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F. K. SCHEFE

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COILING OF CONTINUOUS STRIP METAL

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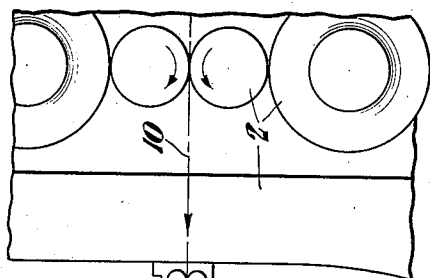


FIG. 1.

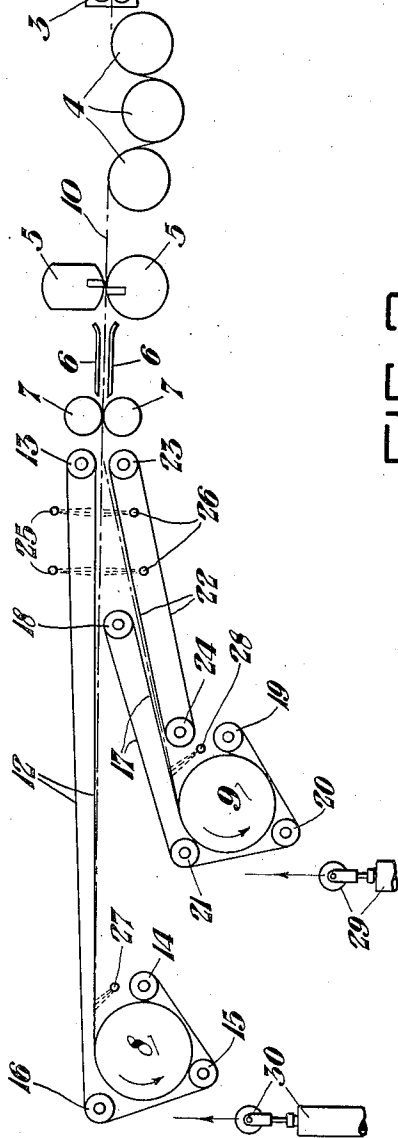


FIG. 2.

Inventor:
FREDERICK K. SCHEFE,
by: *John E. Jackson*
his Attorney.

UNITED STATES PATENT OFFICE

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COILING OF CONTINUOUS STRIP METAL

Frederick K. Schefe, Gary, Ind.

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4 Claims. (Cl. 242-80)

This invention relates to the manufacture of continuous strip metal, and particularly to a method and apparatus for coiling the same.

It has been suggested that rolled metal be manufactured of especially thin gauge metal such as tin plate, by the continuous strip method. In order to realize all the advantages of such a method, it is necessary to operate the rolling mill continuously at a high speed. This is entirely practical, as the short strips can be successively welded together by means of a flash welder, passed through the rolls of the mill, and the strip cut by means of a flying shear, but heretofore it has been a problem to coil the strip at such high speed; that is, after the desired amount of strip material is wound on one reel, it is difficult to transfer the coiling operations from one coiler or reel to another for the reason that in continuous strip rolling, the rolling mill usually delivers the strip at a rate of from 900 to 1400 feet per minute, and, as an example, a delay of ten seconds would result in the piling up or accumulation of from 150 to 230 feet of uncoiled strip, which is very undesirable, thereby making such high speed rolling impractical and defeating the other advantages gained by the use of the continuous strip method.

According to the present invention, the strip can be successively and efficiently coiled at any speed at which it is desired to operate the rolling mill.

It is one object of the present invention to provide an improved means for coiling continuous strip metal whereby the coiling operations can be quickly and conveniently transferred from one reel to another without interfering with the continuous movement of the strip, thereby allowing continuous rolling and other operations to be performed thereon.

It is another object of the invention to provide a method and apparatus for coiling continuous strip metal whereby the uncoiled portion of the strip is automatically directed to the proper reel or coiling means.

It is a further object of the invention to provide an improved method and apparatus for coiling continuous strip metal which is simple and inexpensive in its construction, whereby the strip is accurately and safely conveyed to the proper coiling means.

Various other objects and advantages of this invention will be more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawing there is shown, for the purpose of illustration, one embodiment which my invention may assume in practice.

In the drawing:

Figure 1 is a side elevation showing schematically the arrangement of the improved coiling apparatus of my invention; and,

Figure 2 is an enlarged view of the improved coiling apparatus showing it more in detail.

Referring more particularly to the drawing, there is shown a rolling mill stand 2, having arranged at the delivery end thereof an electro-limit gauge 3, a plurality of tension rolls 4, a flying shear 5, strip guides 6 and a pair of billy rolls 7.

According to this invention, there is located at the delivery end of the rolling mill, beyond the flying shear and billy rolls, a pair of winding reels 8, 9 which are driven by any suitable means (not shown), the winding reel 9 being preferably positioned at a lower level than the winding reel 8, as shown. These reels are adapted to coil the continuous strip 10 as it is delivered thereto.

There is arranged above the strip 10 an endless conveyer belt 12 extending around a stationary pulley 13 which is driven, in any suitable manner, around a reel 8 and the movable pulleys 14, 15 and 16. There is arranged below the strip 10 another endless conveyer belt 17 extending around a stationary pulley 18, which also may be driven, in any suitable manner, around the reel 9 and movable pulleys 19, 20 and 21. There is positioned below the strip 10 and conveyer belt 17 still another endless conveyer belt 22 extending around a driven pulley 23, which is positioned directly opposite and just below the driven pulley 13, and around a fixed pulley 24.

There is arranged above the strip, just beyond the billy rolls and the driven pulleys 13 and 23, a pair of air jets 25, and opposite these, on the underside of the strip, a similar pair of air jets 26, the purpose of which will be described later in the specification. There is also positioned below the strip 10, just above the movable pulley 14, another air jet 27 and still another air jet 28 similarly positioned above the movable pulley 19.

The coiling of the continuous strip is performed as follows:

It will be assumed that the strip is being coiled on the reel 9. In starting the coil of the strip on reel 9, the conveyer belts 17 is positioned as shown in the full lines of Figure 2, but after the coiling has been started and a few convolutions of the strip have been wound on the reel 9, con-

veyer belt 17, together with pulleys 19, 20 and 21, is moved by a mechanism (not shown) upwardly, away from the reel 9, to a position as shown in the broken lines of Figure 2, parallel to

conveyer belt 12, and the belt made taut by a vertically movable pulley 29 moved to position against the bottom of the belt, preferably by pneumatic means (not shown), ready for the transfer of the coiling operations.

After the desired amount of metal has been coiled on the reel 9, the conveyer belts 12 and 17 are put into motion at approximately the same speed as that of the strip as it is being delivered from the billy rolls, and the air jets 26 and 27 turned on so that air pressure is exerted against the bottom side of the strip. The flying shear 5 is then made to operate so as to completely sever the strip. The ends resulting from the shearing of the strip then pass between the billy rolls 7, with the trailing end of the coiled portion of the strip passing along the conveyer belt 22 onto the reel 9 to complete the coiling of that portion of the strip, while the leading end of the uncoiled portion of the strip is forced upwardly against the bottom side of the conveyer belt 12 and made to pass over the driven pulley 18 between the conveyer belts 12 and 17, onto and around the coiling reel 8. As the leading end of the strip approaches the reel 8, it is forced upwardly against the bottom side of the conveyer belt 12 by the air pressure issuing forth from air jet 27 so as to insure the passage of the end around the reel to properly start the coiling of the strip thereon.

After the start of the coiling of the strip on reel 8, the conveyer belt 12, together with the pulleys 14, 15 and 16, is moved upwardly by mechanism (not shown) away from the reel, as shown in the broken lines of Figure 2, and made taut by means of another vertically movable pulley 30, also preferably moved to position by pneumatic means (not shown), against the bottom side of the conveyer belt 12; and the conveyer belt 17, together with the pulleys 19, 20 and 21, is moved downwardly to assume a position around the reel 9, as shown in the full lines of Figure 2. The air jets 26 and 27 are then turned off and the air jets 25 on top of the strip turned on so as to exert pressure on that side of the strip. The flying shear is then operated so as to again sever the strip 10 and, as the leading edge of the uncoiled portion of the strip comes to position below the air jets 25, it is forced downwardly against the top side of the conveyer belt 22 and thereby made to pass between the belts 17 and 22 onto and around the reel 9. The air jet 28 is turned on also at the same time the air jets 25 are turned on, thereby forcing the leading edge of the strip upwardly against the lower portion of the endless belt 17 to insure the passage of the end of the strip around the reel 9 to properly start the coiling thereon.

It will be seen that the coiling operations are transferred from one reel to the other as described until the desired amount of strip is coiled or the entire length of the strip is coiled. In each case, after a few convolutions of the strip have been wound on the reel, the endless conveyer belts 12 and 17 are moved to a position away from the reels, ready for the transfer of the coiling operations and to prevent undue wear to these belts as it is their purpose only to direct the leading edge of the uncoiled portion of the strip to the reels at the time of transferring the coiling operations.

There is shown compressed air jets for deflecting the leading end of the strip, but it will be understood that any suitable means, such as magnets, vacuum means, or any suitable mechanical or other means, may be provided that will exert sufficient pressure thereagainst to insure the start of the coiling. There are also shown billy rolls 7 for directing the strip to the endless belts 12 and 22, but it will be understood that these billy rolls can be dispensed with and the driven pulleys 13 and 23 positioned directly opposite the flying shear 5; but it is thought that such billy rolls will aid in properly guiding the edges of the strip to and between the conveyer belts and pulleys.

It will be understood that any number of reels may be provided for coiling the strip and suitably arranged so that the coiling operations can be transferred successively to the reels, as desired, but there are shown only two reels for the purpose of illustration.

As a result of my invention, it will be seen that the coiling operations can be quickly and easily transferred from one reel to another without stopping the movement of the strip, thereby allowing continuous fabricating of the strip from the time the successive short strips are flash welded together to form the continuous strip until the strip is finally coiled and ready for use.

While I have shown and described one embodiment of my invention, it will be understood that this embodiment is merely for the purpose of illustration and description and that various other forms may be devised within the scope of my invention, as defined in the appended claims.

I claim:

1. Means for coiling continuous strip metal including, in combination, means for continuously supplying the strip, a plurality of reels for receiving the strip, a retractable endless conveyer belt disposed around each of said reels, means for directing the strip to position between one of the reels and its respective endless conveyer belt, said endless conveyer belt being adapted to direct the strip around said reel so as to coil a portion of the same thereon, and means for alternately cutting and directing the uncoiled portion of the strip successively to position between another of said reels and its respective endless conveyer belt so as to coil the desired amount of strip material successively on each of them.

2. Means for coiling continuous strip material including, in combination, means for continuously supplying the strip, a pair of reels for receiving the strip with one positioned below the other, an endless conveyer belt disposed around each of said reels, means for directing the end of the strip to position between one of the reels and its respective endless conveyer belt, said endless conveyer belt adapted to direct the strip around said reel so as to coil a portion of the same thereon, means for cutting the strip after the desired amount has been coiled thereon and means for directing the end of the uncoiled portion of the strip between the other reel and its respective endless conveyer belt, said strip thereafter adapted to be alternately cut and directed to position between each of said reels and their respective endless conveyer belts so as to coil the desired amount of the strip on each of the reels throughout the coiling operation.

3. Means for coiling continuous strip metal including, in combination, means for continuously supplying the strip, a pair of reels for receiving the strip with one positioned slightly above and

beyond the other, a retractable endless conveyer belt disposed in one position around each of the reels so that they are positioned one above the other, means for directing the end of the strip
 5 between the retractable endless conveyer belts to position between the upper reel and its respective endless conveyer belt, said endless conveyer belt adapted to direct the strip around said reel so as to coil a portion of the same thereon,
 10 means for moving the upper endless conveyer belt to a retracted position away from the upper reel after the coiling of the strip on said reel has begun, means for cutting the strip while the same is in motion after the desired amount
 15 of the same has been coiled thereon, means for directing the end of the uncoiled portion of the strip between the lower reel and its respective endless conveyer belt so as to coil a portion of the strip thereon, and means for moving the lowermost retractable endless conveyer belt to a retracted position away from the reel after the coiling of the strip on that reel has begun, said strip thereafter adapted to be alternately cut and directed to position between each of said
 20 reels and their respective endless conveyer belts so as to coil the desired amount of the strip on each of the reels throughout the coiling operation.

4. Means for coiling continuous strip metal including, in combination, means for continuously supplying the strip, a pair of reels for receiving the strip with one positioned above and beyond the other, a pair of retractable endless conveyer belts with one being relatively long and disposed in one position around the upper reel and the other being relatively short and disposed in one position directly below the other around the lower reel, another endless conveyer belt angularly disposed below the lowermost retractable

endless conveyer belt, and adapted to cooperate with said lowermost retractable endless conveyer belt, said lowermost retractable endless conveyer belt adapted to be disposed in one position so as to cooperate with said upper retractable endless conveyer belt to aid in guiding the strip to the
 5 upper reel, means for directing the end of the strip between the upper and lower retractable endless conveyer belts, means for directing the end of the strip between the upper reel and its respective endless conveyer belt, said latter endless conveyer belt adapted to direct the strip around said reel so as to coil a portion of the strip thereon, means for moving the upper endless conveyer belt upwardly to a retracted position away from the upper reel after the coiling of the strip on said reel has begun, means for cutting the strip while the same is in motion after the desired amount of the same has been
 10 coiled thereon, means for directing the end of the uncoiled portion of the strip between the lowermost retractable endless conveyer belt and the angularly disposed endless conveyer belt positioned therebelow whereby the strip is guided to the lower reel, means for directing the end
 15 of the strip between the lower reel and its respective retractable endless conveyer belt so as to coil a portion of the strip thereon, and means for moving the lower retractable endless conveyer belt to a retracted position directly below said
 20 upper retractable endless conveyer belt after the coiling of the strip on the lower reel has begun, said strip thereafter adapted to be alternately cut and directed as described to position between each of said reels and their respective retractable
 25 endless conveyer belts so as to coil the desired amount of the strip on each of the reels throughout the coiling operation.

FREDERICK K. SCHEFE.