March 20, 1962 P. HANNES 3,025,981

SLIT HOPPER DISCHARGE MEANS

Filed July 12, 1960 2 Sheets-Sheet 1

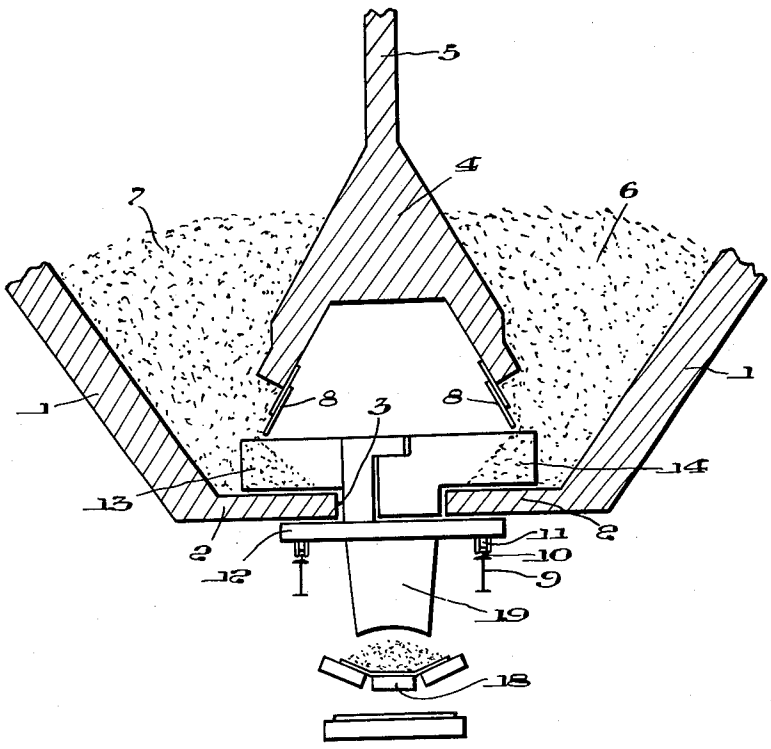

Fig. 1.

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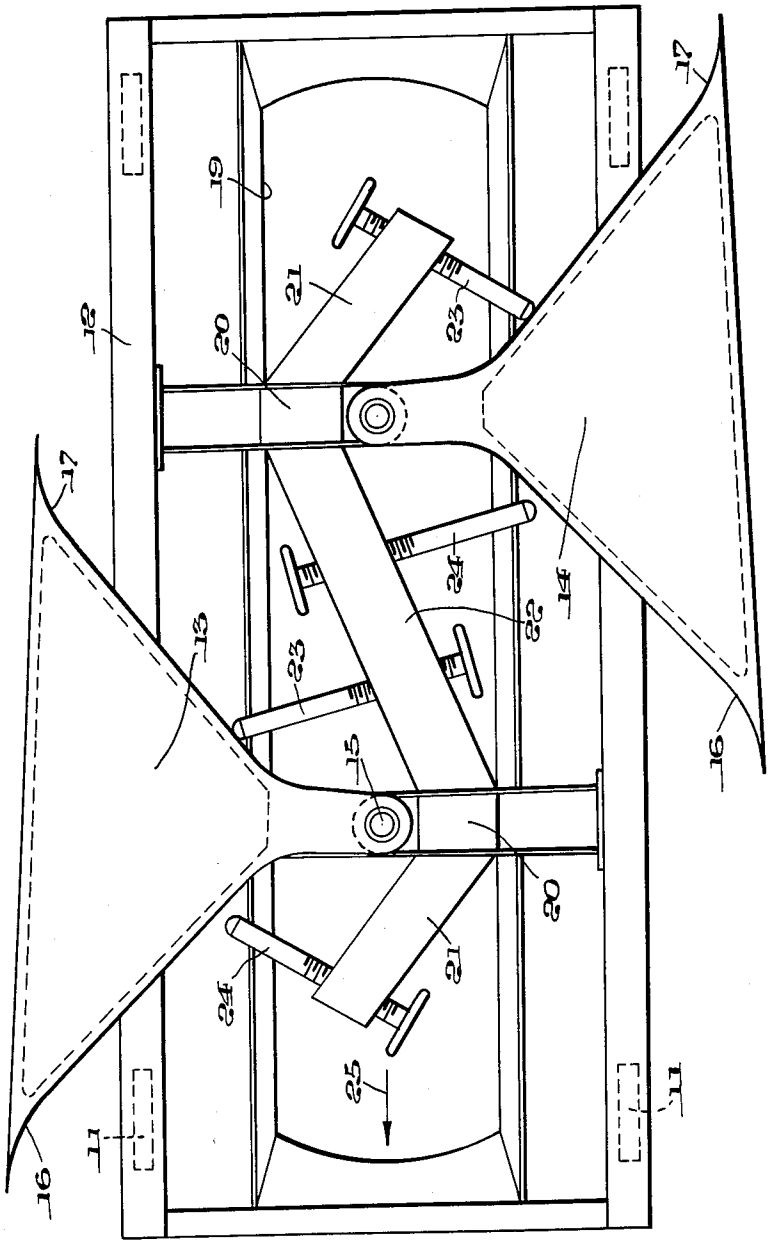

Fig. 2.

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SLIT HOPPER DISCHARGE MEANS

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3 Claims. (Cl. 214—17)

The invention relates to a slit hopper with a central saddle for material which is deposited on both sides of said saddle on retracting horizontal supporting surfaces; the material is discharged from said surfaces by scrapers arranged under the saddle on a longitudinally movable car.

In known slit hoppers, the material which is sloped or inclined to converge on the supporting horizontal surfaces, is discharged therefrom by means of scrapers which consists of arms which swing to reverse their position on the supporting surfaces and that scrape the material from the supporting surfaces as the car moves along under the saddle. A pair of such scrapers is arranged on each scraper car for each direction of travel, one pair of which is swing out over the supporting surfaces and the other pair of which is retracted. On reversing the direction of travel, special apparatus is necessary for bringing the scrapers into and out of position. On reversing the direction of travel of the scraper car in order to bring the scrapers, which swing out for the discharge of the material, at once into the complete operating position, it is necessary in known apparatus to move the scraper car beyond the vicinity of the inclined or converging material and only then to effect the reversal of the direction of travel of the scraping car. In the short period of time, of say three seconds, necessary for this, the conveyor belt which is arranged under the saddle and supporting surfaces of the slit hopper runs without load so that in this period of time the material is not conveyed onto the belt leaving blank spaces and then the load and capacity of the belt is uneven and not uniform. However, such a uniform conveying is of considerable importance in installations for mixing different types of materials, such as coal for coke ovens and ore for sintering, in order to obtain uniform mixtures.

The invention now consists in arranging on each said supporting surface of the slit hopper a scraper constructed in the shape of a double plow pointing toward both directions of travel. By this scraper constructed conforming to the invention, the scrapers do not have to be withdrawn from the vicinity of the coal in the bin or hopper at the ends of the slit hopper in order to obtain an immediate complete engagement of the scrapers in the coal deposited on the supporting surfaces. The scrapers, on the contrary, are always ready for engagement after reversal of the direction of travel of the scraper car and begin at once with the discharge of the material in the opposite direction of travel.

According to another characteristic of the invention, the scrapers are arranged on opposite sides of the saddle in a partially overlapping relation position in the longitudinal direction of the car.

In this way, the scraper arranged on the scraper car closer towards the front end of the slit hopper, conveys half of the amount of material on the shelves at that end of the hopper onto the conveyor belt and also begins at once to convey material with the opposite motion again. Likewise, the other scraper closer to the other end of the hopper ends with the conveyance of half of the amount of material at the other end of the saddle, so that in comparison with known scrapers, which are arranged in pairs on the ends of the scraper car, only a very slight or no interruption occurs in the supply of material to the conveyor belt at each end, and merely the height of the layer of the material on the belt is reduced to one-half along the length of part of the belt, as a result of the reversal time for the reversal of the scraper car. An operation of the belt without loading thereof in parts, which is detrimental to the subsequently connected classification apparatus, is prevented thereby.

Furthermore, the invention consists in arranging the scrapers articulately and to limit their capacity of oscillation by adjustable stops. A back-cutting is achieved by these adjustable stops in the sense that the plow-like scraper proceeding in the direction of travel, projects laterally opposite the other scraper part so that a crushing or comminution of the material by the back of the scraper is prevented.

The scraper is automatically adjusted in this slightly inclined position with the beginning of the direction of reversal of the scraper car without any special measures. It is also possible by the adjustable stops to regulate the amount of discharged material, especially in relation of the two scrapers to one another, for example in the case of slit hoppers with two types of materials.

The invention is illustrated by way of example in the drawings.

FIGURE 1 illustrates a vertical section transversely of the saddle through the lower part of a slit hopper provided with the discharge apparatus.

FIGURE 2 illustrates a top plan view of the scraper car from above scrapers.

The lower part of the slit hopper consists of the inclined converging side walls **1** and the essentially horizontal scraper shelf supporting surfaces **2**. The front of the hopper is closed by walls not illustrated. A saddle **4**, on which is connected at the top a vertical separating wall **5**, is arranged above a slit located between the supporting surfaces **2**. Two longitudinal hoppers or compartments **6**, **7**, which may serve for the reception of two different types of material, are formed in this manner. Regulable disks **8**, by means of which the material inclined toward and converging on supporting surfaces **2**, and consequently, the amount of material to be withdrawn, may be regulated, are arranged on the lower ends of saddle **4**.

Underneath the discharge slit **3** a scraper car **12** which is movable on wheels **11**, is arranged on longitudinal guide rails **10** provided with guide rail supports **9**. The scraper car **12** is equipped with scrapers **13**, **14**, which are arranged in a partially overlapping position relative to one another one beyond the other in the longitudinal direction of travel of the car and each of which engages on one of the two shelf supporting surfaces **2** of the slit hopper. Scrapers **13**, **14** oscillate horizontally around a vertical joint or pivot **15** in both directions of travel of the car and have a diverging plow-like construction moving inclinedly in both directions of travel, as illustrated at **16** and **17**.

Furthermore, the scraper car **12** is provided with bottom outlet **19** which discharges the material downwardly onto a continuously moving conveyor belt **18**, on which the material scraped out by scrapers **13**, **14**, on moving of the car **12** is conveyed. Scrapers **13**, **14** are mounted on cross-bars **20** with which are connected attachments **21** and an arm **22** connecting both cross-supports **20**. Adjustable screws **23**, **24** are supported on attachments **21** and arm **22**.

The adjusting screws **23**, **24** are installed so that scrapers **13**, **14** have a slight inclined position in the direction of travel and so that, upon moving car **12** in the direction of arrow **25**, the plow-like part **16** of both scrapers **13**, **14** again engage on the supporting surfaces **2** the same as plow-like part **17** when the car **12** moves

in the opposite direction, so that the plow-like part **16** of both scrapers engages in the material like a knife without the to-be-discharged material being subjected to a crushing.

When the scraper car **12** arrives in one of the two end positions of the slit hopper, the direction of travel is immediately reversed and the scrapers **13**, **14** located in the material oscillate with the beginning of the motion so that the scrapers previously supported by screws **23** are now supported by screws **24**.

As is apparent in FIGURE 2, in the case of travel in the direction of arrow **25** illustrated in FIGURE 2 to the left-hand end of the hopper, the material is withdrawn further ahead by scraper **13**, than is done by scraper **14**, onto the conveyor belt located therebelow in the vicinity of the left front end of scraper car **12**. After the subsequent reversal of the direction of travel, the scraper **14** is located further to the right in the vicinity of the right front end of scraper car **12** so that the material discharged by this scraper from the other supporting surface **2** is conveyed to the end of the conveyor belt further along to the right than is done by the scraper **13** and the conveying is started again immediately after reversal of the direction of travel. Plow **16** of one scraper **13** and plow **17** of the other scraper **14**, consequently scrapes material from its accompanying shelf supporting surfaces **2** to one of their reversal positions and back in contrast with the plow **17** of scraper **13** and plow **16** of scraper **14** which do not reach the ends of the spaces **2** at the ends of their other several positions.

A uniform conveying of the material by means of the conveyor belt is furthermore obtained by the fact that the scraper car has a greater speed in the direction of motion of the conveyor belt than in the opposite direction of travel. This speed is regulated by terminal switches which are arranged on the ends of the slit hopper and against which the scraper car hits.

I claim:

1. The combination with a slit hopper having a central saddle and oppositely disposed scraper shelf supporting surfaces for material which is deposited on both sides of the saddle for withdrawal from the shelf supporting surfaces, of scrapers arranged on opposite sides of a longitudinally movable car and operable between said shelf surfaces under the saddle, each scraper extending over one of said surfaces and having oppositely disposed diverging plows facing in both directions of travel, the scrapers on opposite sides of the car being arranged in spaced relation from each other in the direction of travel of the car alongside the shelf supporting surface, and each scraper being provided with means to maintain both plows always in position for plowing over the supporting surfaces during both directions of movement of the car.

2. Slit hopper conforming to claim 1, and in which the scrapers on opposite sides of the car are arranged in partially overlapping relation in the longitudinal direction of the car.

3. Slit hopper conforming to claim 1, and in which the scrapers are pivotally arranged for horizontal oscillation about a vertical axis and their capacity of oscillation in each direction of movement of the car is limited by regulable stops as the means to maintain both plows always in position for plowing over the supporting surfaces as aforesaid.

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