Aug. 8, 1967 V. E. REZABEK 3,334,428

MATERIAL HANDLING APPARATUS

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FIG. 1.

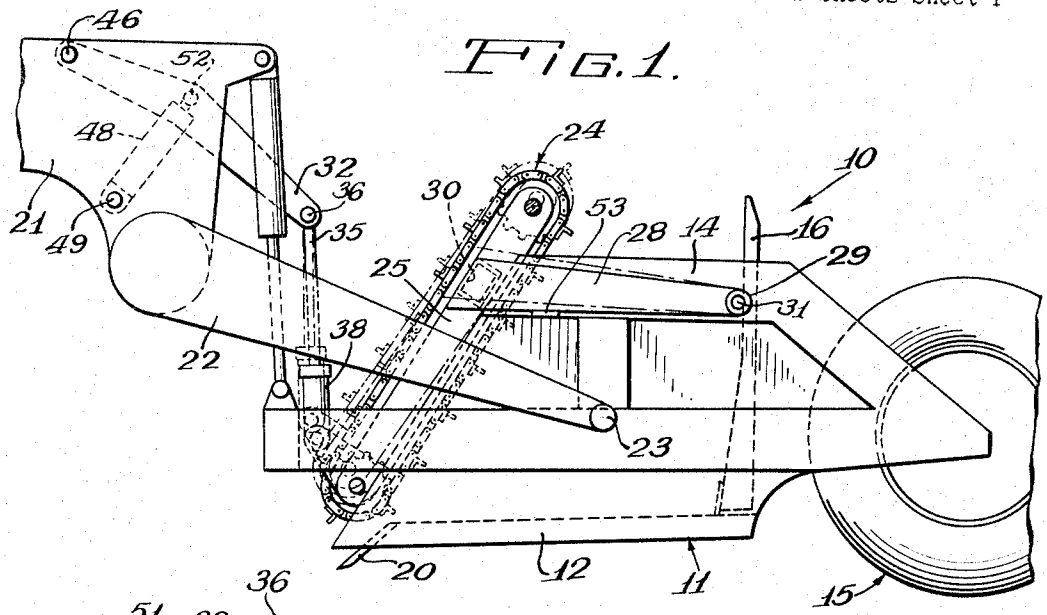


FIG. 2.

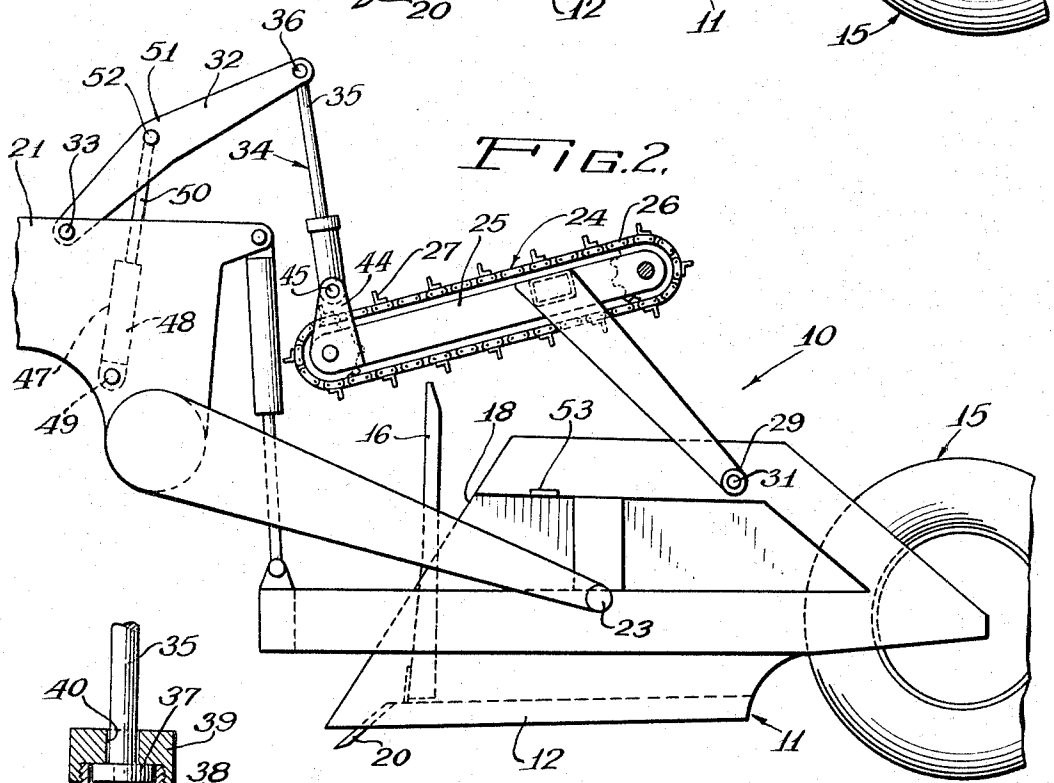
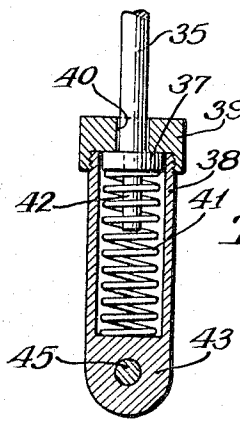


FIG. 3.



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MATERIAL HANDLING APPARATUS

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FIG. 4.

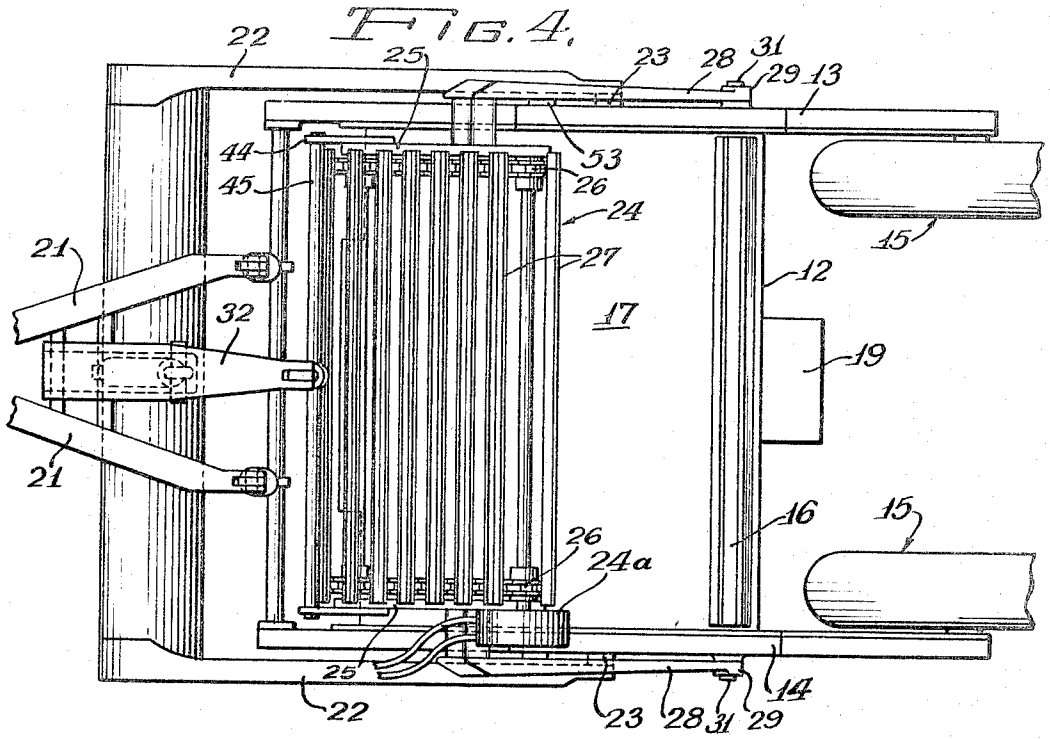
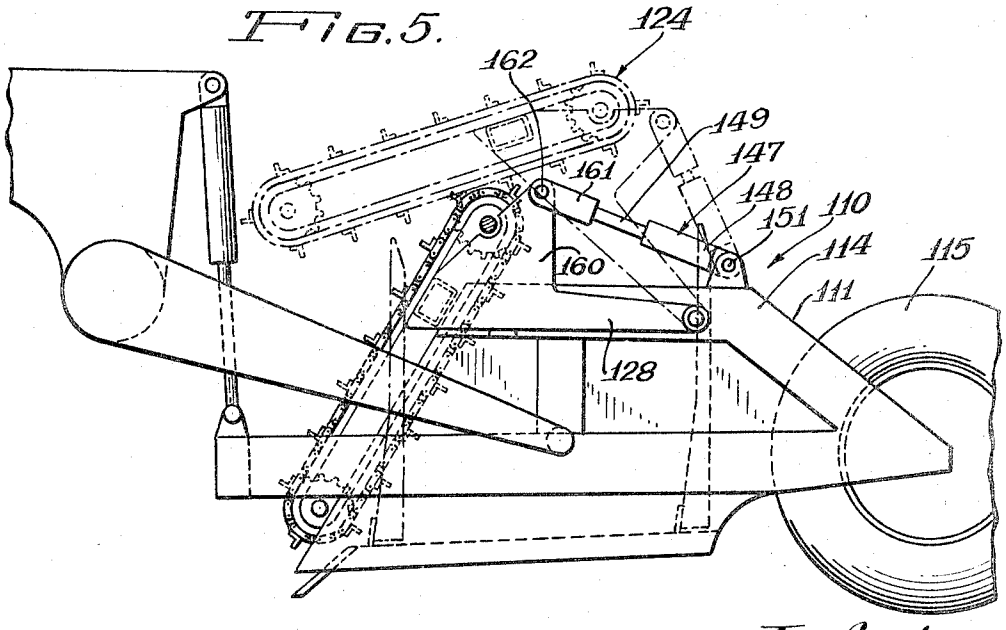


FIG. 5.



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MATERIAL HANDLING APPARATUS

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4 Claims. (Cl. 37—8)

This invention relates to material handling apparatus and in particular to conveyor means for use in such apparatus.

In one conventional form of material handling apparatus, a wheel bowl is provided having a bottom wall with a leading cutting edge and side walls defining a material receiving space having a front opening. The wheeled bowl is adapted to be moved forwardly along the ground by a suitable tractor or the like, whereby the cutting edge scrapes earth material from the ground and delivers it into the material receiving space. It has been found, however, that in such a scraper apparatus the earth material tends to collect in the forward portion of the material receiving space placing an additional load on the tractor in requiring that the newly scraped material force the previously receiving material backwardly to the rear of the space. To alleviate this condition, elevating conveyor mechanisms have been provided on the bowl for conveying the scraped material upwardly and rearwardly to the rear of the space thereby permitting the scraping to be effected with minimum power requirements in the tractor.

The present invention is directed to an improved method of mounting the conveyor mechanism on the bowl. A problem has arisen in the mounting of such conveyor mechanisms. In unloading the scraper, an ejector plate is moved forwardly through the material receiving space to urge the received material forwardly out through the front opening of the space. At this time it is necessary to reposition the conveying means so that it will be out of the path of movement of the ejector plate. A substantial number of different methods of mounting such a conveying means on the bowl have heretofore been provided. However, none has been completely satisfactory in meeting the desideratums of simple, economic, and rigid bowl construction. The present invention comprehends an improved conveyor means mounting structure eliminating the above discussed disadvantages of the known structures in a novel and simple manner.

Thus, a principal feature of the present invention is the provision of a new and improved material handling apparatus.

Another feature of the invention is the provision of a new and improved means for mounting a conveying means in such a material handling apparatus.

A further feature of the invention is the provision of such a material handling apparatus having a wheeled bowl having a bottom wall provided with a leading cutting edge and side walls defining a material receiving space having a front opening, means movable forwardly through the space for ejecting material received therein outwardly through the front opening, and means for pulling the bowl forwardly and having a gooseneck, means for conveying material scraped by said leading edge rearwardly into the space including a frame and a conveyor carried by the frame, a support, means carrying the support on the bowl for pivotal movement about a first axis transverse to the bowl, and means securing the support to the frame for swingably guiding the conveying means about the axis between a lower, rearwardly upwardly inclined conveying position across the front opening and an upper retracted position above the path of movement of the ejecting means, a lever, means carrying the lever on the gooseneck for pivotal movement about a second axis transverse to the gooseneck, means connecting the lever to the frame, and means for moving the lever about the second axis to swing the conveying means about the first axis from the conveying position to the retracted position.

Still another feature of the invention is the provision of such a material handling apparatus wherein the means connecting the lever to the frame includes a yieldable portion.

Still another feature of the invention is the provision of such a material handling apparatus wherein the means connecting the lever to the frame includes pivot means carried by the frame permitting swinging movement of the conveying means independently of the lever.

A yet further feature of the invention is the provision of such a material handling apparatus wherein the pivot means includes an extensible force means carried by the frame.

Yet another feature of the invention is the provision of such a material handling apparatus wherein the pivot means for permitting swing movement of the conveying means includes an extensible force means carried by the frame and connected to the lever intermediate the means carrying the lever on the gooseneck and the means connecting the lever to the frame.

A yet further feature of the invention is the provision of such a material handling apparatus including means for connecting the connecting means to the lever for pivotal movement about a third axis parallel to the second axis.

Still another feature of the invention is the provision of such a material handling apparatus wherein the support means comprises a pair of arms pivotally carried one each on the side walls of the bowl.

A further feature of the invention is the provision of such a material handling apparatus having a wheeled bowl having a bottom wall provided with a leading cutting edge and side walls defining a material receiving space having a front opening, and means movable forwardly through the space for ejecting material received therein outwardly through the front opening, means for conveying material scraped by the leading edge rearwardly into the space including a frame and a conveyor carried by the frame, a support, means carrying the support on the bowl for pivotal movement about a first axis transverse to the bowl, and means securing the support to the frame for swingably guiding the conveying means about the axis between a lower, rearwardly upwardly inclined conveying position across the front opening and an upper retracted position above the path of movement of the ejecting means, extensible means, means connecting one end of the extensible means to the bowl for pivotal movement about a second axis parallel to the first axis, means connecting the other end of the extensible means to the frame, the extensible means being operable to swing the conveying means about the first axis from the conveying position to the retracted position.

Still another feature of the invention is the provision of such a material handling apparatus wherein the means connecting the other end of the extensible means to the frame comprises a connector pivotally secured to the support.

Yet another feature of the invention is the provision of such a material handling apparatus wherein the means connecting the other end of the extensible means to the frame includes a yieldable portion.

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIGURE 1 is a fragmentary side elevation of a material handling apparatus provided with a material conveying means and means for mounting the conveying means

in the material handling apparatus, embodying the invention;

FIGURE 2 is a fragmentary side elevation generally similar to that of FIGURE 1, but with the conveying means in the retracted position;

FIGURE 3 is a diametric section of a yieldable connecting means of the mounting means;

FIGURE 4 is a fragmentary top plan view of the apparatus; and

FIGURE 5 is a fragmentary side elevation of a material handling apparatus generally similar to that of FIGURE 1, but having a modified means embodying the invention for mounting the conveying means of the material handling apparatus.

In the exemplary embodiment of the invention as disclosed in FIGURES 1 through 4, a material handling apparatus generally designated **10** is shown to comprise a bowl generally designated **11** having a bottom wall **12** and side walls **13** and **14**. The bowl **11** is movably carried by means of a pair of wheels **15** journalled on the rear of the side walls **13** and **14**. An ejector plate **16** is provided for movement from a rearmost position (shown in FIGURES 1 and 4) forwardly through the space **17** defined by the bottom wall **12** and side walls **13** and **14** to a forward position (shown in FIGURE 2) wherein the ejector plate extends through the front opening **18** of the space **17**. In so moving through the space, the ejector plate moves material collected in the space **17** outwardly through the front opening **18**. The means for moving the ejector plate may be of any conventional well known construction, being illustrated herein schematically as means **19** carried at the rear of the bowl. Upon ejection of the material from the space **17**, the ejector plate is returned to the rear position shown in FIGURES 1 and 4, in which the ejector plate defines the rear wall of the material receiving space **17**.

The material, such as earth and the like, is brought into the receiving space **17** by movement of the bowl **11** forwardly over the ground with a leading cutting edge means **20** thereon extending downwardly from the bowl at the front opening **18** arranged to dig into the surface of the ground and scrape the upper layer thereof into the space **17**. The forward movement of the bowl **11** is effected by a suitable tractor having a gooseneck **21**. The bowl **11** is connected to the gooseneck by a pair of arms **22** secured to the sidewalls **13** and **14** by suitable pivotal connectors **23**.

The means for conveying the material rearwardly and upwardly into the rear portion of the space **17** herein comprises a conveyor **24** having a frame **25** and an endless chain **26** provided with flights **27** for engaging the material as it is scraped by the cutting edge **20** and elevating it toward the rear of the space **17**. The conveyor is driven by a suitable motor **24***a*, as shown in FIGURE 4, so as to move in a counterclockwise direction as seen in FIGURE 1.

The conveyor **24** is swingably mounted on the bowl **11** by means of a pair of supports, or arms, **28**. The arms are pivotally mounted at their rear ends to the side walls **13** and **14** of the bowl by pivots **29** and are fixedly secured to the frame **25** of the conveyor **24** by a rigid connector **30**, whereby the conveyor is swingable, about an axis **31** extending horizontally transversely across the the bowl **11**, between a lower conveying position wherein the conveyor is rearwardly upwardly inclined as shown in FIGURE 1, to an upper generally horizontal retracted position as shown in FIGURE 2. As shown in FIGURE 2, in the retracted position the conveyor is disposed slightly above the ejector plate **16** at the forward end of its travel.

The conveyor **24** is swung between the conveying position and the retracted position in apparatus **10** by means of a lever **32** having one end connected to the gooseneck **21** by a pivot **33** for pivotal movement of the lever about a horizontal axis transverse to the gooseneck. A link generally designated **34** is provided with a rod portion **35** having one end connected to the other end of the lever **32** by a pivot **36**. The lower end of the rod **35**, as shown in FIGURE 3, is provided with a collar **37** received in a cylindrical housing **38**. The upper end of the housing is closed by a cap **39** having an opening **40** through which the rod **35** is axially movable. The collar **37** is biased upwardly by a coil spring **41** within the housing **38**. The upper end of the spring is centered by a dowel **42** projecting downwardly from the collar **37**. The lower end **43** is connected to a connector plate **44** fixed to the frame **25** of the conveyor **24** by a pivot **45**. Thus, the structure **37–42** comprises a yieldable pivot means including an extensible force means for connecting the lever **32** to the frame **25**. Thus, as shown in FIGURE 1, the conveyor **24** may have a limited swinging movement notwithstanding the fixed retention of the lever **32**, thereby to permit the conveyor to pass rocks and the like into the receiving space **17** without jamming or damage of the conveyor.

The lever **32** is swung about the axis **46** of the pivot **33** by a conventional force member, such as an hydraulic piston device, **47** having a cylinder **48** connected at one end to the gooseneck **21** by a conventional pivot **49**, and having its piston rod **50** connected to a middle portion **51** of the lever **32** by a conventional pivot **52**. Thus, when the hydraulic device **47** is operated to urge the piston rod **49** outwardly from the cylinder **48**, the lever **32** is pivoted in a counterclockwise direction, as seen in FIGURES 1 and 2, to raise the lower end of the conveyor **24** to the retracted position of FIGURE 2. When the hydraulic device **47** is reversely operated to retract the rod **50**, the lower end of the conveyor is lowered to the conveying position of FIGURE 1.

As shown in FIGURES 1 and 2, the downward movement of the conveyor **24** may be limited by the engagement of the arms **28** with stops **53** carried on the side walls **13** and **14** of the bowl **11** so that the conveyor will rise and fall with the bowl **11** as the bowl **11** moves upwardly and downwardly in the normal movement thereof over the terrain.

Turning now to the embodiment of the invention as shown in FIGURE 5 of the drawing, a material handling apparatus generally designated **110** is shown to comprise an apparatus generally similar to material handling apparatus **10**, but provided with a modified means for mounting the conveyor on the bowl. In describing the apparatus **110**, numerals similar to the numerals designating the elements of apparatus **10**, but one hundred higher will be applied. Thus, apparatus **110** includes a bowl **111** carried on suitable wheels **115** and provided with a conveyor generally designated **124** which is movable between a full line conveying position and a broken line retracted position substantially identical to the conveying and retracted positions of the apparatus **10**. However, in apparatus **110**, each support arm **128** is provided with a lateral extension **160**. An hydraulic operator **147** has a cylinder portion **148** pivotally carried on the side wall **114** of the bowl **111** by a pivot **151**. The rod **149** of the device **147** is connected at its outer end to a yieldable connector **161** which in turn is pivotally connected to the extension **160** of the support arm **128** by a pivot **162**.

Thus, the hydraulic device **147** selectively positions the conveyor **124** in the conveying and retracted positions by the movement of the rod **149** inwardly and outwardly from the cylinder **148**. In all other respects the apparatus **110** is similar to and functions in a similar manner to the apparatus **10**.

In each of apparatus **10** and **110**, the conveying means is swung about the horizontal axis defined by the rear pivots of the support arms between the lower conveying position and the upper retracted position by means of a conventional extensible piston type operator. In each of the illustrated embodiments, the extensible means is connected to the frame, in apparatus **10** by means of the connector plate **44**, and in apparatus **110** by means of the extension **160** of the support **128**. In each embodiment, the upward

swinging of the conveying means is sufficient to permit the ejector plate to move under the conveying means in discharging the earth material from the receiving space.

Thus, each of the embodiments of the invention disclosed herein is extremely simple and economical of construction while providing the highly desirable selective positioning of the conveying means for selective loading and unloading operations of the scraper.

While I have shown and described certain embodiments of my invention, it is to be understood that it is capable of many modifications. Changes, therefore, in the construction and arrangement may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. In a material handling apparatus having a wheeled bowl having a bottom wall provided with a leading cutting edge and side walls defining a material receiving space having a front opening,

means movable forwardly through the space for ejecting material received therein outwardly through said front opening, and

means for pulling said bowl forwardly and having a gooseneck;

means for conveying material scraped by said leading edge rearwardly into said space including a frame and a conveyor carried by said frame;

a support;

means carrying said support on said bowl for pivotal movement about a first axis transverse to said bowl, and means securing said support to said frame for swingably guiding said conveying means about said axis between a lower, rearwardly upwardly inclined conveying position across said front opening and an upper retracted position above the path of movement of said ejecting means;

a lever;

means carrying said lever on said gooseneck for pivotal movement about a second axis transverse to said gooseneck;

means connecting said lever to said frame, said connecting means including yieldable pivot means having a spring biased extensible force means permitting swing movement of said conveying means independently of said lever; and

means for moving said lever about said second axis to swing said conveying means about said first axis from said conveying position to said retracted position.

2. The material handling apparatus of claim 1, including means on said bowl for limiting the downward movement of said support to a disposition wherein said conveying means is in said conveying position, said limiting means including stop means fixed to at least one of said side walls of said bowl for engagement by said support when said conveying means is in said conveying position for carrying said conveying means with said bowl during up and down movement of the bowl.

3. In a material handling apparatus having a wheeled bowl having a bottom wall provided with a leading cutting edge and side walls defining a material receiving space having a front opening, and

means movable forwardly through said space for ejecting material received therein outwardly through said front opening;

means for conveying material scraped by said leading edge rearwardly into said space including a frame and a conveyor carried by said frame;

a support;

means carrying said support on said bowl for pivotal movement about a first axis transverse to said bowl, and means securing said support to said frame for swingably guiding said conveying means about said axis between a lower, rearwardly upwardly inclined conveying position across said front opening and an upper retracted position above the path of movement of said ejecting means;

extensible means;

means connecting one end of said extensible means to said bowl for pivotal movement about a second axis parallel to said first axis; and

means connecting the other end of said extensible means to said frame, said connecting means including yieldable pivot means having a spring biased extensible force means permitting swing movement of said conveying means independently of said extensible means, said extensible means being operable to swing said conveying means about said first axis from said conveying position to said retracted position.

4. In a material handling apparatus having a wheeled bowl having a bottom wall provided with a leading cutting edge and side walls defining a material receiving space having a front opening, and

means movable forwardly through said space for ejecting material received therein outwardly through said front opening;

means for conveying material scraped by said leading edge rearwardly into said space including a frame and a conveyor carried by said frame;

a support;

means carrying said support on said bowl for pivotal movement about a first axis transverse to said bowl, and means securing said support to said frame for swingably guiding said conveying means about said axis between a lower, rearwardly upwardly inclined conveying position across said front opening and an upper retracted position above the path of movement of said ejecting means;

first extensible means; and

connecting means operatively connecting said first extensible means to said frame for swinging said conveying means selectively to said conveying and retracted positions, said connecting means including yieldable pivot means having a spring biased extensible force means permitting swing movement of said conveying means independently of said first extensible means.

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