Nov. 28, 1944. R. W. YOUNG ET AL 2,363,920

CONVEYER MECHANISM

Filed Oct. 2, 1943 4 Sheets-Sheet 1

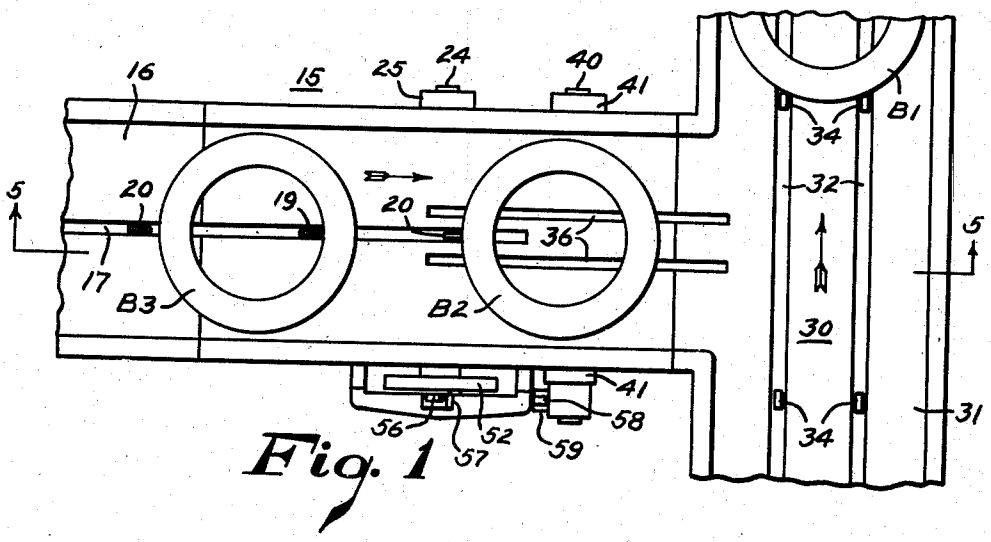


Fig. 1

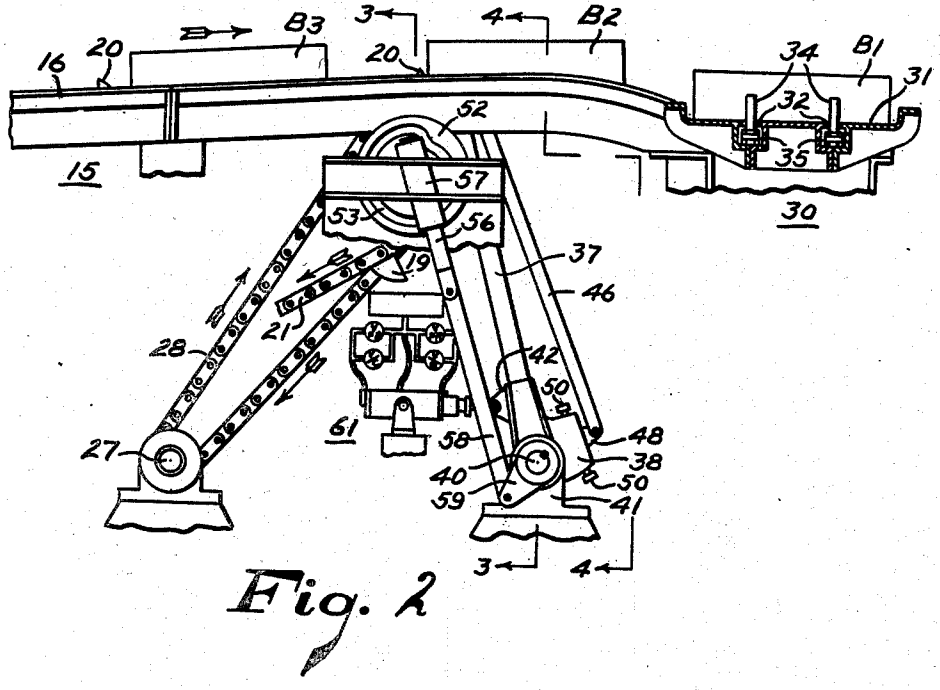


Fig. 2

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Filed Oct. 2, 1943 4 Sheets-Sheet 2

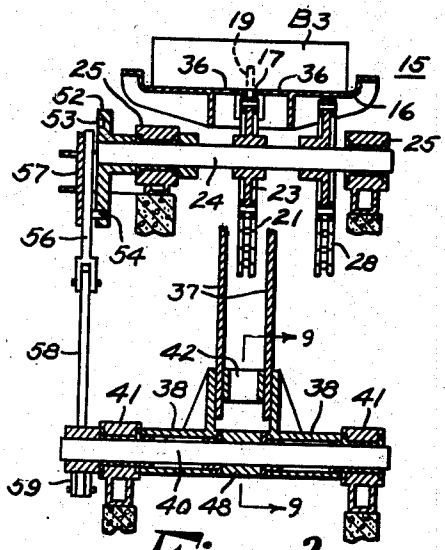


Fig. 3

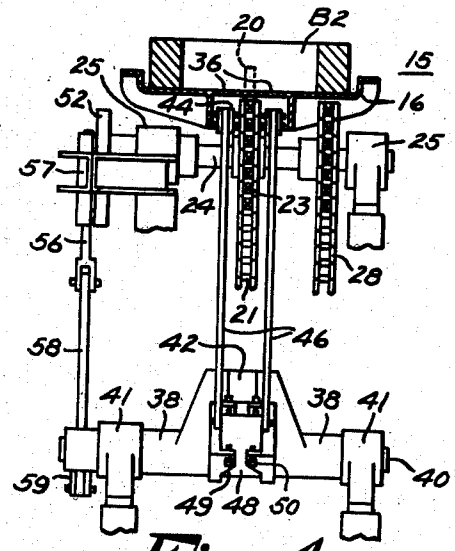


Fig. 4

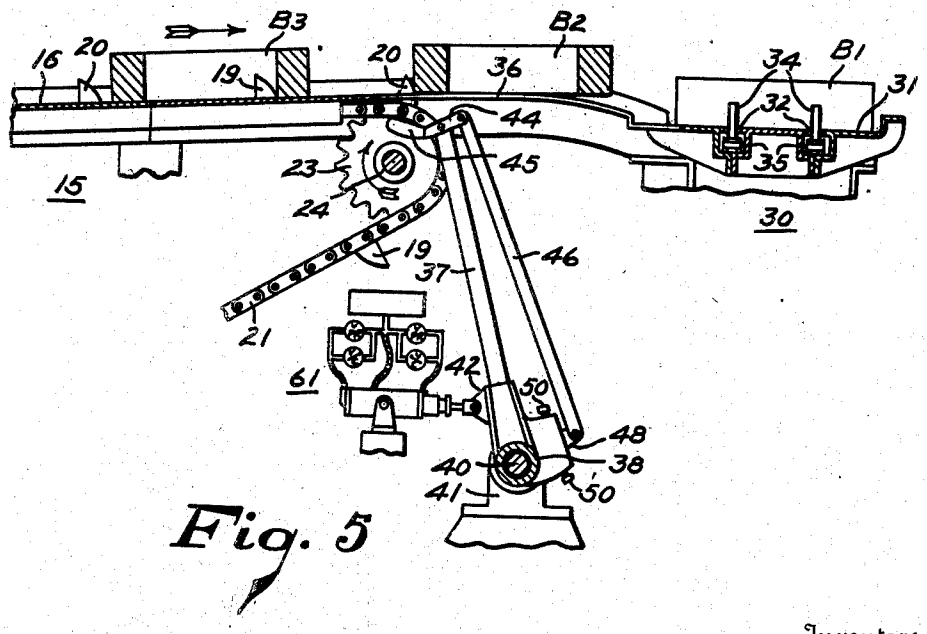


Fig. 5

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CONVEYER MECHANISM

Filed Oct. 2, 1943 4 Sheets-Sheet 3

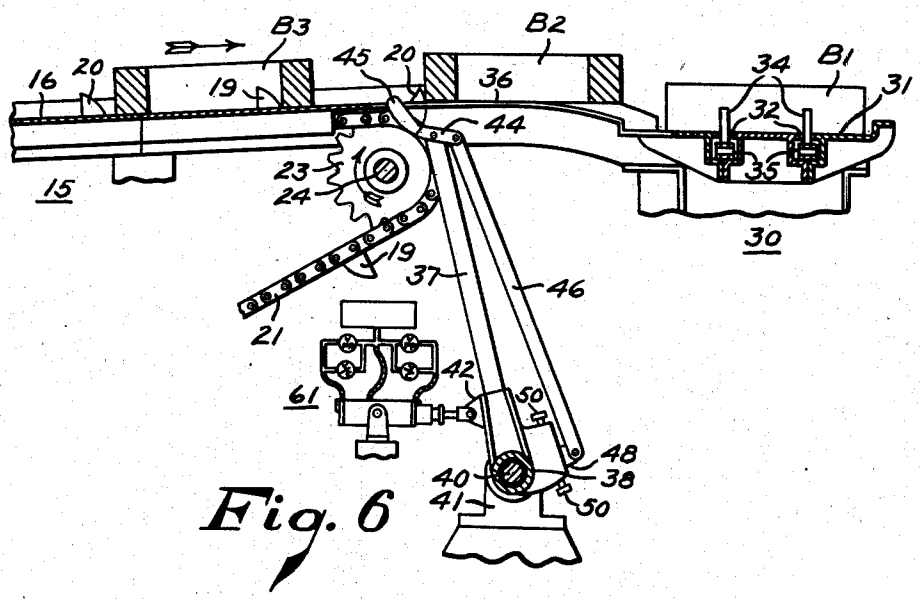


Fig. 6

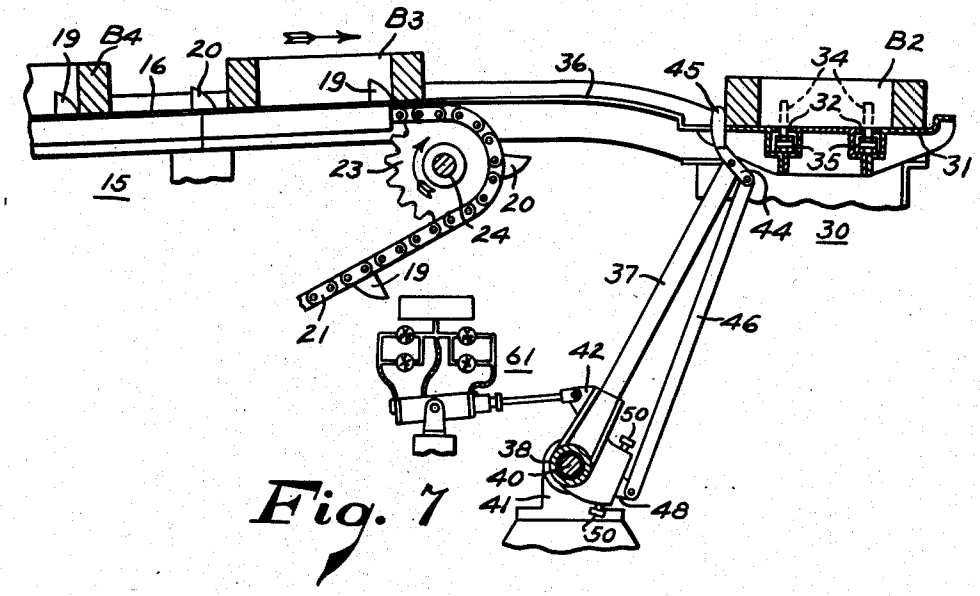


Fig. 7

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CONVEYER MECHANISM

Filed Oct. 2, 1943 4 Sheets-Sheet 4

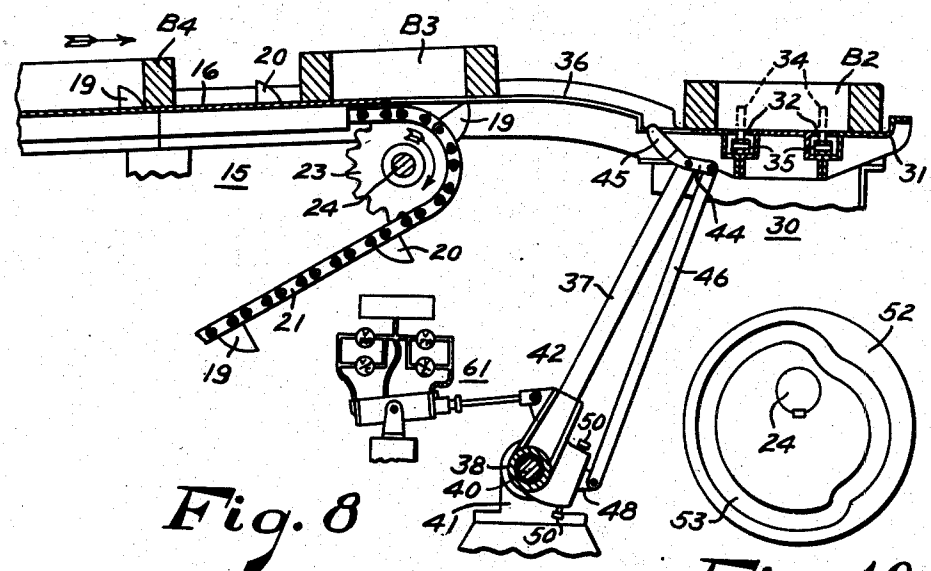


Fig. 8

Fig. 10

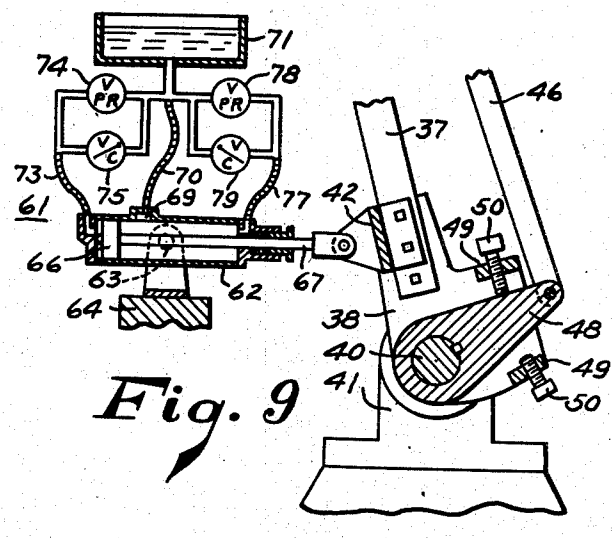


Fig. 9

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UNITED STATES PATENT OFFICE

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CONVEYER MECHANISM

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Application October 2, 1943, Serial No. 504,722

5 Claims. (Cl. 198—24)

This invention relates to conveyer mechanism, and more particularly to mechanism for conveying annular articles, such as coils or bundles of metal rod.

In a rolling mill for the production of rod, it is the practice to coil the rod, while still at a high temperature, into annular bundles. These bundles are deposited flatwise upon a substantially horizontal conveyer from which they are transferred to a second substantially horizontal conveyer extending across the discharge end of the first conveyer. Difficulties have been encountered heretofore in effecting such transfer. Certain prior mechanisms have failed to impart a sufficiently positive motion to the bundles, and in some cases the convolutions of the bundles have at times been disarranged by the transfer mechanism.

It is accordingly one object of the invention to overcome these difficulties and to provide a conveyer mechanism which will handle annular rod bundles or the like in a thoroughly dependable manner.

It is a further object of the invention to provide an improved mechanism which will serve to transfer annular rod bundles or the like in a positive manner from one conveyer to another.

It is a further object of the invention to provide an improved mechanism which will serve to transfer annular rod bundles or the like flatwise from one conveyer to another without disarranging the convolutions of the bundles.

With these and other objects in view, as will be apparent to those skilled in the art, the invention resides in the combination of parts set forth in the specification and covered by the claims appended hereto.

Referring to the drawings illustrating one embodiment of the invention and in which like reference numerals indicate like parts,

Fig. 1 is a plan view of an improved conveyer mechanism particularly arranged for handling annular coils or bundles of rod;

Fig. 2 is a side elevation of the mechanism;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a section on the line 4—4 of Fig. 2;

Fig. 5 is a section on the line 5—5 of Fig. 1;

Figs. 6, 7 and 8 are views similar to Fig. 5 but showing the mechanism in different phases of its operating cycle;

Fig. 9 is an enlarged view in section on the line 9—9 of Fig. 3; and

Fig. 10 is an enlarged detail of a rotary cam.

In the drawings there is shown a delivery conveyer 15 comprising a substantially horizontal trough 16 having a central longitudinal slot 17 through which a series of dogs 19 and 20 project upwardly. The dogs 19 alternate with the dogs 20, and both series of dogs are mounted upon an endless chain 21 which passes around a sprocket wheel 23 located near the discharge end of the conveyer. This wheel 23 has a pitch circumference equal to the distance between successive dogs 20, and it is mounted upon a transverse horizontal shaft 24 which is rotatably supported beneath the trough 16 by means of two axially spaced bearings 25. This shaft is driven from a driving shaft 27 (Fig. 2) through the medium of a chain and sprocket drive 28.

Across the discharge end of the conveyer 15 there extends a receiving conveyer 30 comprising a substantially horizontal trough 31 having two longitudinal slots 32 through which dogs 34 extend upwardly. These dogs are mounted upon two endless chains 35 which are driven in timed relationship with the conveyer 15 by any suitable means. The dogs 34 on the two chains are located directly opposite one another.

A series of annular rod bundles or coils B1, B2, B3, B4 etc. are placed in the delivery trough 16 in such a manner that the dogs 19 will extend upwardly into the central openings in the bundles and pull them along the trough. As each dog 19 reaches the sprocket wheel 23 and passes downwardly out of the bundle (as shown in Fig. 8), the bundle will come to rest for a brief moment until the following dog 20 engages the bundle from behind and pushes it forward to a position close to the receiving trough 31 (as shown in Fig. 5).

Means is provided to transfer each bundle with a comparatively rapid motion from the delivery trough 16 into the path of the dogs 34 in the receiving trough 31, so that a pair of these dogs may push the bundle along the conveyer 30. For this purpose the delivery trough 16 is provided with two longitudinally extending slots 36 located on opposite sides of the central slot 17 and in overlapping relationship therewith (as shown in Fig. 1). These slots 36 extend forwardly into the receiving trough 31. Beneath each slot 36 there is provided an upright arm 37 which is pivotally supported at its lower end so that the arms can swing forwardly and rearwardly. Preferably the lower end of each arm is secured to a sleeve member 38 (Fig. 3), the two sleeve members being mounted in axially spaced relation upon a transverse horizontal shaft 40 carried in bearings 41. The shaft extends through the sleeve members and is free to turn therein through a limited angle, as will be explained hereinafter. The two

arms are rigidly connected by a bracket 42 (Fig. 3) so that they will swing as a unit. Upon the upper end of each arm 37 there is pivoted a lever 44, which is shaped to provide a rearwardly projecting finger 45. These fingers can be swung upwardly through the slots 36 to serve as pushers which will engage the bundles and move them in the desired manner. In order to control the position of the fingers relative to the arms 37, the front end of each lever 44 is connected by means of an upright link 46 to an arm 48 which is keyed to the shaft 40 and projects in a generally forward direction therefrom. In order to limit the movement of the shaft within the sleeve members 38, each of the latter is provided with a pair of lugs 49 (Fig. 9) located respectively above and beneath the arm 48, each lug having an adjustable screw 50 mounted therein. These parts are so arranged that when the arm 48 swings upwardly into engagement with the upper screws, it will lower the fingers 45, and when the arm swings downwardly into engagement with the lower screws, it will raise the fingers 45 through the slots 36. This construction provides an adjustable lost-motion connection between the shaft 40 and the arms 37.

An oscillating motion is imparted to the shaft 40 in timed relation with the rotation of the conveyer shaft 24. For this purpose a cam 52 is keyed to one end of the shaft 24, this cam having a groove 53 in its outer face for the reception of a cam roller or follower 54 (Fig. 3) mounted on an upright bar 56. This bar is slidably supported in a stationary guideway 57. The lower end of the bar 56 is connected by a link 58 to an arm 59 which is keyed to one end of the shaft 40 and extends rearwardly therefrom. As the cam rotates, the bar 56 will be moved up and down, and the shaft 40 will be oscillated in the manner desired.

It is important to prevent the arms 37 from assuming an incorrect position relative to the arm 48, under the influence of gravity, when they pass over the top of the shaft 40, as otherwise the fingers 45 would be incorrectly positioned in relationship to the slots 36. In order to avoid this possibility, the arms 37 are connected to a hydraulic dashpot mechanism 61 arranged to impart a yielding resistance to the movement of the arms at such times as gravity tends to accelerate such movement. As best shown in Fig. 9, this mechanism 61 comprises a generally horizontal cylinder 62 which is carried by horizontal trunnions 63 in a stationary support 64 behind the arms 37. Within the cylinder there is provided a slidable piston 66 from which a piston rod 67 extends forwardly to connect with the bracket 42. The cylinder is formed intermediate its length with a port 69 which is connected through a flexible conduit 70 to an oil reservoir 71. The rear end of the cylinder is connected through a flexible conduit 73 and a pressure relief valve 74 to the reservoir, the valve 74 being by-passed by a check valve 75 which opens in the direction of flow toward the cylinder. The front end of the cylinder is connected through a flexible conduit 77 and a pressure relief valve 78 to the reservoir, the valve 78 being by-passed by a check valve 79 which opens in the direction of flow toward the cylinder. These parts are so arranged that the piston 66 will pass the port 69 at about the same time as the arms 37 pass over the shaft 40, so that further movement of these arms will be resisted by the pressure of the oil as it is compelled to flow through one or the other of the pressure relief valves 74 and 78, depending upon the direction of travel. The check valves 75 and 79 will permit the cylinder to fill readily behind the piston, thus avoiding the creation of a vacuum.

The operation of the invention will now be apparent from the above disclosure. The rod bundles will be pulled along the trough 16 of the conveyer 15 by the dogs 19, and as each dog 19 passes downwardly around the sprocket wheel 23 and out of its bundle the following dog 20 will push the bundle ahead. In Figs. 1 to 5 inclusive, one of the dogs 20 has reached the wheel 23, and the corresponding bundle B2 has been pushed forwardly to a position close to the transverse receiving conveyer 30. At this time the bar 56 will have reached the bottom of its stroke, and the arm 48 will be at the top of its arc of travel and in contact with the upper screws 50. The fingers 45 will be retracted, as shown in Fig. 5, and the arms 37 will be in their rearmost positions. As the shaft 24 continues to rotate, the cam 52 will raise the bar 56, at first very rapidly and then somewhat more gradually, thus turning the shaft 40 and swinging the arm 48 downwardly. During the initial rapid portion of this movement, the arm 48 will tip the levers 44 and project the fingers 45 upwardly through the slots 36 until all the lost motion is taken up, as indicated in Fig. 6, and the arm comes into contact with the lower screws 50. The continued downward movement of the arm 48 will swing the arms 37 forwardly, the fingers 45 pushing the bundle B2 ahead of them until the bar 56 reaches the top of its stroke and the arms 37 are at their limit of forward travel. At this time the bundle B2 will be located in the center of the receiving trough 31, as shown in Fig. 7, in position to be engaged by the next pair of dogs 34. As the arms 37 pass over the top of the shaft 40 during this forward movement, the piston 66 of the dashpot 61 will pass the cylinder port 69 and then force the oil outwardly from the front portion of the cylinder 62 through the relief valve 78. This will resist the forward movement of the arms 37 and prevent gravity from swinging them ahead faster than the arm 48 is moving, which would cause a premature retraction of the fingers 45. After the bundle has been properly deposited in the receiving trough 31, the continued rotation of the cam 52 will lower the bar 56 and raise the arm 48. This will first retract the fingers 45, as shown in Fig. 8, so that they cannot interfere with the on-coming bundle B3. The arm 48 will now be in contact with the upper screws 50, and its continued upward movement will carry the arms 37 rearwardly until they have reached their original position in readiness for the next cycle. During this rearward movement, the dashpot piston 66 will again pass the cylinder port 69, and oil from the rear portion of the cylinder 62 will be forced through the relief valve 74. This will create sufficient resistance to counteract the effect of gravity on the arms 37, and thereby prevent premature raising of the fingers 45.

The invention provides a comparatively simple and dependable power-actuated mechanism whereby the rod bundles are positively transferred from the delivery conveyer to the receiving conveyer. Furthermore the fingers 45 are held in a retracted position throughout the return movement, so that they cannot engage the on-coming bundle, and the danger of disarranging the bundles is avoided.

Having thus described our invention, what we

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

1. Conveyer mechanism for handling articles, such as annular rod bundles or the like, comprising a receiving conveyer, a substantially horizontal delivery trough leading to the conveyer, the trough having a longitudinal slot therein adjacent the conveyer, means to move articles along the trough to a position over the slot, an upright arm located beneath the trough and pivotally supported at its lower end, a finger mounted on the upper end of the arm in line with the slot, power actuated means having a lost motion connection with the arm arranged to swing the arm forwardly and rearwardly with a positive motion in timed relationship with the arrival of the articles, and a connection from the power actuated means to the finger arranged to project the finger upwardly through the slot as the lost motion is taken up prior to each forward movement of the arm and to retract the finger as the lost motion is taken up prior to each rearward movement of the arm, the finger serving to push the articles forwardly to the receiving conveyer as the arm swings forwardly.

2. Conveyer mechanism for handling articles, such as annular rod bundles or the like, comprising a receiving conveyer, a substantially horizontal delivery trough leading to the conveyor, the trough having a longitudinal slot therein adjacent the conveyer, means to move articles along the trough to a position over the slot, an upright arm located beneath the trough and pivotally supported at its lower end, a finger mounted on the upper end of the arm in line with the slot, power actuated means having a lost motion connection with the arm arranged to swing the arm forwardly and rearwardly with a positive motion in timed relationship with the arrival of the articles, a connection from the power actuated means to the finger arranged to project the finger upwardly through the slot as the lost motion is taken up prior to each forward movement of the arm and to retract the finger as the lost motion is taken up prior to each rearward movement of the arm, the finger serving to push the articles forwardly to the receiving conveyer as the arm swings forwardly, and a dashpot mechanism connected to the arm and arranged to impose a yielding resistance to the movements thereof.

3. Conveyer mechanism for handling articles, such as annular rod bundles or the like, comprising a receiving conveyer, a substantially horizontal delivery trough leading to the conveyer, the trough having a longitudinal slot therein adjacent the conveyer, means to move articles along the trough to a position over the slot, a substantially horizontal transverse shaft beneath the trough, an upright arm located beneath the trough and pivotally supported at its lower end on the shaft, a finger mounted on the upper end of the arm in line with the slot, power actuated means to oscillate the shaft in timed relationship with the arrival of the articles, a lost-motion connection from the shaft to the arm to swing the arm forwardly and rearwardly with a positive motion, and means connecting the shaft to the finger arranged to project the finger upwardly through the slot as the lost motion is taken up prior to each forward movement of the arm and to retract the finger as the lost motion is taken up prior to each rearward movement of the arm, the finger serving to push the articles forwardly to the receiving conveyor as the arm swings forwardly.

4. Conveyer mechanism for handling articles, such as annular rod bundles or the like, comprising a receiving conveyer, a substantially horizontal delivery trough leading to the conveyer, the trough having a longitudinal slot therein adjacent the conveyer, means to move articles along the trough to a position over the slot, a substantially horizontal transverse shaft beneath the trough, an upright arm located beneath the trough and pivotally supported at its lower end on the shaft, a lever pivotally mounted on the upper end of the arm and shaped to provide a finger in line with the slot, power actuated means to oscillate the shaft in timed relationship with the arrival of the articles, a lost-motion connection from the shaft to the arm to swing the arm forwardly and rearwardly with a positive motion, a lever arm secured to the shaft, and a link connecting the lever arm with the said lever and arranged to swing the finger upwardly through the slot as the lost motion is taken up prior to each forward movement of the upright arm and to retract the finger as the lost motion is taken up prior to each rearward movement of the upright arm, the finger serving to push the articles forwardly to the receiving conveyer as the upright arm swings forwardly.

5. Conveyer mechanism for handling articles, such as annular rod bundles or the like, comprising a receiving conveyer, a substantially horizontal delivery trough leading to the conveyer, the trough having a longitudinal slot therein adjacent the conveyer, a power-driven rotatable shaft beneath the trough, dogs actuated by the shaft to move articles along the trough to a position over the slot, a cam mounted on the shaft, a cam follower actuated by the cam, a substantially horizontal transverse shaft beneath the trough, means connecting the cam follower to the transverse shaft to oscillate the same in timed relationship with the arrival of the articles, an upright arm located beneath the trough and pivotally supported at its lower end on the transverse shaft, a finger mounted on the upper end of the arm in line with the slot, a lost-motion connection from the transverse shaft to the arm to swing the arm forwardly and rearwardly with a positive motion, and means connecting the transverse shaft to the finger arranged to project the finger upwardly through the slot as the lost motion is taken up prior to each forward movement of the arm and to retract the finger as the lost motion is taken up prior to each rearward movement of the arm, the finger serving to push the articles forwardly to the receiving conveyer as the arm swings forwardly.

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