A. TEPLITZ

METHOD AND APPARATUS FOR INTRODUCING COILS OF METAL STRIP TO PROCESSING LINES

Inventor: ALFRED TEPLITZ

his Attorney.
METHOD AND APPARATUS FOR INTRODUCING COILS OF METAL STRIP TO PROCESSING LINES

Alfred Teplitz, Pittsburgh, Pa., assignor to United States Steel Company, a corporation of New Jersey

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This invention relates to apparatus and methods for introducing coils of metal strip to processing lines, such as electrolytic tin plating lines, continuous annealing or pickling lines or the like.

Strip processing lines commonly have uncoiling mandrels which feed the strip to the line and to which the strip is introduced in large coils which weigh anywhere from five to twenty-five tons. The usual practice in introducing these coils involves placing a supply of coils at the top of a sloping ramp and rolling the coils down the ramp singly as they are needed. An elevator, which also is shiftable horizontally, is situated at the foot of the ramp and it lifts each coil to the height of the uncoiling mandrel and shifts the coil sidewise into engagement with this mandrel. The reverse of these operations occur when a processed coil is removed from the line.

This practice is satisfactory for coils which weigh up to about fifteen tons, but I have found that heavier coils cannot be handled satisfactorily on a sloping ramp. For example, twenty-five ton coils are difficult to get in motion and then they are difficult to stop without damaging the strip in the coil.

An object of the present invention is to provide improved apparatus and methods for introducing coils of metal strip to processing lines from which sloping ramps and rolling of the coil are eliminated, thereby overcoming difficulties encountered in handling heavier coils.

A further object of the invention is to provide improved apparatus and methods for introducing coils to strip processing lines in which coils are placed on a conveyor; the conveyor carries the coils to an elevator opposite the uncoiling mandrel; the elevator lifts the coils to mandrel height; and the mandrel shifts the coils sidewise from the elevator to a position aligned with the processing line.

A further object of the invention is to provide an improved combination of a conveyor and elevator which cooperate in a novel fashion to move articles horizontally and vertically.

A further object of the invention is to provide improved uncoiling mandrels which are shiftable sidewise to engage a coil on a support and to carry the coil into alignment with a processing line.

In accomplishing these and other objects of the invention, I have provided improved details of structure, a preferred form of which is shown in the accompanying drawings, in which:

Figure 1 is a top plan view of an apparatus for introducing coils of metal strip to a processing line embodying features of the present invention;

Figure 2 is an end elevational view of the apparatus, partly in section; and

Figure 3 is a side elevational view of the apparatus.

In the drawing there is shown at 10 an endless conveyor, which comprises a series of laterally spaced strands 12. The conveyor has the usual power driving mechanism 13, which preferably is situated in a pit 14 beneath floor level. The strands preferably are of the chain type and rails 15 support their upper runs substantially at floor level. These rails are supported on cross braces 16 which are carried on vertical columns 17. The upper run of the conveyor forms a horizontal conveying surface on which coils S of metal strip are placed toward the right as viewed in Figure 3. These coils advance toward the left for introduction to a processing line, which is parallel to the conveyor and is indicated schematically at L (Figure 1).

There is shown at 18 an elevator, which comprises a horizontal beam 19 situated between the upper and lower runs of conveyor 16 adjacent the left end as viewed in Figure 3. Hydraulic pistons and cylinders 20 of any standard construction are situated outside the lower run of the conveyor and are adapted to raise and lower beam 18. These cylinders may be operated by standard control mechanism, and the elevator may have any standard equalizer means to insure that the two pistons move together without binding, neither of which is shown. A plurality of risers 21 extend upwardly from beam 18, there being one such riser extending into each space between successive conveyor strands 12. These strands are free of one another throughout their length and hence the risers do not restrict conveyor travel. The upper edges of the risers preferably have notches 22 for lifting coils S from the conveyor to an uncoiling mandrel 23, presently described. The beam and risers are fixed horizontally, being movable only vertically.

A mandrel housing 24 is situated sidewise of the left end of the conveyor beyond the processing line L and supports mandrel 23 so that this mandrel may be shifted sidewise with respect to the conveyor. In a preferred arrangement the mandrel housing has bearings 25 which rotatably support a sleeve 26 (Figure 2). These bearings may be of any appropriate design, such as roller bearings or tapered thrust bearings. The housing also supports a motor 27 and gearing 28 for rotating said sleeve. Mandrel 23 is of any usual
expanding type and has a shank 23 slidably keyed in sleeve 26. Commonly the expansion means is hydraulic, and the far end of the shank furnishes a convenient place for mounting hydraulic expanding mechanism 30. Rotation of the sleeve rotates the mandrel for uncoiling coils supported thereon and feeding them into processing line L. The mandrel can be shifted sidewise either to a position above risers 21 for engaging coils thereon, or to a position closer to the housing aligned with processing line L for feeding strip thereto.

The preferred mechanism for shifting the mandrel comprises a pair of double acting fluid pressure pistons and cylinders 31, one of said cylinders being situated on each side of housing 24. Piston rods 32 extend back from the pistons in these cylinders and carry a cross bar 33. The rear end portion of mandrel shank 23, just ahead of the expanding mechanism 30, is rotatably supported in a bearing 34 fixed to said cross bar. Movement of the pistons to the right, as viewed in Figures 1 and 4, draws the pistons in to the cylinder and moves cross bar 33, and mandrel 23 and its shank 29 to a position in which said mandrel is directly above risers 21. Thus the mandrel may engage within the open space in the center of col 3. Movement of the piston to the left moves the mandrel to a position aligned with the processing line for uncoiling and feeding strip.

According to the method for introducing coils of strip metal to a processing line embodied in the present invention, coils S are placed on conveyor 10 toward the right as viewed in Figure 3 by suitable handling mechanism, such as an overhead crane. Just before the coil on the conveyor is needed for feeding to the processing line, the conveyor is operated to move that coil toward the left to a position directly above risers 21 of elevator 18 and opposite mandrel 23. Initially these risers are lowered beneath the upper run of the conveyor. After the coil arrives over the elevator, cylinders 31 are operated to lift beam 19, risers 21 and coils S until the open center of the coil is aligned with mandrel 23. The height to which the coil is lifted varies according to the size of the coil.

When the preceding coil is exhausted, rotation of the mandrel is stopped and cylinders 31 are operated to shift the mandrel back to the left until the coil is aligned with processing line L. Preferably a new coil S is then placed in readiness on conveyor 10.

From the foregoing description it is seen that I have provided improved apparatus and methods for introducing coils of metal strip to processing lines in which the need for rolling the coils down sloping ramps is eliminated. Thus I have overcome the objection of usual practices as applied to very heavy coils. In providing such apparatus and methods, I have utilized a novel combination of a conveyor with an elevator and also I have provided a novel construction of shiftable mandrel.

It is to be understood that the apparatus and method just described can be used in reverse for removing processed coils from the line. For simplicity I have confined my description to that of introducing coils to the line, but I intend the claims to cover the structure and method when used either for introducing coils to the line or for removing coils from the line.

While I have shown and described only a single embodiment of the invention, it is apparent that modifications may arise. For example, an arrangement in which the mandrel is fixed longitudinally in its housing and the housing is shiftable is in many respects equivalent. Therefore, I do not wish to be limited to the disclosure set forth but only by the scope of the appended claims.

I claim:

1. Apparatus for introducing coils of metal strip to processing lines comprising in combination a conveyor laterally offset from the processing line and having a series of laterally spaced strands adapted to support coils, an elevator cooperable with said conveyor to lift coils singly therefrom, a mandrel, and means supporting said mandrel and adapted to shift it sidewise to a position above said elevator for engaging coils thereon and having risers adjustable to position aligned with the processing line for feeding strip thereto.

2. Apparatus for introducing coils of metal strip to processing lines comprising in combination a conveyor laterally offset from the processing line and having a series of laterally spaced strands forming a substantially horizontal conveying surface adapted to support coils and move them horizontally, an elevator cooperable with said conveyor to lift coils singly therefrom, a mandrel, and means supporting said mandrel and adapted to shift it sidewise to a position above said elevator for engaging coils thereon and to a second position aligned with the processing line for feeding strip thereto.

3. Apparatus for introducing coils of metal strip to processing lines comprising in combination a conveyor laterally offset from the processing line and having a series of laterally spaced strands adapted to support coils, an elevator cooperable with said conveyor and having a plurality of vertically movable risers extending into the spaces between the conveyor strands and adapted to lift coils singly therefrom, a mandrel, and means supporting said mandrel and adapted to shift it sidewise to a position above the elevator risers for engaging coils thereon and to a second position aligned with the processing line for feeding strip thereto, said mandrel being adapted to carry coils from said elevator to the processing line during such shifting.

4. Apparatus for introducing coils of metal strip to processing lines comprising in combination a conveyor laterally offset from the processing line and having a series of laterally spaced strands forming a substantially horizontal con-
veying surface adapted to support coils and move them horizontally in a direction parallel to the processing line, an elevator cooperable with said conveyor and having a plurality of horizontally fixed, vertically movable risers extending into the spaces between the conveyor strands and adapted to lift coils singly therefrom, a mandrel, a housing spaced sidewise from said conveyor beyond the processing line, an elevator cooperable with said conveyor and having a plurality of horizontally fixed, vertically movable risers extending into the spaces between the conveyor strands and adapted to lift coils singly therefrom, a mandrel, a housing spaced sidewise from said conveyor beyond the processing line, a sleeve rotatably mounted in said housing and supporting said mandrel so that the mandrel rotates with the sleeve, drive means carried by said housing for rotating said sleeve and said mandrel for feeding strip to the line, said mandrel being shiftable in said sleeve sidewise of the processing line to a position above the elevator risers for engaging coils thereon and to a position aligned with the processing line for feeding strip, and power means on said housing for shifting said mandrel.

9. In an apparatus for introducing coils of metal strip to a processing line, a housing, a sleeve rotatably supported in said housing, a mandrel carried in said sleeve and rotatable therewith, drive means for rotating said sleeve and said mandrel for feeding strip to the line, said mandrel being shiftable in said sleeve to engage coils supported at mandrel height and carry them into alignment with the processing line, fluid pressure cylinders on the sides of said housing, a cross bar having a rotatable connection with the rear end of said mandrel, and pistons and piston rods in said cylinders and connected to said cross bar to shift said mandrel.

10. A method for introducing coils of metal strip to a processing line comprising placing the coils on a horizontally movable conveyor, conveying the coils to a position opposite an uncoiling mandrel, lifting the coils singly from the conveyor to the height of the mandrel, engaging the coils with the mandrel, and carrying coils thus engaged to alignment with the processing line by shifting the mandrel sidewise of the line.

ALFRED TEPILTZ.

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