Oct. 17, 1950 E. H. EDSTROM 2,526,010

STRIP COILING APPARATUS

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Fig. 2.

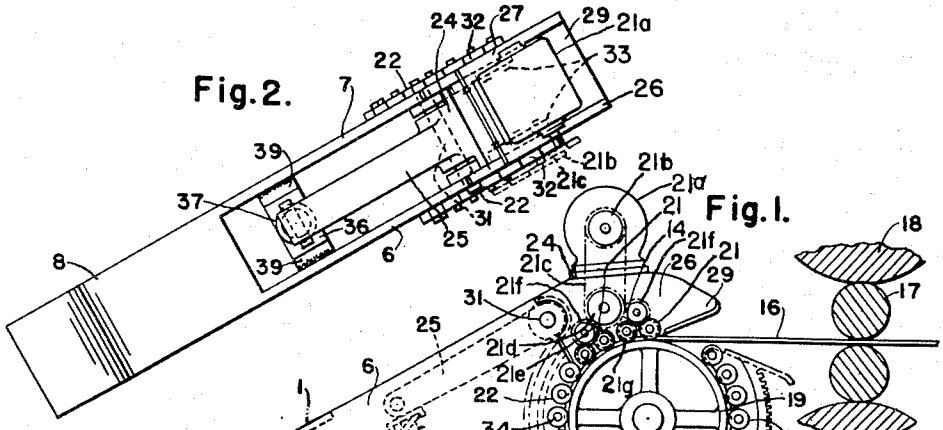


Fig. 1.

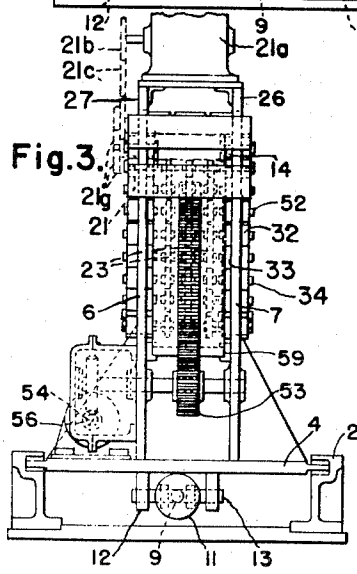
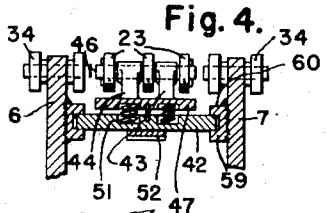


Fig. 3.

Fig. 4.



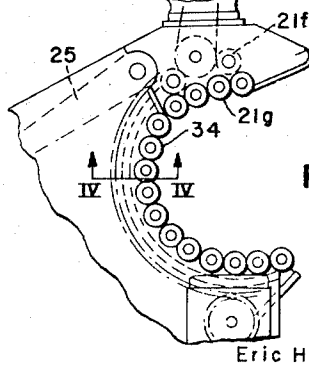


Fig. 1a.

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Fig. 6.

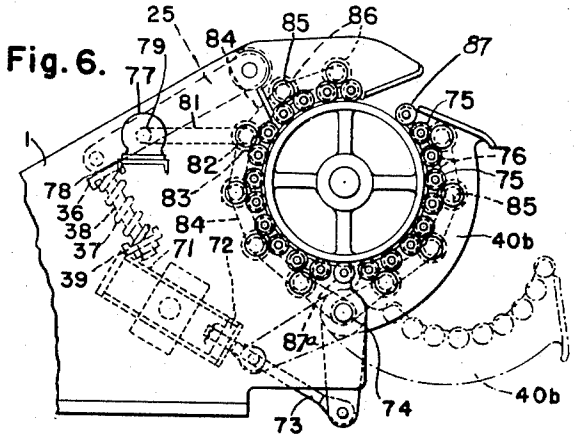
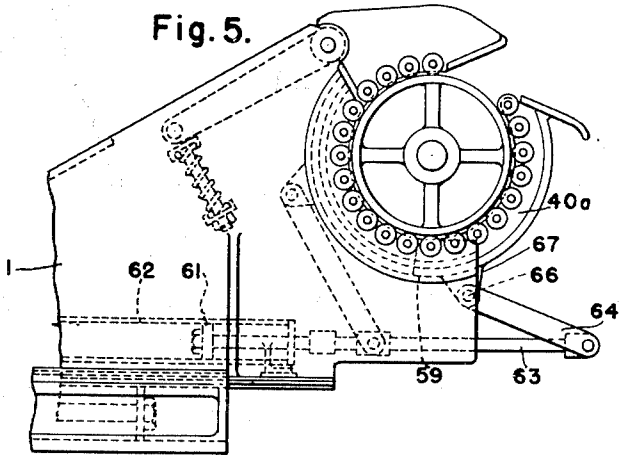


Fig. 5.



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2,526,010

STRIP COILING APPARATUS

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Application August 23, 1947, Serial No. 770,245

13 Claims. (Cl. 242—78)

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This invention relates to apparatus for wrapping upon a driven reel the leading end of strip at the speed of and as it is delivered from a hot or cold mill, pickling or plating line or other strip processing apparatus.

A common practice in strip wrapping makes use of an endless belt which substantially encircles the winding reel and frictionally holds the strip in contact with the reel while the first few coils are wound. The belt then is removed to allow the rest of the strip to be wound. Usually the belt is carried by rollers, some of which are borne by pivotally mounted arms, and apparatus is provided to swing the arms upwardly and rearwardly from the reel to permit the removal of the belt. One difficulty with this apparatus is that it requires a large operating space, particularly requiring excessive room for the pivoting of the arms and belt. Further, the drive mechanism for pivoting the arms is complex, expensive and easily thrown out of order. Also the apparatus is limited as to the gauge of the strip which it will wrap, since thicker gauge strip tends to quickly fray and cut the belt and heavy gauge strip is too stiff to be bent properly around a reel.

It is among the objects of this invention to provide a strip metal wrapping apparatus which requires relatively little operating space, which may be simply and sturdily built, and which may be used efficiently to wrap strip of heavy as well as light gauges.

In accordance with the invention, a carriage is provided which is movable to and from a strip-wrapping position and which includes a frame and a roller supporting member movably borne by the frame. Both the frame and the roller support carry a series of rollers each arranged in arcuate form to guide the strip and hold it in contact with the reel. In strip-wrapping, or operative, position of the carriage these two series lie in arcuate sequence and extend substantially around the reel. The apparatus is provided with power mechanism for so moving the roller supporting member that the carriage can be moved to and from strip-wrapping position.

The invention is illustrated in the accompanying drawings of which Figs. 1 and 2 are side and plan views, respectively, of one form of the invention; Fig. 1*a* is a partial side view and Fig. 3 is an end view of the same form showing the front series of rollers retracted to free the carriage; Fig. 4 is an enlarged section along lines IV—IV of Fig. 1; and Figs. 5 and 6 are side views of two alternate forms of the invention.

Referring to the form of the invention illustrated in Figs. 1, 2 and 3, the strip-wrapping elements of the apparatus are borne by a carriage 1 which is movable to and from strip-wrapping position in a track 2. The carriage consists of a frame 3 which is formed of a platform 4, side walls 6 and 7 and an end wall 8, the side edges of the platform being formed to ride in the track. The carriage is moved by air pressure acting on a piston 9 carried in an air cylinder 11 mounted below the platform. The lower rear portion of the carriage is provided with a bracket 12 which is pivotally connected to the piston by pivot rod 13.

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A feature of the invention is that in place of the common endless belt, rollers 14 are used to wrap the strip. A strip 16 is shown in Fig. 1 as being delivered from a rolling mill which includes work and backup rolls 17 and 18, the strip being wrapped on a reel 19 which is driven by any suitable means. For purposes which will become apparent, rollers 14 are divided into three separate series 21, 22 and 23, which, when the apparatus is in strip-wrapping position, lie in an arcuate sequence around and in contact with the face of the reel or of the strip wrapped upon it.

The uppermost series 21 is mounted in a pivoted member 24 formed of a lever arm 25 the forward portion of which is bifurcated into a pair of side plates 26 and 27. The front portions of the side plates are connected to each other by a guide plate 29 which aids in projecting the strip between rollers 21 and reel 19. Member 24 is carried in frame 3 on a pivot rod 31 which extends transversely between the frame's side walls 6 and 7. The rollers of series 21, extending completely across the space between and supported by the bifurcated plates 26 and 27 are driven by an electrical motor 21*a* secured to the upper edges of side plates 26 and 27 and, as shown in Figures 1, 2, and 3, the driving connection between motor 21*a* and rollers 21 consists of a sprocket 21*b* secured to the motor shaft over which a continuous chain 21*c* passes from a second sprocket 21*d* to the shaft of which is also secured a gear 21*e* which meshes with idler gears 21*f* rotatably secured to the frame and which mesh with and drive gears 21*g* of rollers 21.

The principal purpose of having a pivoted member 24 is to provide a resilient or yieldable support for these upper rollers so that the rollers can be pressed outwardly as strip-wrapping proceeds. To make the rollers resilient, it is preferred to support the rearward end of arm 25 on a plate 36 which is urged upwardly by a coil spring 37 so as to spring press the rollers into contact

with the reel. The spring has a supporting rod 38 which extends through a transverse channel 39 secured to the side walls of the carriage frame. Pressure of the strip on the rollers will swing member 24 and compress spring 37. Although this resilient means is preferred, other ways of spring pressing the rollers are possible and are within the contemplation of the invention.

The middle series 22 of the rollers are mounted in an arcuate portion of side plates 6 and 7 of the carriage frame. As seen from the drawings they are arranged in contact with the reel in an arc of a cylinder of the same radius as the reel, the series being formed of pairs of rollers which are rotatably mounted in the frame's side walls 6 and 7 and which include pairs of rollers mounted in each side plate, each pair having an outer and an inner roller 32 and 33 respectively carried by a pivot pin 34. The rollers are mounted so as to extend below the lower edge of side plates 6 and 7 and engage an arc of the reel. Since these rollers are yieldably pressed against the reel by air pressure in an air cylinder 11 it is unnecessary to provide any special spring mounting for them.

The series 23 of the rollers are mounted in a roller-carrying support 40 which is movably borne by the carriage frame so that it can be moved free of the reel to permit movement of the carriage. As most clearly shown in Fig. 4, support 40 is formed of an arcuate rear wall 42 and inwardly extending roller-carrying yoke arms 43 and 44. A series of roller-carrying rods 46 are mounted in the arms, each of which carries three idle rollers. In their strip-wrapping position, the rollers contact and are spring pressed against the reel. As shown in Fig. 4, roller carrying yoke arms 43 and 44 are secured to an arcuate plate 47 which is connected detachably to rear wall 42 by means of pin and socket members, plate 47 normally being pressed away from wall 42 by springs 51.

Roller-carrying support 40 is provided exteriorly with a rack 52 which is engaged by a pinion 53 that meshes with a worm gear 54 mounted on a drive shaft 56 driven by a motor 57 which is secured to the carriage platform. Member 40 is adapted to be slid in an arcuate path in a track 59, Fig. 4, provided in the frame. The track is formed from a pair of arcuate plates 60 which are secured to the inner surfaces of the frame's side walls 6 and 7 and which are provided with track forming recesses. When support 40 is fully slid into the track, its rollers are brought into arcuate registry with the rollers of series 22 which are carried by the frame. In this position, the carriage is freed from engagement with the reel and can be moved away from it.

The operation of the apparatus should be reasonably obvious. The carriage is moved into strip-wrapping position by air pressure acting in cylinder 11, during which movement roller-carrying support 40 is retracted into the frame. After driven roller series 21 and idler roller series 22 are in contact with the reel, motor 57 is operated to slide support 40 out of its track and operatively position its series of rollers around the reel. Metal strip then is fed between the rollers and the reel and is thereby wound on the reel. By reason of roller series 21 being driven, the leading end of the strip is positively forced around the reel. After a few turns are wound, it is desirable to move the carriage away from the reel to permit the remainder of the strip to be wrapped. This is accomplished by reversing motor 57 to slide support 40 back into its track. Such sliding of the support is permissible since its rollers are rotating with the strip and the sliding merely increases the speed of rotation of its rollers. With support 40 fully retracted, the carriage can be moved away in the obvious manner.

Alternate forms of the invention are illustrated in Figs. 5 and 6. The form shown in Fig. is similar to that of Fig. 1 in that movement of the carriage is permitted by sliding its roller-carrying support 40*a* into a track 59 in the carriage frame. The principal difference is that, in place of the motor-driven gear and pinion of the Fig. 1 form, support 40*a* in Fig. 5 is moved by a piston 61 which acts in an air cylinder 62 and which is connected mechanically by a piston rod 63 to linked arms 64 pivotally connected to a rod 66 carried by a pair of supporting plates 67 secured to member 40*a*. When pressure is applied to retract the piston, member 40*a* is slid into track 59 in the manner previously described with reference to the embodiment of Figs. 2 and 3. Although no driving means is shown for the rollers of this embodiment, it is obvious that any number or all of them may be driven if desired, by means, such as are shown, for example, in the drawings Fig. 1 or Fig. 6.

In the form of the invention illustrated in Fig. 6, roller-carrying member 40*b* is swung, instead of being slid, to and from its wrapping position. The pressure mechanism is an air cylinder 71 in which a piston 72 reciprocates. The roller-carrying member 40*b* is in the form of a rigid bell crank lever which is connected pivotally at one end to the end of a piston rod 73, and is pivoted on a transverse rod 74 which is mounted in the side walls of the frame. In operation, when pressure is applied to retract piston 72, the outer or roller-carrying portion of the lever is swung from its strip-wrapping position to the carriage-liberating position shown in dotted lines in Fig. 6. As will be apparent, in this form of the invention resilient mounting for the rollers 75 is unnecessary. The rollers 75, to the shafts of which gears 76 are secured, are driven by means of an electrical motor 77, mounted on a bracket 78 secured to the frame's side plate, through a chain gear drive. The chain gear drive consists of a sprocket 79, secured to the shaft of the motor 77, with a continuous chain 81 passing therefrom to a triple sprocket 82 rotatably secured to the frame's side plate and having on the axis thereof a gear 83 meshing with two of the gears 76 of two of the rollers 75, and from which triple sprocket, chains 84 pass to double sprockets 85 having supported on the axes thereof gears 86 which mesh with and drive gears 76 of additional rollers 75. Thus, by providing a series of chains, double sprockets and gears as shown in Figure 6, all of the rollers with the exception of idler roller 87, over which the leading end of the strip to be coiled passes on its entry to the throat of the coiling device and the roller 87*a* adjacent to the transverse rod 74, are positively driven.

The invention provides apparatus which is efficient both in construction and operation. An important advantage is that the use of members which pivot in a substantial vertical arcuate path is avoided so that relatively little space is required between the reel and mill. Also, since the rollers act positively and inflexibly upon the strip, the apparatus can be used to wrap metal strip of thicker gauges than can be wrapped by flexible belt wrappers.

According to the provisions of the patent statutes, I have explained the principle and construction of my invention and have illustrated and described what I now consider to represent its best embodiment. However, I desire to have it understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically illustrated and described.

I claim:

1. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame and a roller-carrying support movably borne by said frame, said frame and support each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, power mechanism for moving said carriage to and from a strip-wrapping position, the rollers on said frame adapted to remain adjacent to and in working pressure relationship with said reel while said carriage is in the strip wrapping position, and mechanism for moving said support in one direction to position the series of rollers thereof in arcuate sequence with the series borne by said frame when said carriage is in strip-wrapping position and for moving said support in another direction to permit said carriage and frame borne rollers to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

2. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a frame, a roller carrying support movably borne by the frame, said frame and support each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, means for rotating at least a portion of said series of rollers, power mechanism for moving said carriage to and from a strip-wrapping position, and power mechanism for moving said support in one direction to position the series of rollers thereof in arcuate sequence with the series borne by said frame when said carriage is in strip-wrapping position and for moving said support in another direction to permit said carriage to be moved from the reel after the leading end of a strip has been wrapped on the periphery of said reel by said two series of rollers.

3. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame and a roller-carrying support movably borne by the frame, said frame and support each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, power mechanism for moving said carriage to and from a strip-wrapping position, the rollers on said frame adapted to remain adjacent to and in working pressure relationship with said reel while said carriage is in the strip wrapping position, and power mechanism for moving said support in one direction to position the series of rollers thereof in arcuate sequence with the series borne by said frame when the carriage is in strip-wrapping position and for moving said support in another direction to permit said carriage and frame borne rollers to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof

by said two series of rollers, said series of rollers being yieldingly pressed into contact with said reel when in the strip-wrapping position.

4. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame and a roller-carrying support movably borne by the frame, said frame and support each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, means for rotating at least a portion of said series of rollers, power mechanism for moving said carriage to and from a strip-wrapping position, and power mechanism for moving said support to permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers, said series of rollers being yieldingly pressed into contact with said reel when in the strip-wrapping position.

5. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame, an upper roller-carrying arm pivotally carried by the frame and a roller-carrying support movably borne by the frame, said arm, frame and support each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, resilient means urging the rollers of said arm into yieldable contact with said reel when said carriage is in strip-wrapping position, power mechanism for moving said carriage to and from a strip-wrapping position, and power mechanism for moving said support in one direction to position the series of rollers thereof in arcuate sequence with said two series borne by said arm and frame when said carriage is in strip-wrapping position and for moving said support in another direction to permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said three series of rollers.

6. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame provided with an arcuate track, a roller-carrying support borne by said frame and slidable in said track, said frame and support each being provided with a series of rollers that continuously lie in an arc of a cylinder of substantially the same radius as that of the reel, mechanism for moving said carriage to and from a strip-wrapping position, power mechanism for sliding said support in one direction to position the series of rollers thereof in arcuate sequence with said series borne by said frame when said carriage is in strip-wrapping position and for sliding said support in the opposite direction to position the said series of rollers thereof in arcuate registry with said series of rollers borne by said frame and permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

7. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame provided with an arcuate track, a roller-carrying support slidable in said track and being provided with a peripheral rack, a pinion rotatably mounted in said frame and meshed with said rack, said frame and support each being provided with a series of

rollers that continuously lie in an arc of a cylinder of substantially the same radius as that of the reel, power mechanism for moving said carriage to and from a strip-wrapping position, and power mechanism for driving said pinion to slide said support in one direction to position the series of rollers thereof in arcuate sequence with said series borne by said frame when said carriage is in strip-wrapping position and to slide said support in the opposite direction to position the series of rollers thereof in arcuate registry with said series of rollers borne by said frame and permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

8. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame provided with an arcuate track, an upper roller carrying arm pivotally carried by the frame, a roller-carrying support slidable in said track and being provided with a peripheral rack, a pinion rotatably mounted in said frame and meshed with said rack, said arm, frame and support each being provided with a series of rollers that continuously lie in an arc of a cylinder of substantially the same radius as that of said reel, resilient means urging the rollers of said arm and said support into yieldable contact with said reel when the apparatus is in strip-wrapping position, pressure mechanism for moving the carriage to and from a strip-wrapping position, and power mechanism for driving said pinion and sliding said support in one direction to position the series of rollers thereof in arcuate sequence with said two series borne by said arm and frame when said carriage is in strip-wrapping position and for sliding said support in the opposite direction to position the series of rollers thereof in arcuate registry with said series of rollers borne by said frame and permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said three series of rollers.

9. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame provided with an arcuate track, a roller-carrying support slidably carried in said track, linked arms secured to said support and adapted when driven to slide the support in the track, said frame and support each being provided with a series of rollers that continuously lie in an arc of a cylinder of substantially the same radius as that of said reel, power mechanism for moving said carriage to and from a strip-wrapping position, and power mechanism for driving said linked arms and sliding said support in one direction to position the series of rollers thereof in arcuate sequence with said series borne by said frame when said carriage is in strip-wrapping position and for sliding said support in the opposite direction to position the series of rollers thereof in arcuate registry with said series of rollers borne by said frame and permit said carriage to be removed from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

10. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame and a swinging member pivotally borne by the frame, said frame and member each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, power mechanism for moving said carriage to and from a strip-wrapping position, the rollers on said frame adapted to remain adjacent to and in working pressure relationship with said reel while said carriage is in the strip wrapping position, power mechanism for swinging said member in one direction to position the series of rollers thereof in arcuate sequence with said series borne by said frame when said carriage is in strip-wrapping position and for swinging said member in another direction to permit said carriage and frame borne rollers to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

11. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame and a swinging member pivotally borne by the frame, said frame and member each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, means for rotating at least a portion of said series of rollers, power mechanism for moving said carriage to and from a strip-wrapping position, power mechanism for swinging said member in one direction to position the series of rollers thereof in arcuate sequence with said series borne by said frame when said carriage is in strip-wrapping position and for swinging said member in another direction to permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said two series of rollers.

12. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame, an upper lever arm and a swinging member both pivotally borne by the frame, said frame and arm each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, resilient means urging the rollers of said lever arm into yieldable contact with said reel when in the strip-wrapping position, pressure mechanism for moving said carriage to and from a strip-wrapping position and pressure mechanism for swinging said member in one direction to position the series of rollers thereof in arcuate sequence with said two series borne by said frame and said lever arm when said carriage is in strip-wrapping position and for swinging said member in another direction to permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said three series of rollers.

13. Apparatus for wrapping upon a driven reel the leading end of strip metal at the speed of and as it is delivered from strip processing apparatus comprising a carriage having a frame, an upper lever arm and a swinging member both borne by said frame, said frame and said arm each being provided with a series of rollers that lie in an arc of a cylinder of substantially the same radius as that of said reel, resilent means urging said rollers of said lever arm into yieldable contact with said reel when in the strip-wrapping position, means for rotating at least a portion of said series of rollers, pressure mechanism for moving said carriage to and from a strip-wrapping position and pressure mechanism for swing-

ing said member in one direction to position the series of rollers thereof in arcuate sequence with said two series borne by said frame and said lever arm when said carriage is in strip wrapping position and for swinging said member in another direction to permit said carriage to be moved from said reel after the leading end of a strip has been wrapped on the periphery thereof by said three series of rollers.

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