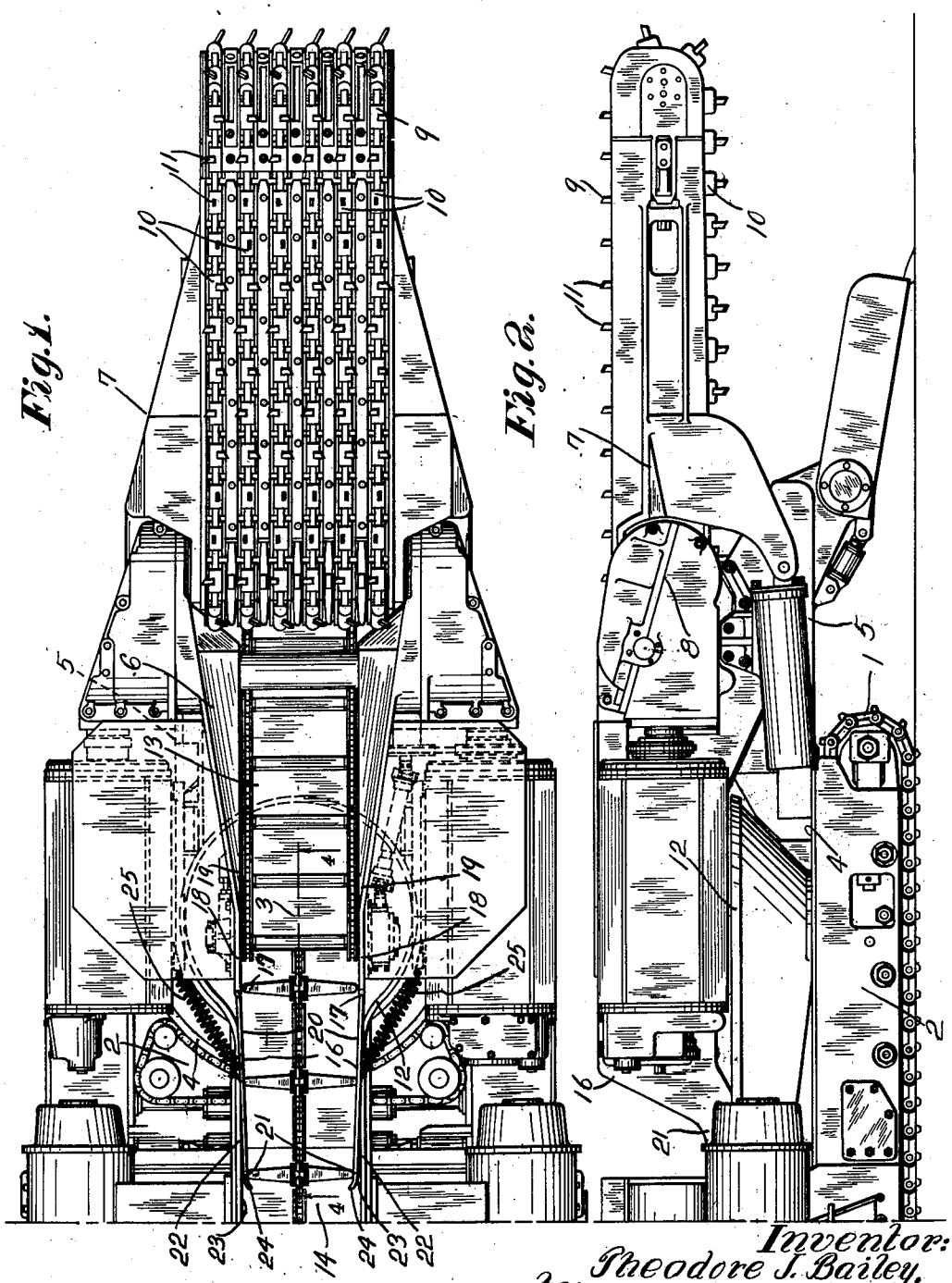
Jan. 27, 1953 T. J. BAILEY 2,626,699

CONVEYER MECHANISM

Filed April 6, 1949 4 Sheets-Sheet 1



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CONVEYER MECHANISM

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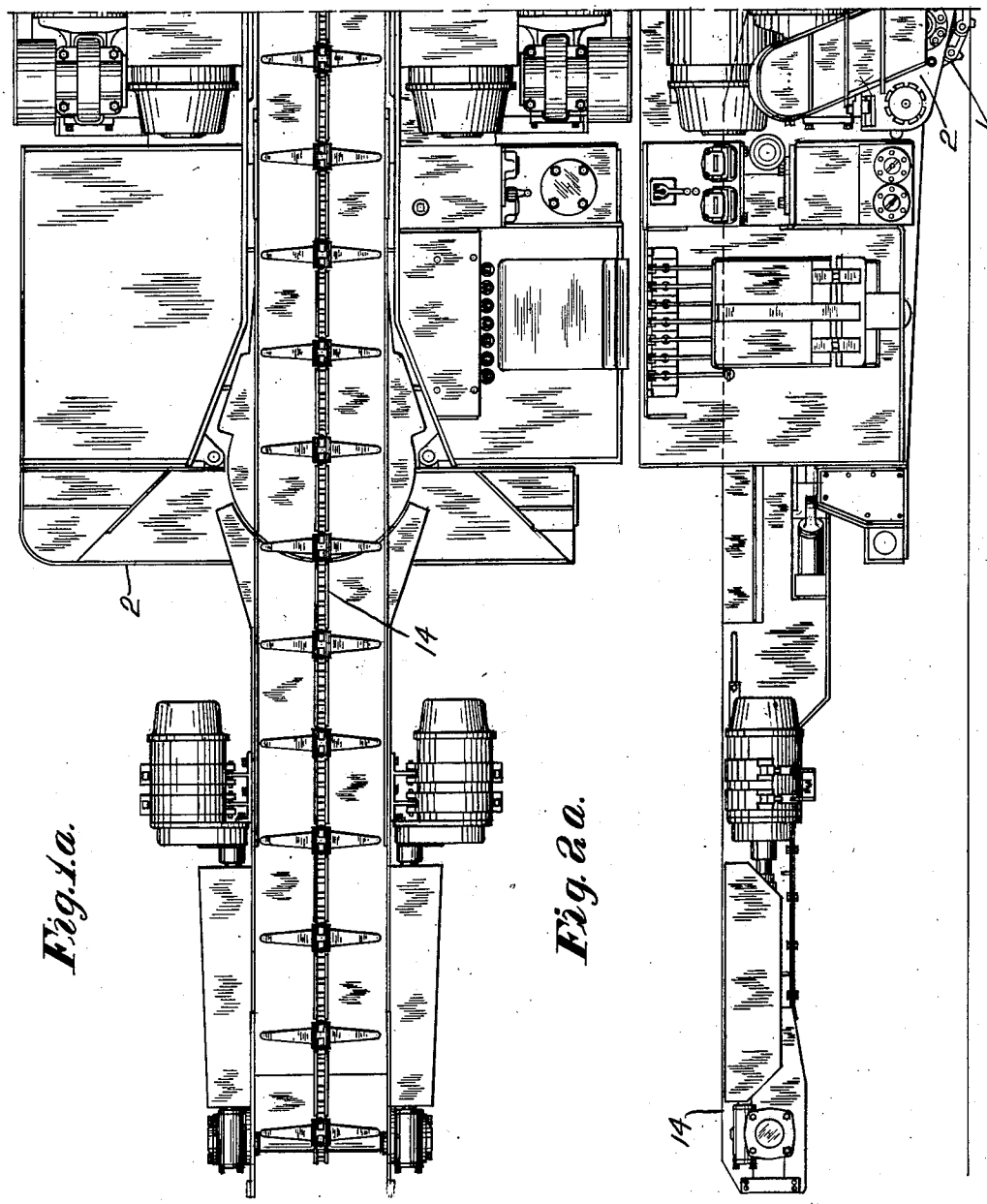

Fig. 1a.

Fig. 2a.

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Fig. 3.

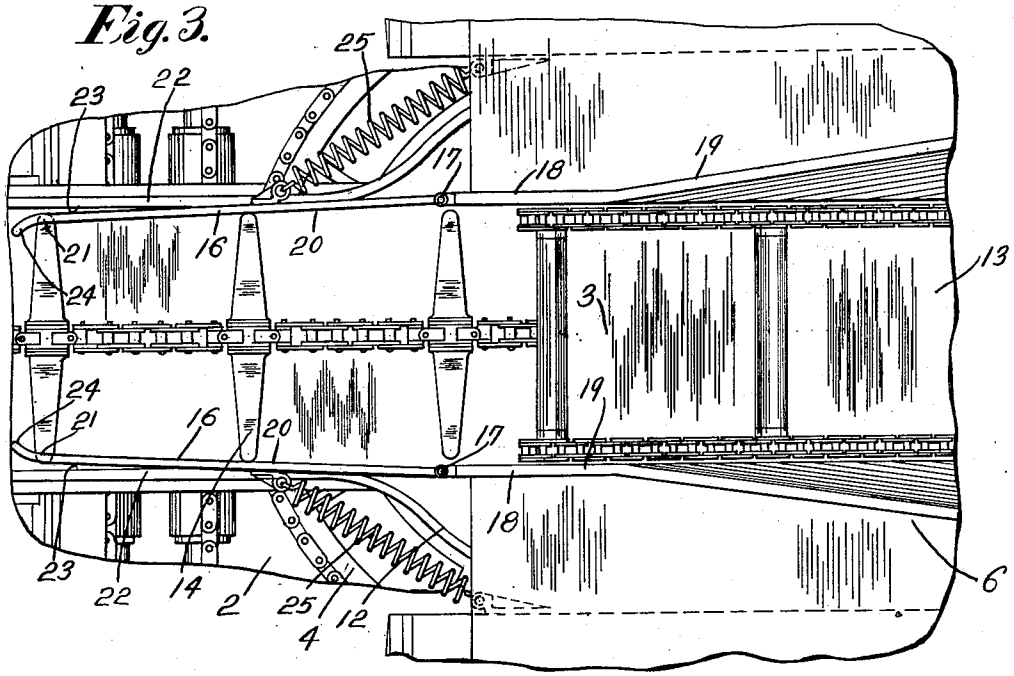
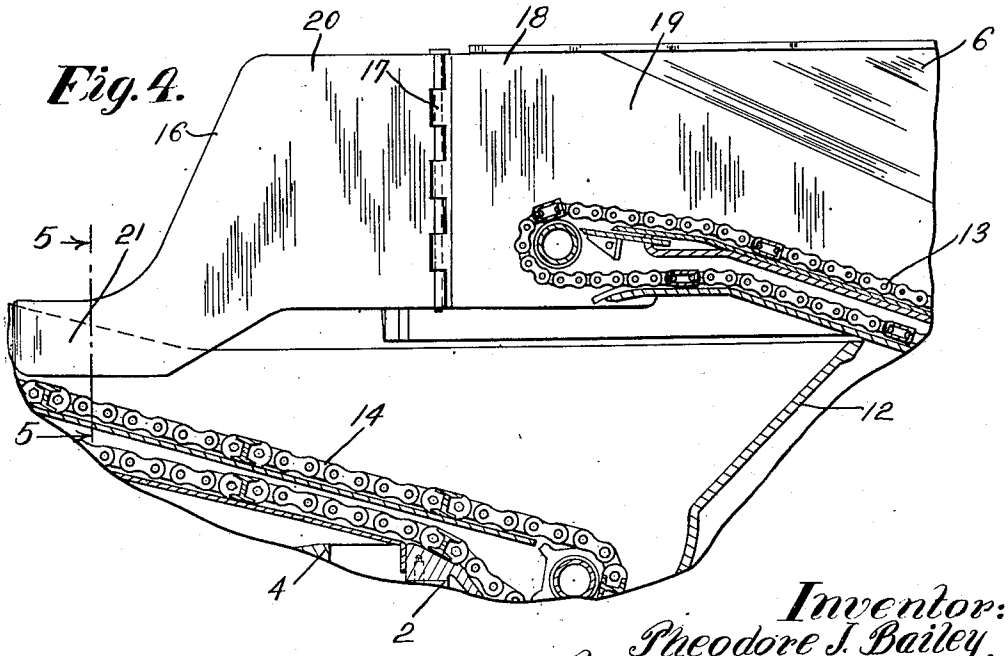


Fig. 4.



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CONVEYER MECHANISM

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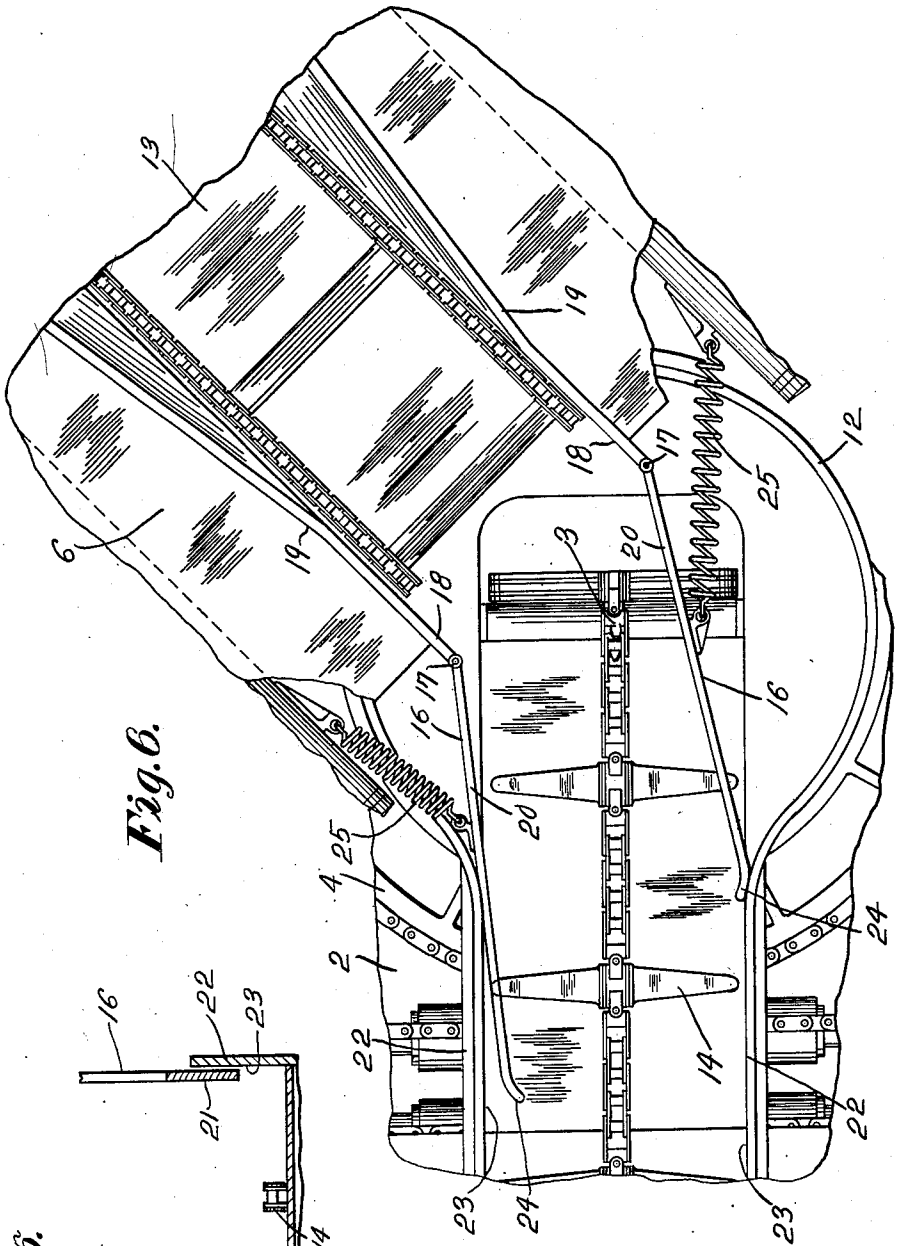

Fig. 6.

Fig. 5.

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UNITED STATES PATENT OFFICE

2,626,699

CONVEYER MECHANISM

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Application April 6, 1949, Serial No. 85,857

5 Claims. (Cl. 198—96)

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This invention relates to mining apparatus and more particularly to conveyor mechanism especially designed for use with a disintegrating and loading machine of the type known as a continuous miner.

In a continuous miner of the same general type as that disclosed in a copending application to John R. Sibley, Ser. No. 102,996, filed July 5, 1949, a mobile base adapted to travel over the floor of a mine, carries a swivelled frame mounted to swing horizontally relative to the base and on which a sliding support is guided for rectilinear movement in a direction radially with respect to the swivel axis. A swingable frame or bar structure is pivotally mounted on the sliding support and carries a vein-attacking and disintegrating mechanism which embodies a series of parallel disintegrating chains movable in vertical orbital paths along guideways supported by the swingable frame structure. A primary conveyor carried by the sliding support and extending beneath the rearward portion of the attacking and disintegrating mechanism, receives the disintegrated material discharged from the attacking and disintegrating mechanism, and this conveyor discharges into a hopper mounted in a stationary position on the base in a generally coaxial relation with the frame-swivel. A rear discharge conveyor on the base has its receiving end extending downwardly into the hopper beneath the rear discharge end of the primary conveyor, for removing the material from the hopper and for conveying the material rearwardly of the base to a suitable point of delivery. The rear discharge end of the primary conveyor overlies and discharges into the hopper irrespective of the swivelled and rectilinear positions of the attacking and disintegrating mechanism relative to the base. It has been found in such machines when the attacking and disintegrating mechanism is in certain positions of angular and rectilinear adjustment with respect to the hopper some of the material being discharged from the primary conveyor is thrown beyond the lateral limits of the hopper resulting in substantial spillage and the need of considerable hand shoveling. The present invention contemplates improvements over such known type of continuous miner in that means is provided, effective in all angular and rectilinear positions of the attacking and disintegrating mechanism with respect to the base, for directing the material being discharged from the primary conveyor downwardly into the hopper and onto the receiving end of the rear discharge conveyor, so that spillage of material

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beyond the sides of the hopper is substantially avoided. In accordance with the present invention, in a preferred embodiment, side deflector plates or so-called wings are pivotally connected to the rear end of the sliding support at the opposite sides of the rear discharge end of the primary conveyor to swing horizontally and extend rearwardly between the upright side portions of the rear discharge conveyor and are yieldingly held, as by springs, in sliding and pivotal contact with the inner surfaces of the upright side portions of the rear conveyor and so extend with respect to the hopper that the material being discharged from the primary conveyor is effectively directed downwardly into the hopper and onto the receiving end of the discharge conveyor. Since the deflector plates or wings are so arranged and are so connected to the sliding support, spillage of material is substantially prevented in all positions of angular and rectilinear movements of the attacking and disintegrating mechanism with respect to the base.

It is accordingly a primary object of the present invention to provide an improved conveyor mechanism for a mining apparatus, whereby substantial spillage of material during the loading operation is substantially avoided. Another object is to provide, in a conveyor mechanism which discharges into a hopper, improved deflector means for preventing spillage of material as it is discharged from the conveyor, laterally beyond the sides of the hopper. A further object is to provide an improved deflector means of the above character wherein said deflector plates or wings are arranged at the sides of the discharge end of the conveyor and so overlie the hopper that the material discharged from the conveyor is effectively directed downwardly into the hopper. Yet another object is to provide an improved conveyor mechanism wherein a primary conveyor discharges into a hopper and a rear discharge conveyor removes the material from the hopper, and having improved means cooperating with and extending between the conveyors above the hopper, for directing the material discharged from the primary conveyor into the hopper and onto the receiving end of the rear discharge conveyor. A still further object is to provide, in a conveyor mechanism wherein a primary conveyor is slidable rectilinearly relative to a hopper and is swingable horizontally relative to the hopper and to a rear discharge conveyor which removes the material from the hopper, a pair of retaining wings pivotally mounted at the sides of the rear

end of the primary conveyor to swing horizontally and engaging at their rearward ends the inner surfaces of the side walls of the rear conveyor and yieldingly held in contact with such inner surfaces so that irrespective of the rectilinear and angular positions of the primary conveyor with respect to the hopper, the material being discharged from the primary conveyor is always directed downwardly toward the hopper and the receiving end of the rear conveyor. Still another object is to provide an improved conveyor mechanism comprising conveyor sections having relative angular and rectilinear movements, and each provided with side plates, and means intervening said conveyor sections for directing the material being conveyed from one to the other including side deflector members pivotally mounted on upright axes at the sides of one conveyor section and slidingly and pivotally engaging the side plates of the other conveyor section and embodying means for yieldingly urging said deflector members apart into contact with said side plates. A further object is to provide in a conveyor mechanism of the above character an improved deflector wing structure wherein the deflector wings project rearwardly between the side plates of the rear conveyor and are yieldingly held as by springs in sliding and pivotal contact with the inner surfaces of the conveyor side plates. These and other objects and advantages of the invention will, however, hereinafter more fully appear.

In the accompanying drawings there is shown for purposes of illustration one form which the invention may assume in practice.

In these drawings:

Figs. 1 and 1*a*, taken together, constitute a plan view of a continuous miner in which an illustrative form of the invention is embodied.

Figs. 2 and 2*a*, taken together, constitute a side elevational view of the continuous miner shown in Figs. 1 and 1*a*.

Fig. 3 is an enlarged plan view of a portion of the conveyor mechanism with which the invention is associated.

Fig. 4 is a central longitudinal vertical sectional view taken substantially on line 4—4 of Fig. 1, showing one of the improved side deflector wings and its manner of cooperation with the primary and rear conveyors.

Fig. 5 is a detail cross sectional view taken on line 5—5 of Fig. 4.

Fig. 6 is a fragmentary plan view, similar to Fig. 3, showing the primary conveyor in one extreme angular and forward rectilinear position with respect to the rear conveyor, showing the relation of the side deflector wings with respect to the hopper.

The continuous miner disclosed herein in which the improved conveyor mechanism is embodied, as mentioned above, is generally like that disclosed in the copending Sibley application Ser. No. 47,422 and generally comprises a mobile base 1 having a frame 2 on which is swivelled at 3 on an upright axis to swing horizontally relative thereto, a horizontal frame 4. The swivelled frame 4 has a horizontal portion 5 projecting outwardly beyond the base, and guided on this horizontal portion is a sliding support 6 which is movable rectilinearly relative to the frame 4 in a direction radially with respect to the swivel axis 3. A swingable frame or bar structure 7 is pivotally mounted on a horizontal transverse axis at 8 on the sliding support 6 to swing in vertical planes with respect thereto and to swing

horizontally with the swivelled frame 4 with respect to the base. The vertically swingable frame structure 7 extends outwardly beyond the base and carries a mine vein-attacking and disintegrating mechanism 9 for detaching and disintegrating the coal or other mineral in relatively wide vertical segments from a solid coal seam or mine vein. The attacking and disintegrating mechanism comprises a series of parallel disintegrating chains 10 carrying disintegrating instruments or bits 11 and guided for circulation in vertical orbits about guideways on the frame structure 7. Arranged generally coaxially with the swivel axis 3 is a stationary hopper 12 rigidly secured to the base frame and projecting a substantial distance above the top of the base in the manner shown in Fig. 2, and a primary front conveyor 13 is carried by the sliding support 6 with its forward portion underlying the rearward portion of the attacking and disintegrating mechanism 9. As the attacking and disintegrating mechanism dislodges and disintegrates the coal or other mineral the top runs of the disintegrating chains 10 move the disintegrated material rearwardly along the top of the attacking and disintegrating mechanism to discharge onto the primary conveyor 13 and the latter moves the material thereon rearwardly to discharge into the hopper 12. A rear discharge conveyor 14 carried by the base frame has its front receiving end extending downwardly into the hopper as shown in Fig. 4 and this conveyor moves the material from the hopper and conveys it rearwardly of the base to a suitable point of delivery. The conveyors 13 and 14 are of the conventional endless cross flight type and act to move the material over the top plates of the conveyor frames, and are fully disclosed in the copending application above referred to. Since the construction of the continuous miner above described is generally fully disclosed in the copending application above referred to further description thereof is herein unnecessary.

During the dislodging and disintegrating operation, in a manner also fully disclosed in the above mentioned copending application, the vein-attacking and disintegrating mechanism 9, as the disintegrating chains 10 are rapidly circulated in their orbits, may be swung downwardly by power devices about the pivot 8 relative to the swivelled frame 4 to locate the outer tip end of the attacking and disintegrating mechanism near the mine floor, and the sliding support 6 may then be moved by power devices rectilinearly outwardly relative to the swivelled frame to sump the outer portion of the attacking and disintegrating mechanism into the solid coal seam or mine vein. When the outer portion of the attacking and disintegrating mechanism is in sumped position the swingable frame structure 7 may be swung upwardly about its pivot 8 by power devices at a relatively high speed and with a powerful upward thrust to effect dislodgment and disintegration of a relatively wide vertical segment of the coal seam or mine vein between the top of the attacking and disintegrating mechanism and the mine roof. When the attacking and disintegrating mechanism reaches the limit of its upward swinging movement at the mine roof, the sliding support 6 may be retracted by its power devices relative to the swivelled frame 4 to withdraw the other portion of the attacking and disintegrating mechanism from the coal seam or mine vein. The dislodged and disintegrated material is moved rearwardly by the top

runs of the disintegrating chains and is discharged onto the primary conveyor 13 and the latter discharges the disintegrated material into the hopper 12, and the rear discharge conveyor 14 moves the disintegrated material from the hopper and conveys it rearwardly of the base to a suitable point of delivery.

When the attacking and disintegrating mechanism is in its retracted position on the swivel frame, the latter may be turned by power devices in a horizontal direction about its swivel axis relative to the base to locate the attacking and disintegrating mechanism in new positions of attack with respect to the working face, and by repeated sumping, swinging and withdrawing movements of the attacking and disintegrating mechanism, successive segments of coal or other mineral may be detached and disintegrated until the coal or other mineral for the entire width of the working face is removed. The hopper 12 is so arranged with respect to the primary conveyor and the primary conveyor itself is so constructed and arranged that the disintegrated material received from the attacking and disintegrating mechanism is discharged into the hopper irrespective of the angular and rectilinear positions of the attacking and disintegrating mechanism with respect thereto.

Now referring to the improved means for preventing substantial spillage of disintegrated material as it is discharged by the primary conveyor into the hopper in the different angular and rectilinear positions of the attacking and disintegrating mechanism, it will be noted that arranged above the hopper 12 are upright side retainer plates or deflector wings 16, 16 which are pivoted at 17 on vertical axes to swing horizontally on rearward projections 18 of vertical side frames 19 of the primary conveyor 13. The deflector wings are of substantial height at their forward portions 20 as shown in Fig. 4 and narrow downwardly and rearwardly so that rearward portions 21 of relatively low height are provided. These rearward portions extend rearwardly between vertical side frames 22 of the rear conveyor 14 (Fig. 5) and slidingly and pivotally engage the inner surfaces 23 of these side frames. The rearward ends of the wings are slightly bent horizontally inwardly at 24 so in certain positions thereof they may ride freely over the surfaces with which they contact. Coil springs 25 are connected between the outer sides of the wings and rear end of the sliding support 6, as shown in Fig. 3, for constantly urging the wings apart into yielding contact with the side frame surfaces 23. As the attacking and disintegrating mechanism swings about the swivel axis 3 relative to the base and moves rectilinearly with the sliding support 6 relative to the swivel frame, the deflector wings 16, while yieldingly held in contact with the surfaces 23 by the coil springs, pivot relative to and slide over the side surfaces 23, from the position shown in Fig. 3 to the extreme position shown in Fig. 6. As shown in Fig. 5 the lower edges of the deflector wings 16 extend a substantial distance below the tops of the conveyor plates 22 with the top edges of the wings disposed a short distance above the top edges of the conveyor plates. It will thus be seen that irrespective of the angular and rectilinear positions of the primary conveyor with respect to the hopper the deflector plates or wings direct the disintegrated material discharged from the primary conveyor downwardly into the hopper 12 and onto the front receiving end of the rear discharge conveyor. It will be evident that in all positions of the deflector plates, there is sufficient space therebetween for the passage of material between the plates to the hopper and rear conveyor.

As a result of this invention an improved mining apparatus is provided having improved conveyor mechanism whereby substantial spillage of the material being conveyed is substantially avoided. It will further be evident that by provision of the deflector wings arranged between the relatively swingable and rectilinearly movable conveyor sections the material discharged from one conveyor section onto the other is prevented from substantial spillage. By arranging the deflector wings in the manner disclosed above the hopper and by pivotally connecting the wings to the sliding conveyor section with the rearward portions of the wings yieldingly held in sliding and pivotal contact with the side frames of the other conveyor section, the material discharged from one conveyor is effectively directed into the hopper without substantial spillage irrespective of the relative positions of the conveyor sections. The improved deflector structure is simple and rugged in design and may be readily applied to a mining apparatus of conventional construction with a minimum of change. Other advantages of the invention will be clearly apparent to those skilled in the art.

While there is in this application specifically described one form which the invention may assume in practice, it will be understood that this form of the same is shown for purposes of illustration, and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. A conveyor mechanism comprising, in combination, a front conveyor mounted to swing horizontally about a vertical axis and to move rectilinearly in a direction radially of said axis, a hopper mounted beneath the discharge end of said front conveyor and relative to which said front conveyor has horizontal swinging and rectilinear movements as aforesaid, said hopper having a circular frame provided with spaced vertical rearward side frame portions, said front conveyor having spaced vertical side frames at their rear ends overlying said hopper, a rear conveyor extending forwardly between said vertical side frame portions of said hopper frame with its receiving end terminating within said hopper for removing the material discharged into said hopper from said front conveyor rearwardly from said hopper, upright deflector wings pivotally connected at their front ends to the rear ends of said side frames of said front conveyor to swing horizontally about parallel vertical axes and extending rearwardly above said hopper between the vertical sides of said conveyor and hopper frames for directing the material discharged from said front conveyor downwardly into said hopper irrespective of the horizontally swiveled or the rectilinear position of said front conveyor relative to said hopper, said deflector wings having rearward portions extending between and guided by said rearward side frame portions of said hopper frame above said rear conveyor, and means for yieldingly urging said rearward portions of said deflector wings into guided contact with the inner walls of said rearward side frame portions of said hopper frame, said deflector wings engaging said inner walls

in the different angular positions of said front conveyor about said vertical axis, said wings also moving bodily with said front conveyor and slidingly engaging said inner walls during said rectilinear movement of said front conveyor relative to said hopper.

2. A conveyor mechanism as set forth in claim 1 wherein said rearward portions of said deflector wings extend downwardly below the bottoms of the forward portions of said wings and below the top of said hopper frame whereby said forward wing portions may move horizontally above said hopper during horizontal swinging of said front conveyor while said rearward portions of said wings remain in guided contact with said inner walls.

3. A conveyor mechanism as set forth in claim 1 wherein said yielding urging means for said wings act to swing said wings apart and comprises springs connected at their forward ends to the frame of said front conveyor at points spaced outwardly from the sides of said front conveyor and at their rearward ends to said wings at points located near the middle portions of the outer sides of said wings and above the bottoms of said forward portions of said wings and above the top of said hopper frame.

4. A conveyor mechanism as set forth in claim 1 wherein the front portions of said inner walls of said rearward frame portions are outwardly curved where they join onto said circular hopper frame with the inner surfaces thereof convex and the rearward portions of said deflector wings are curved with their convex sides contacting said inner walls whereby when said front conveyor is swung horizontally relative to said rear conveyor about said vertical axis one of said curved wing portions has rocking movement against one inner wall surface while an intermediate vertical outer surface of said other wing rocks on the convex surface of one of said curved forward portions of said other inner wall.

5. A conveyor mechanism comprising, in combination, a front conveyor mounted to swing horizontally about a vertical axis and having a horizontal rear discharge end, said front conveyor having a troughlike frame including spaced vertical sides projecting rearwardly beyond said discharge end, a rear conveyor having a horizontal forward receiving end underlying said discharge end of said front conveyor and having a troughlike frame including spaced vertical sides, said front conveyor mounted for horizontal rectilinear movement relative to said rear conveyor in a direction radially of said vertical axis, said discharge end of said front conveyor overlying the receiving end of said rear conveyor in all positions of rectilinear movement thereof, and upright deflector wings extending between said vertical sides of said conveyor frames for directing the material discharged from said front conveyor downwardly toward the receiving end of said rear conveyor in all swivelled positions of said front conveyor, said wings being pivotally connected at their front ends to the rear ends of said vertical sides of said front conveyor frame to swing horizontally about parallel vertical axes above the receiving end of said rear conveyor, said wings having downwardly extending rear portions extending between said spaced vertical sides of said rear conveyor frame and engaging and guided by said inner walls above said rear conveyor, said rear wing portions slidingly engaging said inner walls of said rear conveyor frame during such rectilinear movement, and yieldable means for urging said wings apart into guided engagement with said inner walls.

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