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Eibe

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[54] **COMBINATION PICKLING-ROLLING MILL**

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[58] **Field of Search** 72/38, 39, 40, 200, 201, 72/202, 227, 228, 230, 231; 134/64, 122, 137

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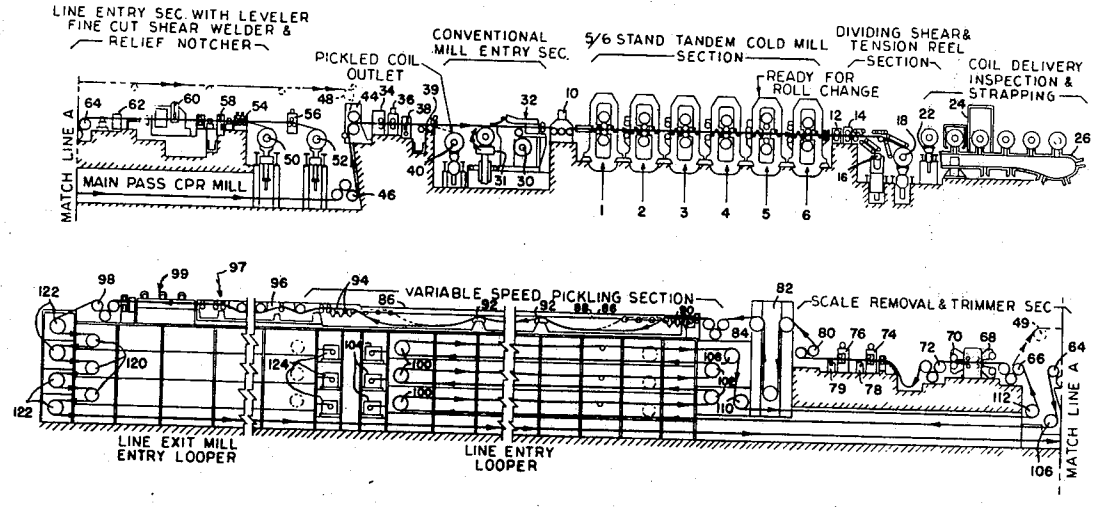
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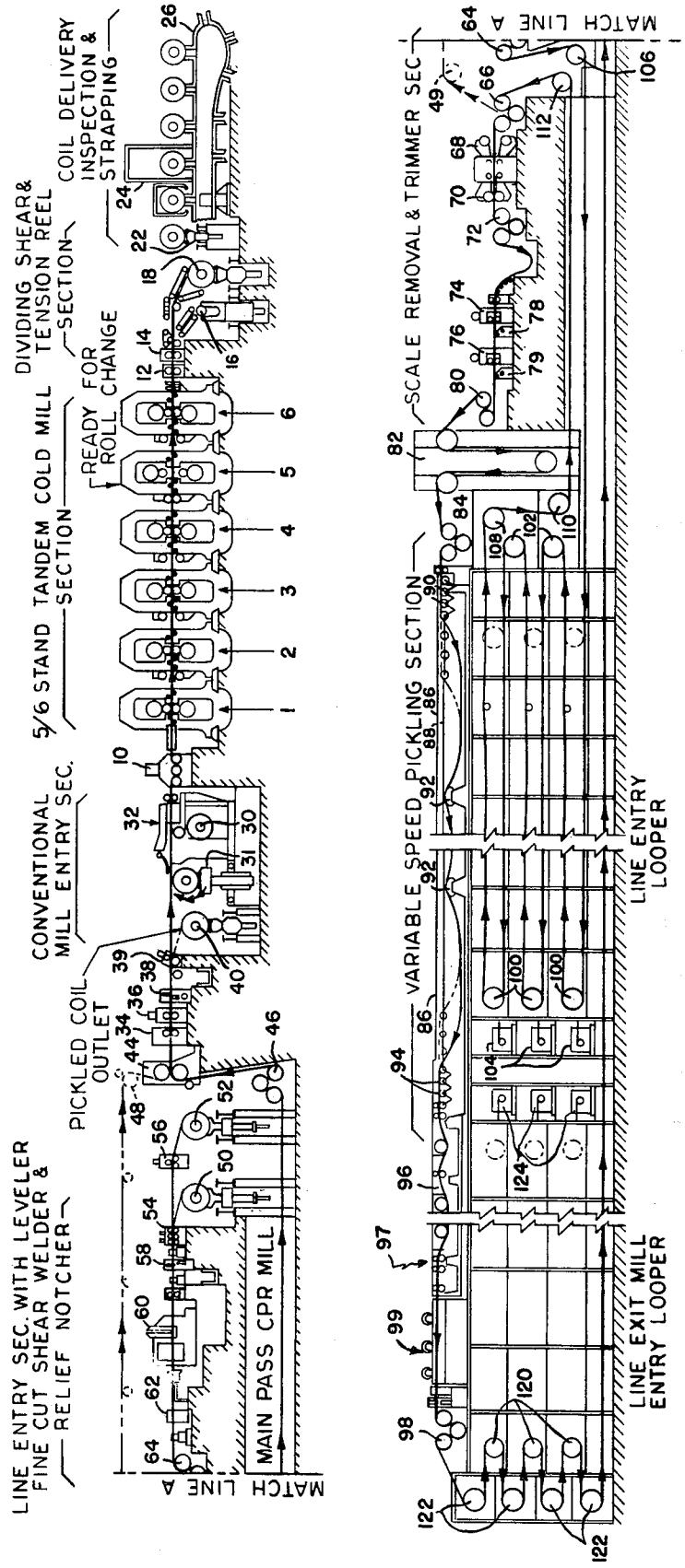
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[57] **ABSTRACT**

A mill which combines the processes of pickling hot band and subsequent cold rolling. The pickled strip is passed from the pickling line directly to a tandem cold rolling mill without any intervening coiling thereof. The combination mill is adapted to operate as a combination pickling-rolling mill, for fully continuous rolling of pickled coils and for conventional batch type rolling.

21 Claims, 1 Drawing Figure




LINE ENTRY SEC. WITH LEVELER
FINE CUT SHEAR WELDER &
RELIEF NOTCHER
PICKLED COIL
OUTLET
CONVENTIONAL
MILL ENTRY SEC.
5/6 STAND TANDEM COLD MILL
SECTION
READY
ROLL
CHANGE
SECTION
DIVIDING SHEAR &
TENSION REEL
COIL DELIVERY
INSPECTION &
STRAPPING
MAIN PASS CPR MILL
MATCH LINE A
SCALE REMOVAL & TRIMMER SEC
VARIABLE SPEED PICKLING SECTION
LINE ENTRY
LOOPER
LINE EXIT MILL
ENTRY LOOPER
MATCH LINE A

COMBINATION PICKLING-ROLLING MILL

BACKGROUND OF THE INVENTION

In the past, the processes of pickling hot band and subsequent cold rolling have been practiced as separate processes. After the pickling process, the pickled strip is coiled and stored. Subsequently, the stored coils are delivered to a cold rolling mill for rolling the strip to the desired thickness.

In addition to the loss of production, the separate operation of the processes of pickling hot band and subsequent cold rolling thereof results in a considerable duplication of equipment. In addition, there is an excessive use of building and floor space and an increased labor force is required because of the equipment duplication. Expenses of operation are also increased because of excessive handling and the inventory of the coils between the separate operations.

The disadvantages set forth above could be overcome by the provision of a mill in which the processes of pickling and cold rolling are combined.

SUMMARY OF THE INVENTION

It is the general object of this invention to provide a combination mill in which the processes of pickling and cold rolling are combined in a single operation and in which the pickled strip is passed directly to a tandem rolling mill without any intervening coiling thereof.

Another object of the invention is to provide a combination mill of the indicated type which, in addition to operation as a combination pickling-rolling mill, is operable for the pickling of strip, for the fully continuous rolling of pickled coils and for conventional batch type rolling.

The combination of pickling and rolling into a single operation has not been considered to be practical in the past because of the difficulty in matching production rate and utilization time between the two facilities. With the development of a highly efficient fully continuous 5/6 stand tandem cold mill such as the one described in my application Ser. No. **503,056,** filed Sept. **4, 1974,** the net utilization time of a tandem rolling mill can be brought up to the level of a well designed high production pickle line. It is noted that most of the equipment needed for the entry end of a fully continuous rolling mill is a duplicate of that type of equipment now used at the entry and delivery section of a modern pickle line. In the past devices it was uneconomical to produce pickled, oiled, and strapped coils which have to be handled and stored for a later rehandling and processing through a tandem mill. However, by the provision of a combination pickling-rolling mill in accordance with the invention these duplications and uneconomical storing procedures are obviated.

The combination pickling-rolling mill in accordance with the invention has a number of compatible conditions between the two processes, namely, (1) the production is on the same level, (2) the exit pickling and entry mill speeds are close, (3) the utilization time of the two processes is matched, (4) the service life of the equipment contacting the strip is balanced (5) the pickled strip comes dry and clean for entering the mill, and (6) the strip has time to cool to a reasonable temperature before arriving at the first stand of the tandem mill.

Furthermore, the combination pickling-rolling mill in accordance with the invention achieves a high utilization by the flexibility of the layout. The mill in accordance with the invention has the possibility of using the pickling line alone or of using the mill alone. Also, it can provide fully continuous operation of the mill without the pickling line.

The combination pickling-rolling mill in accordance with the invention achieves considerable saving by reason of combining equipment which was previously duplicated in the separate processes. By reason of the use of combined equipment, capital expenditure savings in mechanical and electrical equipment is achieved, building and floor space is saved, coil inventory is eliminated, and labor costs are reduced.

In accordance with a further aspect of the invention, the total length of the pickling tank section is increased about **25** percent. This permits a greater speed increase which is especially desired for some sheet gauges. Moreover, a coarse pickling speed adjustment is made available by mechanically changing the total strip immersion length and/or the scale breaking technique.

The capital expenditure savings of a combination pickling-rolling mill over a comparable two process system is substantial. Combining the mechanical and electrical equipment should save about **18** percent. Also, the savings in buildings and floor space would be considerable. Furthermore, a permanent operational cost saving is a greatly reduced labor force due to the elimination of equipment duplication. Finally, less handling and no, or only a small, inventory of coils between the normally separation operation results in substantial savings.

BRIEF DESCRIPTION OF THE DRAWING

The single FIGURE of the drawing is a side elevation of a combination pickling-rolling mill in accordance with the invention partly in diagrammatic form.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawing, there is shown a combination pickling-rolling mill in accordance with the invention in which there is provided a 5/6 stand tandem cold rolling mill section such as the one shown in my application Ser. No. **503,056,** filed Sept. **4, 1974.** The tandem cold roll mill comprises six mill stands **1, 2, 3, 4,** 5 and **6** of the conventional four-high type. A three roll bridle unit **10** is located adjacent the entry end of mill stand **1** and serves to control the tension of the strip delivered thereto. At the exit end of the mill, the strip is delivered from the mill stand **6** to a dividing, shear and tension reel section which comprises a pinch roll **12,** a shear **14** and a pair of tension reels **16** and **18.** Adjacent the dividing, shear and tension reel section is a coil delivery, inspection and strapping section which comprises a coil transfer car **22,** a bander **24,** and a delivery conveyor **26.**

The 5/6 stand tandem cold mill described in said priormentioned application comprises one more mill stand than is required by the mill to achieve the rolling of strip in accordance with the pass schedules for which the mill is designed. By reason of the provision of an additional mill stand, there is always a mill stand which can be substituted for a mill stand which is to have its rolls changed. The mill stands are designed so that each mill stand can achieve the rolling action of a preceding upstream mill stand. To this end, the mill stands are designed such that each can operate throughout most of

the speed range of an adjacent mill stand whereby a mill stand can be taken out of the rolling line for roll changing without interrupting the rolling action of the mill by adjusting the remaining operative mill stands and a substitute mill stand to achieve the necessary rolling conditions. This type of mill stand increases the utilization time of the mill by saving the downtime resulting from a roll changing operation.

To the immediate left of bridle unit **10** is a conventional mill entry section which comprises a payoff reel **30**, a coil preparation car **31**, and a coil end preparation station **32**.

To the left of the conventional mill entry section is a group of equipment for treating a pickled strip which is to be coiled, such group comprising a strip oiler **34**, a pair of pinch rolls **36**, a shear **38** and a pair of guide pinch rolls **39**. The pinch rolls **39** are adapted to be tilted to a position to guide a pickled strip to a tension reel **40** for coiling as will be described more fully hereafter.

To the left of the strip oiler **34** is a pinch roll unit **44** which is adapted to receive strip from below by way of a three roll bridle unit **46** and to receive strip from above by way of a guide roller **48**.

To the left of the pinch roll unit **44** is a line entry section which comprises a pair of payoff reels **50** and **52**, a leveler **54** and a leveler-pinch roll unit **56**, a fine cut shear **58**, a welder **60**, and a relief notcher **62**. At the left end of the line entry section is a three roll bridle unit **64** which is cut through the center by the match line "A" shown in the drawing.

To the left of the line entry section is a scale removal and trimmer section which comprises an entry bridle unit **66**, a mill stand comprising two sets of rolls **68** and **70** for scale breaking and skin passing, a three roll bridle unit **72**, two pairs of rotary side trimming shears **74** and **76** and two pairs of scrap choppers **78** and **79**. At the exit end of the scale removal and trimmer section there is provided a two roll bridle unit **80**.

To the left of the scale removal and trimmer section is a looper **82** which receives strip from the bridle unit **80**.

To the left of the looper **82** is a variable speed pickling section which comprises an entry bridle unit **84** which receives the strip entering the pickling section from looper **82** and delivers the strip to a three section pickling tank **86**. The top level of the pickling solution is indicated at **88**. The strip enters the solution in the pickling tank **86** by passage across a plurality of rollers **90** which hold the strip above the level of the pickling solution. The rollers **90** are movable from a retracted solid line position to an extended dashed line position as shown in the drawing to vary the location at which the strip is delivered into the pickling solution. The strip is supported at intermediate locations in the pickling tank **86** by a pair of supports **92** and leaves the pickling solution by passage over a plurality of rollers **94** which hold the strip above the solution level **88**. The rollers **94** are movable from a retracted solid line position to an extended dashed line position as shown in the drawing to vary the location at which the strip passes out of the pickling solution. Thus, in the same manner as the rollers **90**, the rollers **94** serve to vary the length of strip maintained in the pickling solution, whereby the pickling speed can be varied.

From the rollers **94**, the pickled strip passes through a three section rinsing tank **96**, squeegee rolls **97** which remove the pickling solution from the strip and a drying section **99**. The strip then passes to a three roll bridle unit **98**.

Located beneath the pickling tank **86** is a line entry looper, i.e., it serves as the entry looper for the pickle line. This looper is of conventional type and comprises three loop cars which ride on horizontal tracks and carry rollers **100** which are moved between the solid and dashed line positions during the delivery of accumulated strip as is conventional in the art. The line entry looper also comprises a pair of stationary rolls **102** and drum means **104** for controlling the movement of the movable rolls **100**. Strip enters the line entry looper by being fed around a roller **106** from the bridle unit **64** and passes to the lowermost movable roll **100**. The strip is delivered from the line entry looper by way of a pair of rolls **108** and **110** from which it is passed around a roll **112** to the entry bridle unit **66** for the scale removal and trimmer section.

To the left of the line entry looper is a line exit and mill entry looper which serves as the exit looper for the pickle line and as the entry looper for the 5/6 stand mill. The line exit and mill entry looper is of conventional type and comprises loop cars which are movable on horizontal tracks and carry three movable rollers **120** for movement between the solid and dashed line positions shown on the drawing. The looper comprises four stationary rollers **122** and drum means **124** for controlling movement of the movable rolls **120**. The rolls **120** move from the dashed line position to the solid line position during the payout of accumulated strip as is conventional in the art. Strip is delivered to the uppermost stationary roll **122** of the line exit and mill entry looper from the exit bridle unit **98**. Strip is delivered from this looper by way of the lowermost stationary roller **122** from which it passes beneath the line entry looper, the scale removal and trimmer section and the line entry section to the three roll bridle unit **46**.

In the operation of the mill as a combination pickling-rolling mill, the strip is fed from a coil on payoff reel **50**, for example, to the left as viewed in the drawing through the leveler **54** and the other elements of the line entry section to the three roll bridle unit **64** from which it passes around roller **106** to the bottom roll **100** of the line entry looper. It is noted that the main pass for the combination pickling-rolling mill is shown by the single arrow lines in the drawing. After passing through the line entry looper, the strip passes around rollers **108, 110** and **112** to the entry bridle unit **66** for the scale removal and trimmer section. The strip is then treated by one of the sets of rolls **68** or **70** for scale breaking and skin passing. It is noted that only one of these rolls **68** and **70** is operable at a time, the other roll remaining ready to be changed while the first one is performing the scale breaking operation. After passing around the bridle unit **72**, the strip passes through the trimming shears and choppers **74, 78, 76** and **79**, which operate to trim the strip in preparation for pickling. The strip then passes from the exit bridle **80** to the looper **82** from which the strip passes to the entry bridle **84** for the pickling section.

In the pickling section the strip passes over the top of rollers **90** and into the pickling solution in the tank **86** at a desired location. The strip passes over the supports **92** and out of the pickling solution by passing onto the top of rollers **94**. The rollers **90** and **94** are set to a pre-

determined position to control the point at which the strip enters and leaves the pickling solution. By this arrangement, even though the pickling time is about the same for most material, the speed of the strip passing through the pickling solution can be varied to precisely that desired for the strip being rolled. This permits a more accurate matching of the speed of the pickling line with that of the tandem rolling mill.

After passing through the mechanism for removing the solution from the strip, the strip passes through the bridle unit **98** and into the line exit and mill entry looper at the top stationary roll **122.** From the bottom stationary roll **122** of this looper, the strip passes to the right to the bridle unit **46** and upwardly to the pinch rolls **44.** From the pinch rolls **44** the strip passes to the right across the conventional mill entry section and into the entry bridle unit **10** for the tandem rolling mill section. After being rolled at the mill stands of this section, the strip passes alternately to one of the tension reels **16** and **18** whereat the strip is coiled. The rolled coil is then transferred to the circumferential and eye bander **24** by the conveyor **26.** From the bander **24,** the rolled coil continues to move along the delivery conveyor **56** for removal as is conventional in the art. Some coils are taken off the conveyor **26** at random by the coil car **22** for inspection.

When all of the coil has passed off the reel **50** which is delivering the coil being rolled, the trailing end is joined to the beginning end of a coil on the other payoff reel **52.** The forward end of the coil on the payoff reel **52** is passed through the flattener **54** to the line entry section where it is joined with the trailing end of the coil just paid off from reel **50.** During this coil switching procedure, which requires that the strip within the line entry section be stopped for a short while, strip is continued to be fed to the pickling section, and ultimately to the five/sixths stand tandem cold mill section, by the action of the line entry looper which delivers accumulated strip to entry bridle **66.** Also, the line exit and mill entry looper is used to maintain the desired rate of supply of strip to the tandem cold mill which is slowed down for the purpose of switching. To this end, the line exit and mill entry looper is in the solid line position shown on the drawing and accumulates strip as the rolls **120** move to the right to the dashed line position as the looper is filled. This allows the strip to run at a steady speed through the pickling section. When the rolling mill subsequently accelerates from the reel switch speed to full speed, the rolls **120** will move to the left from the dashed to the solid line position to deplete the looper. A continuous supply of strip is maintained by alternately supplying coils from the payoff reels **50** and **52** and by joining in the line entry section the trailing end of the coil being rolled to the beginning end of the new coil.

It will be apparent that in this mode of operation, pickled strip is delivered directly from the pickling line to the tandem cold mill section without any intervening coiling thereof.

It is noted that the layout of the mill in accordance with the invention is highly flexible so as to permit high utilization thereof. Thus, the mill can be operated as a pickling line alone if desired. Also, it can be used as a fully continuous rolling mill or a conventional rolling mill without the pickling line. This will be apparent by a consideration of FIG. **1** wherein there is shown in double arrow lines the alternate pass for continuous rolling of pickled coils and in triple arrow lines the pass for conventional batch type rolling.

This multiple pass design maintains the full working identity of either the mill or the pickling section in the event of a time consuming repair in either one of these sections.

In the operation of the mill for the fully continuous rolling of pickled coils, the operation is the same as that described above except that pickled coils are delivered from the reels **50** and **52** and the strip passes from the entry bridle **66** for the scale removal and trimmer section upwardly to the roller **49** and to the right to the roller **48** and downwardly into the pinch roll **44** from which it passes across the conventional mill entry section to the bridle unit **10** for passage to the rolling mill. Thus, the scale removal and trimmer section and the pickling section are bypassed.

In operation for conventional batch type rolling, the strip is delivered to the mill directly from a coil on the payoff reel **30,** the strip having been prepared from the coil car **31** at the coil preparation station. When a previous coil has paid off reel **30,** the coil car **31** is moved to the right so as to place the prepared coil onto the payoff reel **30.** At the same time, the prepared front end is fed to the rolling mill. In this operation the use of bridle unit **10** is optional and can be bypassed if desired.

When the mill is operated as a pickling line alone, the strip is moved along the main pass line as described above except that after passing through the guide pinch rolls **39,** the pickled strip is directed downwardly onto a tension reel **40** whereat it is coiled. During this mode of operation the shear **38** is used to trim the trailing end of the coil on reel **40.**

It is thus apparent that the mill has a high degree of flexibility. Thus, if there is a breakdown in the rolling mill section, the mill can be operated to continue pickling. Also, if the pickling line has a breakdown or requires maintenance, fully continuous rolling can still be maintained. Moreover, if any equipment to the left of the conventional mill entry section should require maintenance or break down, the mill can still operate with conventional batch type rolling. Furthermore, if anything behind the entry bridle **66** for the scale removal and trimmer section should break down or require maintenance, fully continuous rolling can still be performed.

The arrangement and grouping of the mechanical equipment is also an improvement over the prior art. For example, the trimming shear group, including elements **74, 76, 78** and **79,** as well as the pickled coil outlet equipment, including elements **34, 36, 38, 39** and **40,** are placed at the same location as all the other equipment for performing operations associated with the pickle line. This is different from the prior art arrangements wherein such rolls were placed behind the pickle line. The arrangement in accordance with the invention groups all the mechanical equipment in the same place whereby the operators have easier access thereto.

Also, the pickle line is located at the extreme end of the combination mill. Thus, the fumes and other deleterious aspects of the pickle line are separated from the rest of the equipment of the mill.

I claim:

1. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling

section for the pickling of strip located on the entry side of said rolling mill section, means including a supply of strip to be pickled and rolled located between said pickling section and the entry end of said rolling mill section for feeding strip to be pickled and rolled from said strip supply to said pickling section in the direction away from said rolling mill section, and means for feeding strip from the exit end of the pickling section in the direction toward said rolling mill section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip.

2. A combination pickling-rolling mill according to claim **1** wherein said means for feeding strip to the pickling section includes a pair of payoff reels, and means for alternately feeding strip from coils on said payoff reels to said pickling section.

3. A combination pickling-rolling mill according to claim **2** comprising a pickle line entry looper in the main pass line of the mill between the means for feeding strip to said pickling section and said pickle section for accumulating a length of strip.

4. A combination pickling-rolling mill according to claim **3** including a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill.

5. A combination pickling-rolling mill according to claim **4** including means for joining the trailing end of a coil on one of said payoff reels with the beginning end of a coil on the other of said payoff reels, said end joining means being located in the main pass line of the mill between said pair of payoff reels and said pickle line entry looper.

6. A combination pickling-rolling mill according to claim **5** wherein there is provided a scale removal and trimmer section located in the main pass line of the mill between said pickle line entry looper and said pickling section.

7. A combination pickling-rolling mill according to claim **6** wherein said scale removal and trimmer section comprises a pair of alternately operable rolls for scale breaking and skin passing.

8. A combination pickling-rolling mill according to claim **7** wherein said scale removal and trimmer section includes two pairs of alternately operable rotary side trimming shears and two pairs of alternately operable scrap choppers.

9. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling section for the pickling of strip, means for feeding strip to be pickled and rolled to said pickling section, means for feeding strip from the exit end of the pickling section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip, said means for feeding strip to the pickling section including a pair of payoff reels and means for alternately feeding strip from coils on said payoff reels to said pickling section, a pickle line entry looper in the main pass line of the mill between the means for feeding strip to said pickling section and said pickling section for accumulating a length of strip, a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill, means for joining the trailing end of a coil on one end of said payoff reels with the beginning end of a coil on the other end of said payoff reels, said end joining means being located in the main pass line of the mill between said pair of payoff reels and said pickle line entry looper, and means for feeding strip in an alternate pass line from the exit end of said pickle line entry looper and bypassing said pickling section to said rolling mill section whereby fully continuous rolling is performed by the passage of strip through said alternate pass line.

10. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling section for the pickling of strip, means for feeding strip to be pickled and rolled to said pickling section, means for feeding strip from the exit end of the pickling section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip, said means for feeding strip to the pickling section including a pair of payoff reels and means for alternately feeding strip from coils on said payoff reels to said pickling section, a pickle line entry looper in the main pass line of the mill between the means for feeding strip to said pickling section and said pickling section for accumulating a length of strip, a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill, means for joining the trailing end of a coil on one end of said payoff reels with the beginning end of a coil on the other end of said payoff reels, said end joining means being located in the main pass line of the mill between said pair of payoff reels and said pickle line entry looper, a tension reel means, and means for diverting strip, which is being fed from the line exit and mill entry looper toward said rolling mill section, to said tension reel means for the coiling of pickled strip.

11. A combination pickling-rolling mill according to claim **10** including means for treating strip delivered to said tension reel means.

12. A combination pickling-rolling mill according to claim **9** including a conventional mill entry section which comprises a third payoff reel located adjacent said the entry end of said rolling mill section and means for feeding strip from a coil on said third payoff reel directly to said rolling mill for conventional batch-type rolling.

13. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling section for the pickling of strip, means for feeding strip to be pickled and rolled to said pickling section, means for feeding strip from the exit end of the pickling section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip, said means for feeding strip to the pickling section including a pair of payoff reels and means for alternately feeding strip from coils on said payoff reels to said pickling section, a pickle line entry looper in the main pass line of the mill between the means for feeding strip to said pickling section and said pickling section for accumulating a length of strip, a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill, and means for joining the trailing end of a coil on one end of said payoff reels with the beginning end of a coil on the other end of said payoff reels, said pickling section, said loopers, and said end joining section all being located to one side of said pair of payoff reels, and said rolling mill section being located to the other side of said pair of payoff reels.

14. A combination pickling-rolling mill according to claim 13 wherein said conventional mill entry section is located closer to said rolling mill section than said pair of payoff reels.

15. A combination pickling-rolling mill according to claim 13 including a scale removal and trimmer section located in the main pass line of the mill between said pickle line entry looper and said pickling section, and said pickling section is located farther from said pair of payoff reels than said scale removal and trimmer section whereby the fumes from the pickling solution are easily segregated from the remainder of the mill.

16. A combination pickling-rolling mill according to claim 1 wherein said pickling section comprises a horizontally extending tank for containing pickling solution, and means for varying the location along the horizontal surface of the pickling solution at which strip is delivered into and removed from the pickling solution.

17. A combination pickling-rolling mill according to claim 16 wherein said means for varying the location at which strip is delivered into and out of the pickling solution comprises a group of rollers located at both the entry and exit end of said tank, each group of rollers being linked together and movable across the pickling solution between retracted and extended positions.

18. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling section for the pickling of strip, means for feeding strip to be pickled and rolled to said pickling section, means for feeding strip from the exit end of the pickling section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip, said means for feeding strip to the pickling section including a pair of payoff reels and means for alternately feeding strip from coils on said payoff reels to said pickling section, and a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill, said looper being operable to accumulate strip when the speed of the strip being fed to said rolling mill section is slowed down such as in the case of switching of the feed of strip from said tension reels, whereby strip is fed at a steady speed through said pickling section by the filling of said looper.

19. A combination pickling-rolling mill according to claim 1 wherein said rolling mill section comprises a tandem rolling mill including a plurality of mill stands arranged in tandem and adapted to roll strip in accordance with a predetermined group of pass schedules, and an additional mill stand included in the tandem arrangement in the rolling line, said additional mill stand being unnecessary to achieve the rolling of strip in accordance with said group of pass schedules for which the mill is designed, said mill stands being adapted to operate throughout most of the speed range of an adjacent mill so that a mill stand can be taken out of the rolling line for roll changing without interrupting the rolling action of the mill whereby said rolling mill section has a high utilization time resulting from a minimum downtime due to roll changing and also the total utilization time of the combination pickling-rolling mill is increased.

20. A combination pickling-rolling mill comprising a rolling mill section for the rolling of strip, a pickling section for the pickling of strip, means for feeding strip to be pickled and rolled to said pickling section, means for feeding strip from the exit end of the pickling section directly to the entry end of said rolling mill section for rolling thereof without the intervening coiling of strip, said means for feeding strip to the pickling section including a pair of payoff reels and means for alternately feeding strip from coils on said payoff reels to said pickling section, a pickle line entry looper in the main pass line of the mill between the means for feeding strip to said pickling section and said pickle section for accumulating a length of strip, a pickle line exit and mill line entry looper located in the main pass line of the mill between the exit of said pickling section and the entrance of said rolling mill, and side trimming shears located in the main pass line of the mill between said loopers and near one end of said pickling section.

21. A combination pickling-rolling mill according to claim 20 wherein said side trimming shears are located in the main pass line of the mill between said pickle line entry looper and the entry end of said pickling section.

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