch means operatively associated with said carrier member and with said shaft for rotation of said carrier member by said shaft when said carrier member is in a predetermined axial position on said shaft and for permitting free rotation of said shaft relatively to said carrier member when the latter is axially moved out of said predetermined position by the fuel mass entering the device, a drive wheel mounted on said shaft, said carrier member having a hub axially movable on said shaft and forming one half of said clutch, a leaf spring having a middle portion engaged by said hub, and support means connected with said drive wheel and engaging the ends of said leaf spring for supporting said spring in a position substantially parallel to said wheel and confining said spring within a space smaller than the length of said spring for bending said spring to form a bulge adapted to snap in the axial direction of said drive shaft for snappingly moving said hub between the clutch engaging and the clutch disengaging position.

3. A device according to claim 2 in which said support means include two pins mounted on said drive wheel and in which said spring has an aperture at each end, said apertures individually receiving one of said pins, at least one of said apertures being greater in the longitudinal direction of said spring than the cross section of the pin received in the aperture, said support means including adjustable spring tensioning means abuttingly engaging an end of said spring.

4. A device according to claim 3, including a boss axially extending from said wheel, said spring tensioning means including an adjusting screw having an end abutting against an end of said spring, said screw being screwed into said boss and extending in the direction of the longitudinal axis of said spring.

5. A device according to claim 2, including a conveyor worm for the fuel, said conveyor worm having a hollow shaft, said drive shaft extending into and being rotatably supported by said worm shaft, claws connected with said drive shaft, said hub being provided with gaps adapted to receive said claws.

6. A device according to claim 5, including a bushing mounted on said drive shaft and rigidly connected with said wheel, said claws radially extending from said bushing.

7. A device according to claim 5 in which said hub is provided with an internal annular groove surrounding said drive shaft, said gaps extending axially of said groove and the latter accommodating said claws when the clutch is disengaged.

8. A device according to claim 2, including a stationary housing, an annular groove in said carrier member, a lever swingably supported by said housing and having an end received in said groove for axially moving said carrier member against the action of said spring.

References Cited in the file of this patent

UNITED STATES PATENTS

786,293	Johnston	Apr. 4, 1905
2,094,971	Surdy	Oct. 5, 1937

FOREIGN PATENTS

705,070	Great Britain	Mar. 10, 1954
1,096,107	France	Dec. 29, 1954