Feb. 4, 1936. J. E. FAWELL 2,029,915

FEEDER AND CATCHER APPARATUS FOR ROLLING MILLS

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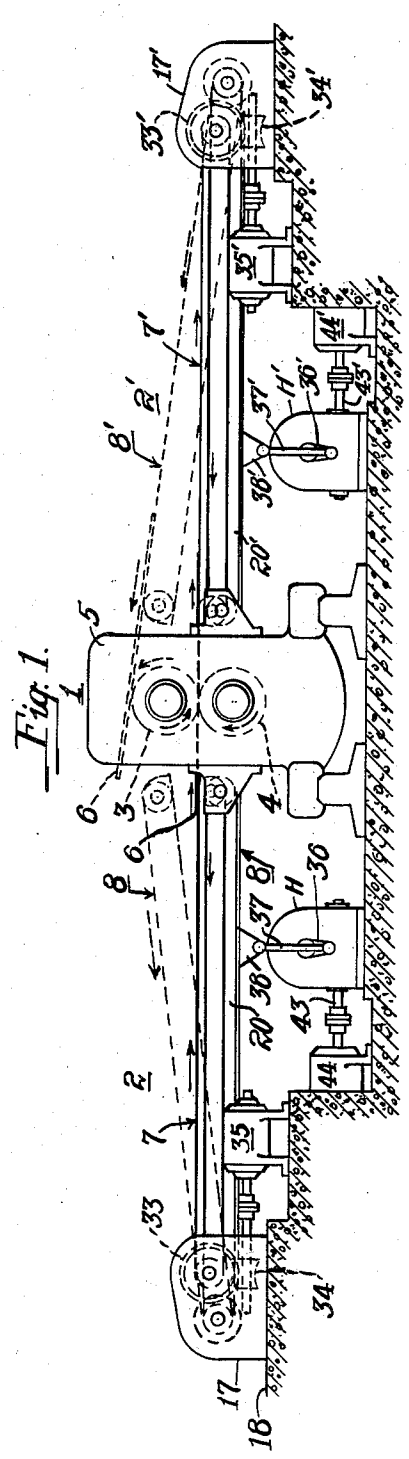


Fig. 1.

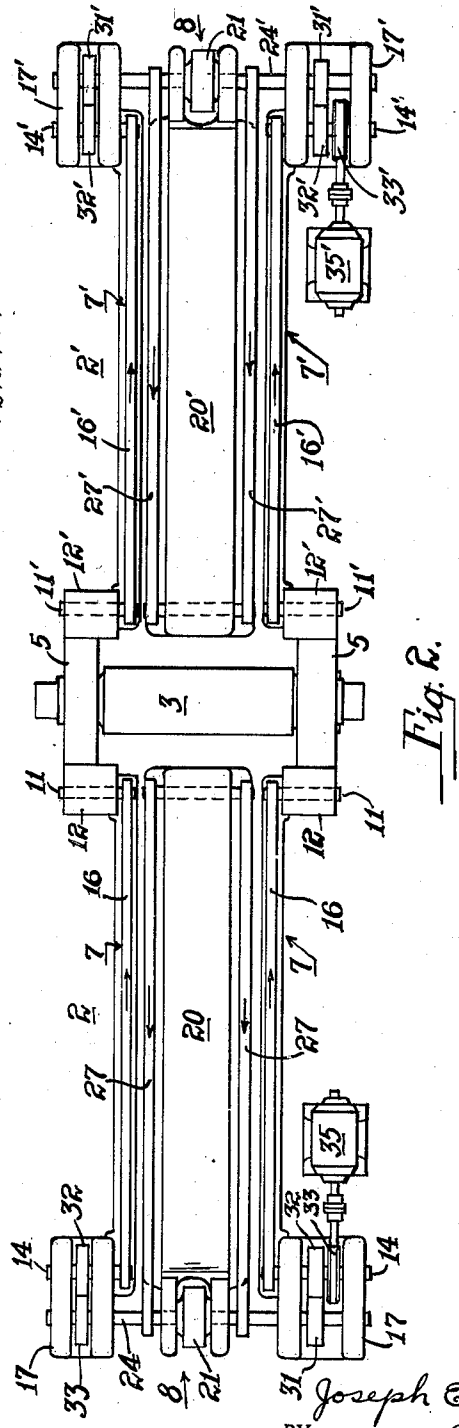


Fig. 2.

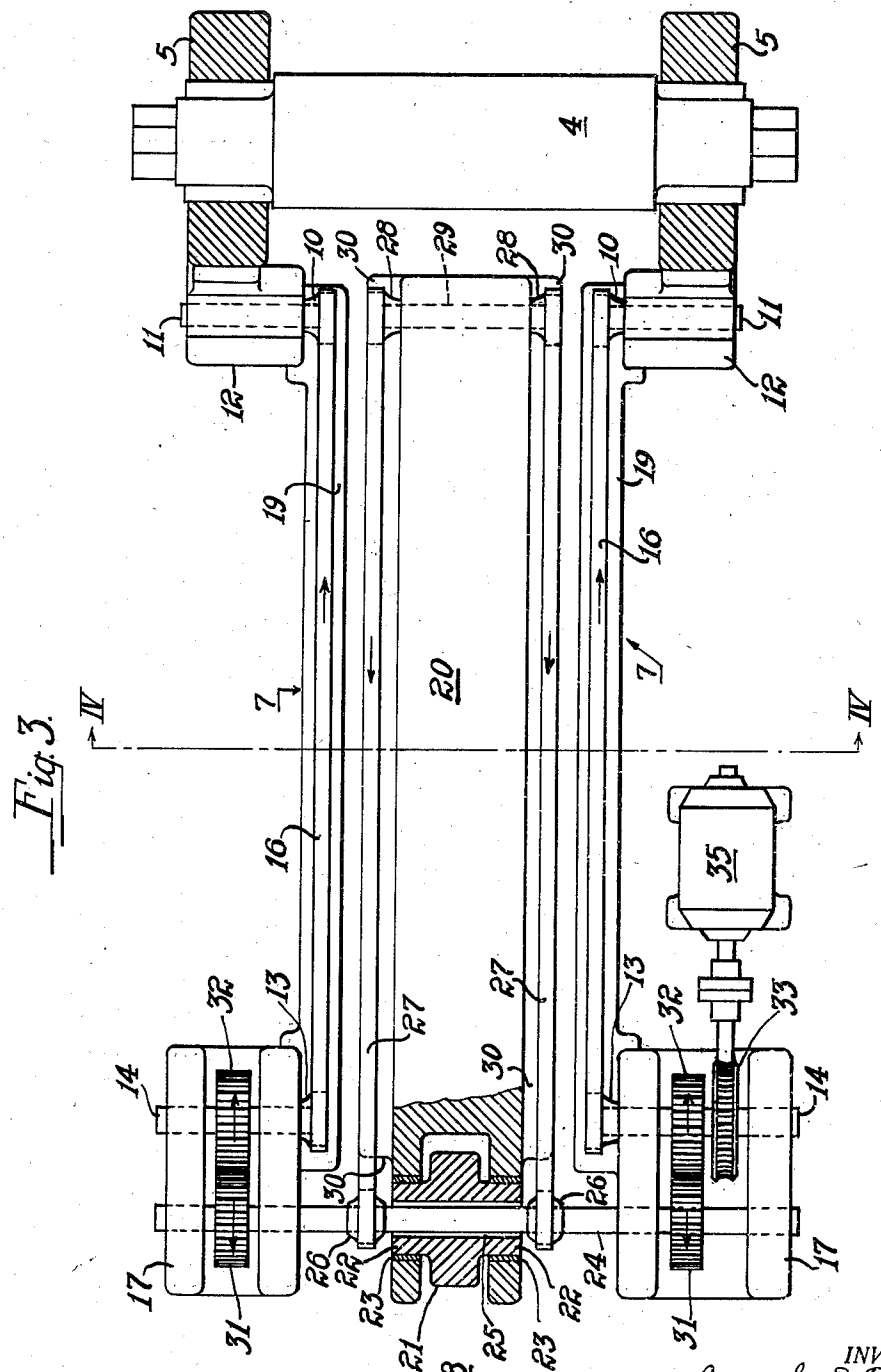
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FEEDER AND CATCHER APPARATUS FOR ROLLING MILLS

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Fig. 3.



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FEEDER AND CATCHER APPARATUS FOR ROLLING MILLS

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Fig. 4.

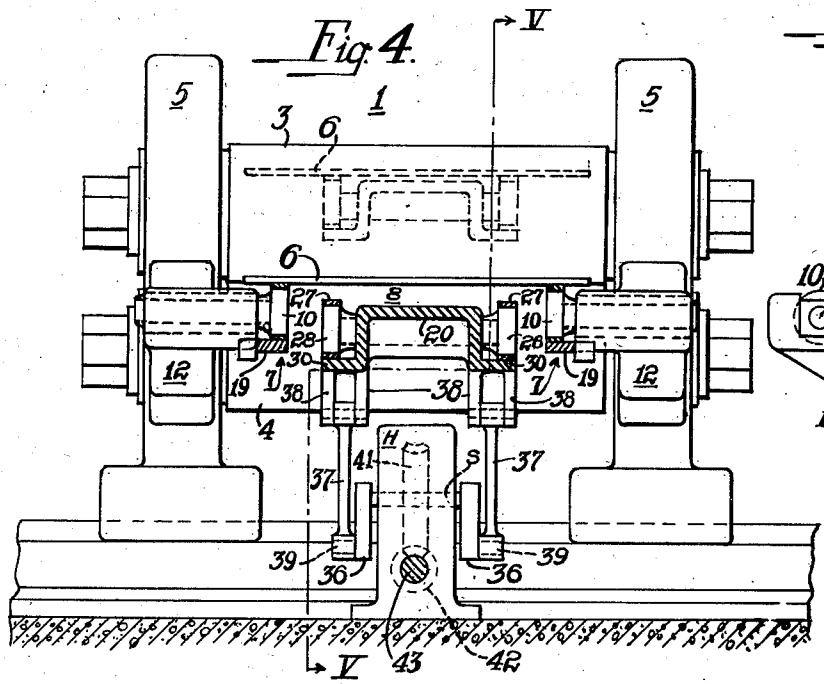
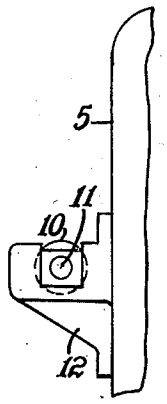


Fig. 7.



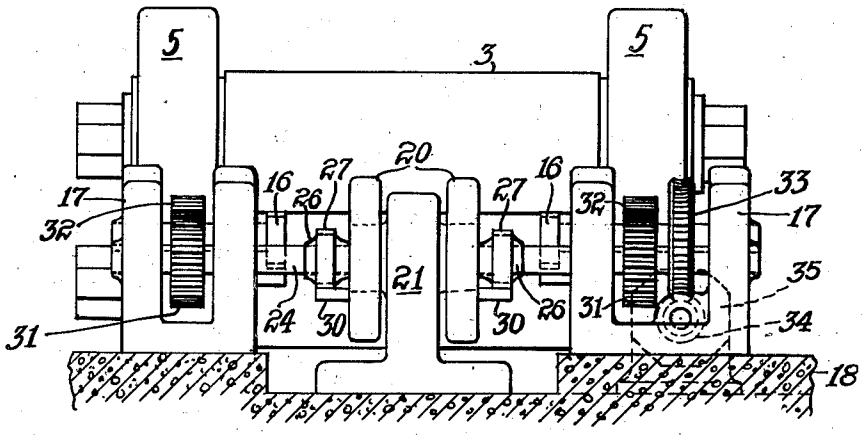


Fig. 6.

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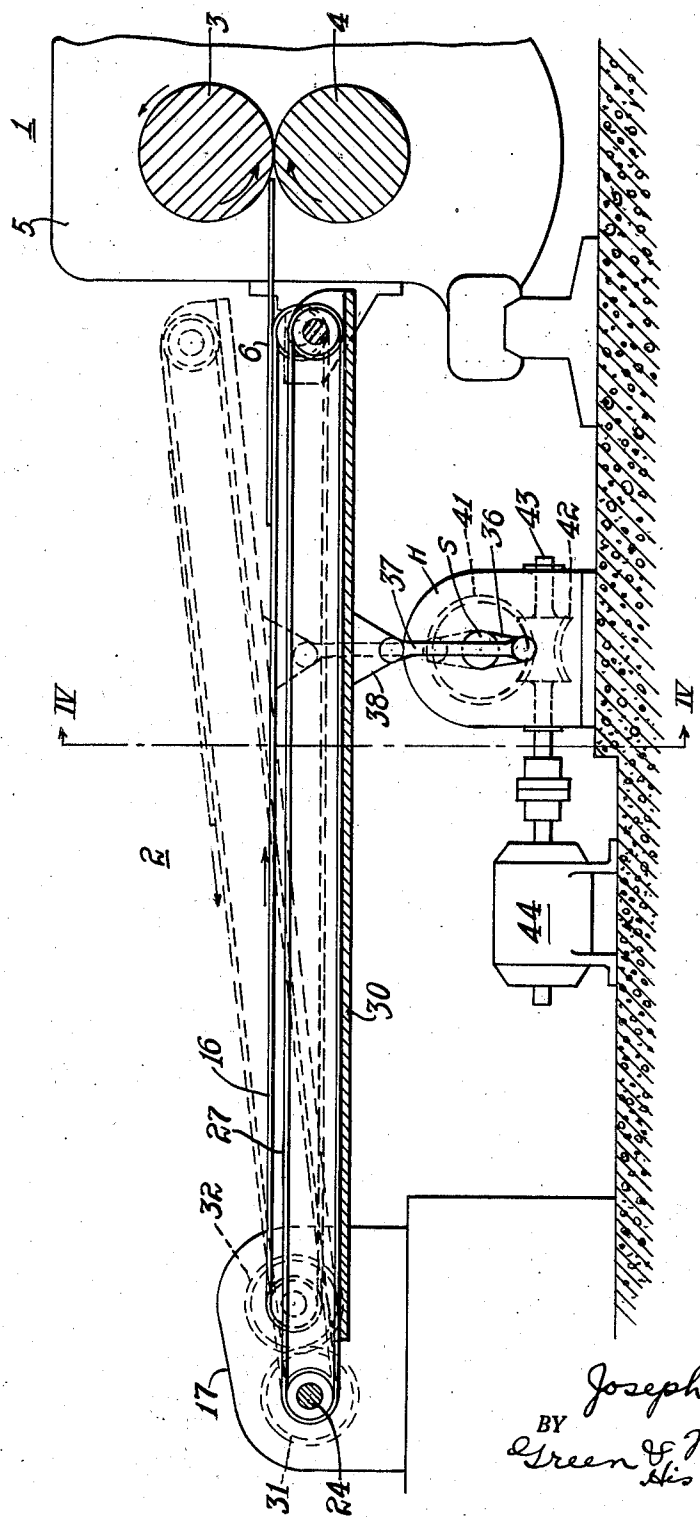


Fig. 5.

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Patented Feb. 4, 1936 2,029,915

UNITED STATES PATENT OFFICE

2,029,915

FEEDER AND CATCHER APPARATUS FOR ROLLING MILLS

Joseph E. Fawell, Pittsburgh, Pa.

Application May 21, 1932, Serial No. 612,670

8 Claims. (Cl. 80—47)

This invention relates to the hot rolling of sheet material and more particularly to catcher and feeder mechanisms for feeding flat material such as sheet packs to and from the rolls of a sheet mill.

An object of this invention is the provision of a catcher and feeder mechanism which is simple in construction, easy to operate and control, and efficient in operation.

Another object of the invention is to produce a catcher and feeder mechanism of such design and construction that the material being rolled may be fed through the mill and returned to the feeding side of the mill without reversing any of the endless conveyors of the mechanism.

Other objects of the invention will, in part, be apparent, and will, in part, be obvious from the following description taken in conjunction with the accompanying drawings in which:

Figures 1 and 2 are side elevation and top plan views, respectively, of a rolling mill having a catcher and feeder mechanism arranged and constructed in accordance with an embodiment of the invention;

Fig. 3 is an enlarged top plan view, partly in section, of the catcher and feeder mechanism employed on one side of the mill, the mechanism on the other side being similar in construction;

Fig. 4 is a view in transverse section taken on line IV—IV of Figs. 3 and 5;

Fig. 5 is a view in longitudinal section taken on line V—V of Fig. 4;

Fig. 6 is an end view of the catcher and feeder mechanism, as seen from left to right in Fig. 3; and

Fig. 7 is a fragmentary view in side elevation showing a bracket which supports one end of the feeder to the rolling mill housing.

Throughout the drawings and the specification like reference characters indicate like parts.

In Figs. 1 and 2 of the drawings, a rolling mill 1 is shown, provided with a feeder and catcher mechanism comprising units 2 and 2'; constituting an embodiment of the invention, disposed on the feeding and discharge sides, respectively, of the mill. Since, as illustrated herein, the units 2 and 2' are of similar construction and embody interchangeable elements, similar and corresponding parts of these units will be given similar reference characters primed.

Mill 1 is adapted to roll particularly in pack form sheets, tin plate, or flat materials and comprises upper and lower rolls 3 and 4 mounted in housings 5.

In the rolling of flat materials, such as referred to above, the material 6 is placed on an endless continuously running conveyor 7, of unit 2 (the top run of which moves toward the rolls), and fed to the rolls. Conveyor 7 is mounted in fixed relation to the rolls, and in such position that the material is delivered between them as shown in Fig. 1. As the material passes through the rolls it is positioned on a conveyor 7' of unit 2', the top run of which travels in the same direction as the top run of conveyor 7 of unit 2. When the material has been discharged from the rolls, conveyor 7' of unit 2' carries the sheet away from the rolls far enough to clear them.

When the material is clear of the rolls, a tiltably mounted conveyor 8' which is continuously running in the opposite direction with reference to conveyors 7 and 7', takes control of the material and transfers it over top roll 3 to a tiltably mounted conveyor 8, of unit 2, which carries the material to a position where it will clear the rolls on the feeding side. When clear of the rolls the tiltably mounted conveyors 8, 8' are actuated to inoperative position whereby the material is again placed on the feeder conveyor 7 and delivered to the rolls from which it is discharged to conveyor 7'. By actuating the tiltable conveyors to operative position the material is again returned to the feeding side of the rolls, as described above.

The above described operation is repeated as many times as required to finish the rolling of the material. The conveyors alternately take control of the material but at no time are the endless conveyors reversed.

Since units 2 and 2' are similarly constructed, a description of the details of construction will be confined to unit 2 only.

The conveyor 6 comprises a pair of pulleys or sprocket wheels 10 which are mounted on stub shafts 11 journaled in brackets 12 carried by the roll housings 5, and a pair of pulleys or sprockets 13 rigidly secured to driven shafts 14, and endless belts or chains 16 mounted in spaced parallel relation to each other. The endless belts or chains are mounted on pulleys or sprockets 10—13, and 10—13, as shown in Figs. 2 and 3.

The driven shafts 14 and 15 are journaled in U-shaped frames 17 secured to a foundation 18.

The bottom or lower runs of chains or belts 16 may be supported on plates 19 carried by brackets 12 and frames 17.

Conveyor 8 comprises a relatively long support 20 of substantially inverted U-shape in section which is tiltably mounted at its end remote from the mill on a standard 21 having journal necks 22 thereon. The journal necks are disposed in

bushed openings 23 formed in the opposite sides of support 20.

Conveyor 8 also includes a driven shaft 24 which is journaled in frames 17 and which extends through an opening 25 in the standard 21. Shaft 24 carries a pinion 26 on each side of the standard 21 adjacent the journal necks 23 on which endless continuously running belts or chains 27 operate. The top runs of chains 27 are disposed above the surface of member 20 so that when conveyor 8 is actuated to operative position, the sheets will be carried by the chains or belts.

The opposite ends of chains or belts 27 operate on sprockets 28 which are supported on a shaft 29 that extends through the sides of support 20 at the end adjacent mill 1. The bottom runs of chains 27 are supported on flanges 30 that extend outwardly from the opposite sides of support 20.

In order that chains or belts 16 and the chains or belts 27 may be driven continuously in opposite directions as indicated by the arrows in Figs. 1, 2, and 3, gears 31 are mounted on shaft 24 between the upwardly extending sides of the respective supports or frames 17 that mesh with gears 32 mounted on shafts 14. By driving one of shafts 14, as indicated in Figs. 1, 2, 3, and 6, by means of a worm wheel 33, worm 34 and an electric motor 35, chains or belts 16 and 27 will be driven in opposite directions and continuously while motor 35 is in operation.

When the material is being fed to the feeding side of the mill, conveyor 7 is operative to move or feed the material as indicated in Fig. 1. Thus, in order that the conveyor chains 16 of conveyor 7 may be operative to perform this function, conveyor 8 must be actuated relative to conveyor 7 so that the chains 27 of conveyor 8 will not come in contact with the material. Likewise, when the material has been delivered by the mill to conveyor 7' and carried to the point where it will clear the mill, conveyors 8 and 8' must be rendered operative to carry the material back over the top roll 3 to the feeding side of the mill. In this case, conveyors 7' and 7 are inoperative with respect to conveyors 8 and 8'.

In order to make conveyors 8, 8' and 7, 7' alternately operative and inoperative, without stopping the chains or reversing their direction of motion, means are provided for alternately raising conveyors 8 and 8' to the broken line position indicated in Fig. 1 and to the full line position indicated in the same figure.

When conveyors 8' and 8 are in the broken line positions indicated in Fig. 1, the material is transferred from the delivery side of the mill to the feeding side, conveyors 7 and 7' being in this case inoperative, and when conveyors 8' and 8 are in the full line position, the chains or belts 27 thereof are disposed below the conveyor chains or belts 16 and 16' of conveyors 7 and 7' and are therefore in their inoperative position relative to the chains or belts of conveyors 7 and 7'.

The means employed for raising and lowering conveyors 8 and 8' to their operative and inoperative positions, respectively, is illustrated particularly in Figs. 1, 4, and 5. The means illustrated comprises a shaft S mounted in a housing H and crank arms 36 secured to the opposite ends of the shaft. The means also include connecting rods 37, the upper ends of which are pin connected to spaced lugs 38 which extend downwardly from the supporting flanges 30 of supports 20. The lower ends of connecting rods 37 are journaled on crank pins 39 carried by the outer ends of crank arms 36.

Shaft S carries a worm wheel 41 disposed within housing H and a worm 42 keyed to a shaft 43 which is driven by an electric motor 44.

When the crank arms 36 occupy the positions indicated in full lines in Figs. 1, 4, and 5, conveyors 8 and 8' are disposed in their inoperative positions, and when motor 44 is operated to turn the crank arms to the broken line positions, indicated in Fig. 5, conveyors 8 and 8' are actuated to the position indicated in broken lines in Figs. 1 and 5, which, as stated previously herein, is the operative position of these conveyors.

In the operation of the mechanism herein shown, the motor 35 may operate continuously since at no time is it necessary to reverse the direction of motion of the conveyor chains 16—16' and 27—27'. By merely operating motor 44 in accordance with the position of the material being rolled, conveyors 8 and 8' may be actuated relative to conveyors 7 and 7' to their operative and inoperative positions.

Motor 44 may be provided with automatic control apparatus now in use on prior art catcher and feeder mechanisms for automatically controlling its operation, and the shifting of conveyors 8 and 8' to their operative and inoperative positions in accordance with the position of the material relative to mill 1. In a practical embodiment of the mechanism herein disclosed, such automatic control apparatus may be added or motor 44 may be controlled manually.

The apparatus herein illustrated may also be provided with guards and guides for accurately positioning and aligning the material on the conveyors. Such apparatus may be added to the mechanism embodying this invention and are well known in the art. The automatic control apparatus for governing the operation of motor 44 and the guards and guides for positioning and aligning the material, being well known in the art, have not been shown herein since it would tend to obscure the features of the invention herein contemplated.

As shown in the drawings, the conveyors are illustrated in conjunction with a two high mill, but it is to be understood that they may be used with three and four high mills also.

While only one embodiment of the invention has been shown and described herein, it is to be understood that various modifications and changes may be made by those skilled in this particular art without departing from either the spirit or the scope of the invention. It is desired, therefore, that only such limitations shall be placed on the invention as are imposed by the prior art and the appended claims.

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

1. The combination with a sheet rolling mill, of two fixed endless conveyors located on opposite sides of said mill and each including spaced endless parallel portions, a conveyor support frame located between the spaced portions of each of said conveyors, a pivotal mounting for the end of each support frame farthest removed from the mill, means for raising and lowering each of said frames about its pivotal mounting, an endless conveyor carried by each of said frames and means connected to constantly drive the fixed conveyors in one direction and the tiltable conveyors in the opposite direction; the relative location of the support surfaces of said conveyors being such that when the conveyors carried by

the tiltable frames are in inoperative position, their support surfaces lie below the support surfaces of the fixed conveyors.

2. The combination with a sheet rolling mill, of two fixed endless chain conveyors located on opposite sides of said mill and each including spaced endless parallel chains, a conveyor support frame located between the spaced chains of each of said conveyors, a pivotal mounting for the end of each support frame farthest removed from the mill, means for periodically raising and lowering each of said frames about its pivotal mounting, an endless conveyor carried by each of said frames, means connected to constantly drive the fixed conveyors in one direction and the tiltable conveyors in the opposite direction; the relative location of the support surfaces of said conveyors being such that when the conveyors carried by the tiltable frames are in inoperative position, their support surfaces lie below the support surfaces of the fixed conveyors.

3. The combination with a mill for rolling sheet material, of a fixed endless chain conveyor located on the catcher side of the mill and including spaced endless parallel chains, a conveyor support frame located between said chains, a pivotal mounting for the end of said support frame farthest removed from the mill, means for periodically raising and lowering said frame about its pivotal mounting, an endless conveyor carried by said frame and comprising spaced endless chains, motor operated means connected to constantly drive the fixed conveyor in a direction to carry material away from the mill and the tiltable conveyor in the opposite direction; the relative location of the support surfaces of said conveyors being such that when the conveyor carried by the tiltable frame is in inoperative position its support surface lies below the support surface of the fixed conveyor.

4. The combination with a mill for pack rolling sheet material, of spaced parallel supporting means located on the catcher side of the mill and arranged to receive and support material issuing from the mill, a conveyor support frame located between said parallel supporting means, a pivotal mounting for the end of said frame farthest removed from the mill, means for tilting said frame about its pivotal mounting to raise and lower its end adjacent the mill, an endless conveyor carried by said support frame and located between said parallel supporting means and means connected to constantly drive said conveyor to move material toward said mill; the relative location of the support surfaces of said conveyor and said spaced supporting means being such that when the conveyor is in its lowest position, its support surfaces will lie below the support surfaces of said supporting means.

5. The combination with a sheet rolling mill, of an endless fixed conveyor located on the catcher side of the mill and including spaced endless parallel members adapted to receive work delivered from the roll pass, a conveyor support located between the spaced members of said conveyor, a pivotal mounting for the end of the support remote from the mill, means connected to the support between its center and its free end for raising and lowering the same about its pivotal mounting, an endless conveyor carried by said support and means connected to constantly drive said conveyors in opposite directions with the fixed conveyor moving in a direction away from the mill and the tiltable conveyor in a direction toward the mill; the relative location of the support surfaces of said conveyors being such that when the tiltable conveyor is in inoperative position its support surface lies below the support surface of the fixed conveyor.

6. The combination with the rolls of a sheet rolling mill, of a fixed endless chain conveyor located on the catcher side of the mill and including spaced endless parallel chains so positioned as to receive material delivered from the roll pass, a conveyor support located between said spaced chains, a pivotal mounting for the end of the support farthest removed from the mill, means connected to the support at a point between its center and its free end and including a motor and a crank arm rotatable in one direction for periodically raising and lowering the support about its pivotal mounting, an endless conveyor carried by said support and including spaced endless parallel chains adapted to convey material toward the upper roll when the pivotally mounted support is in its upper tilted position and means including a single motor connected to constantly drive the fixed conveyor in a direction away from the mill and the tiltable conveyor in a direction toward the mill.

7. In combination with the rolls of a sheet rolling mill, spaced parallel supports extending at right angles to the roll pass and adapted to receive material delivered therefrom, an endless conveyor having spaced runs located between and paralleling said spaced supports, a pivotal mounting for the end of said conveyor remote from the mill, means for continuously driving said conveyor in a direction to carry material toward the mill and means including a crank arm and a motor adapted to rotate in one direction only for periodically raising and lowering said conveyor about its pivotal mounting.

8. In combination with the rolls of a sheet rolling mill, an endless conveyor having spaced parallel runs extending at right angles to the roll pass and adapted to receive material delivered therefrom, means for continuously driving said conveyor in a direction to carry material away from the mill, a second endless conveyor having spaced runs located between and paralleling the runs of said first conveyor, a pivotal mounting for the end of the said second conveyor remote from the mill, means for continuously driving said conveyors in opposite directions, the first in a direction to convey material away from the mill and the second in a direction to convey material toward the mill and means including a crank arm and a motor adapted to rotate in one direction only for raising and lowering said second conveyor about its pivotal mounting.

JOSEPH E. FAWELL.