A. SUNDH.

AUTOMATIC BLOCKING MECHANISM FOR STRIP MILLS.

APPLICATION FILED JAN. 20, 1915.

1,230,941.

Patented June 26, 1917.

4 SHEETS—SHEET 1.

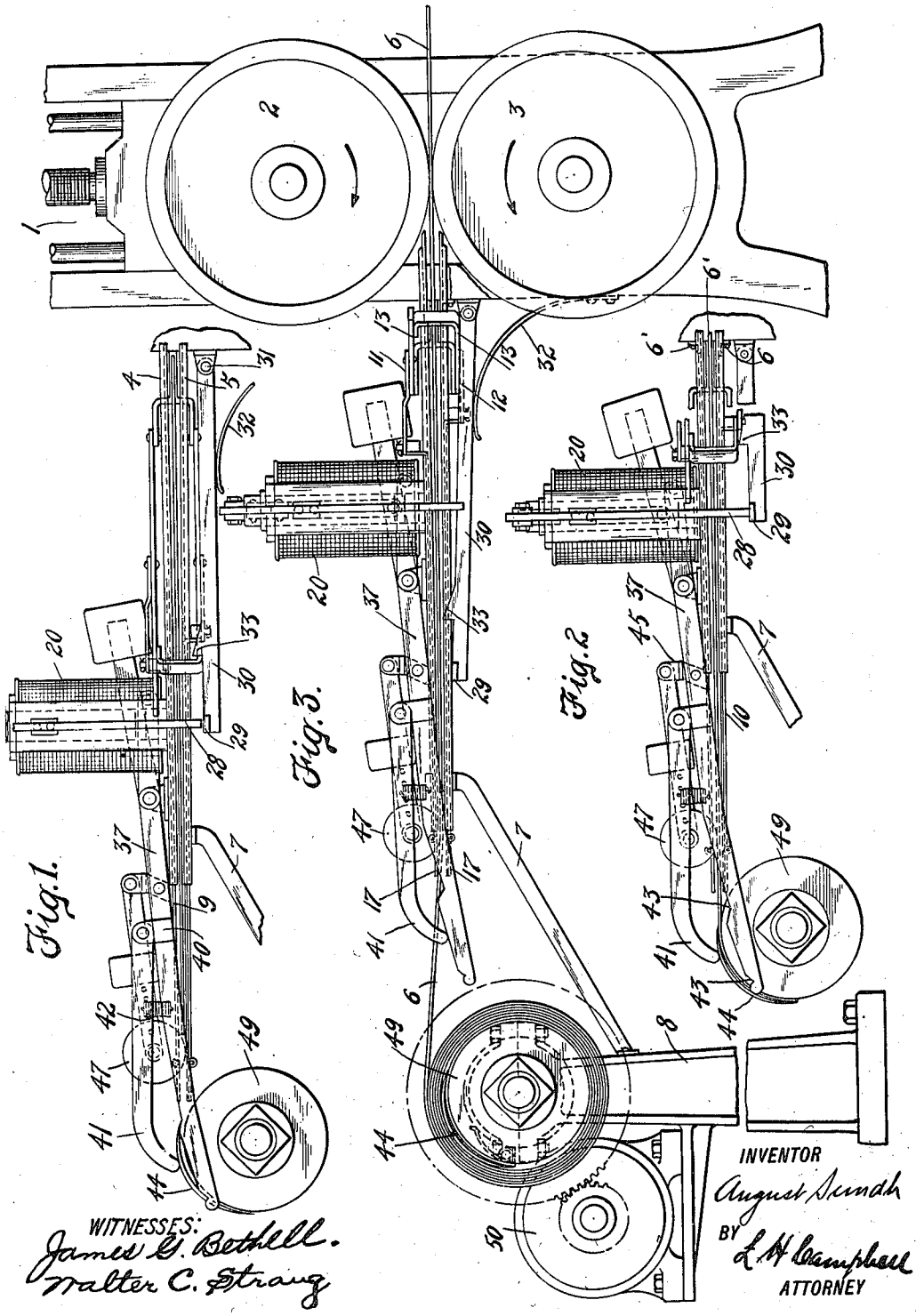


Fig. 1.

Fig. 3.

Fig. 2.

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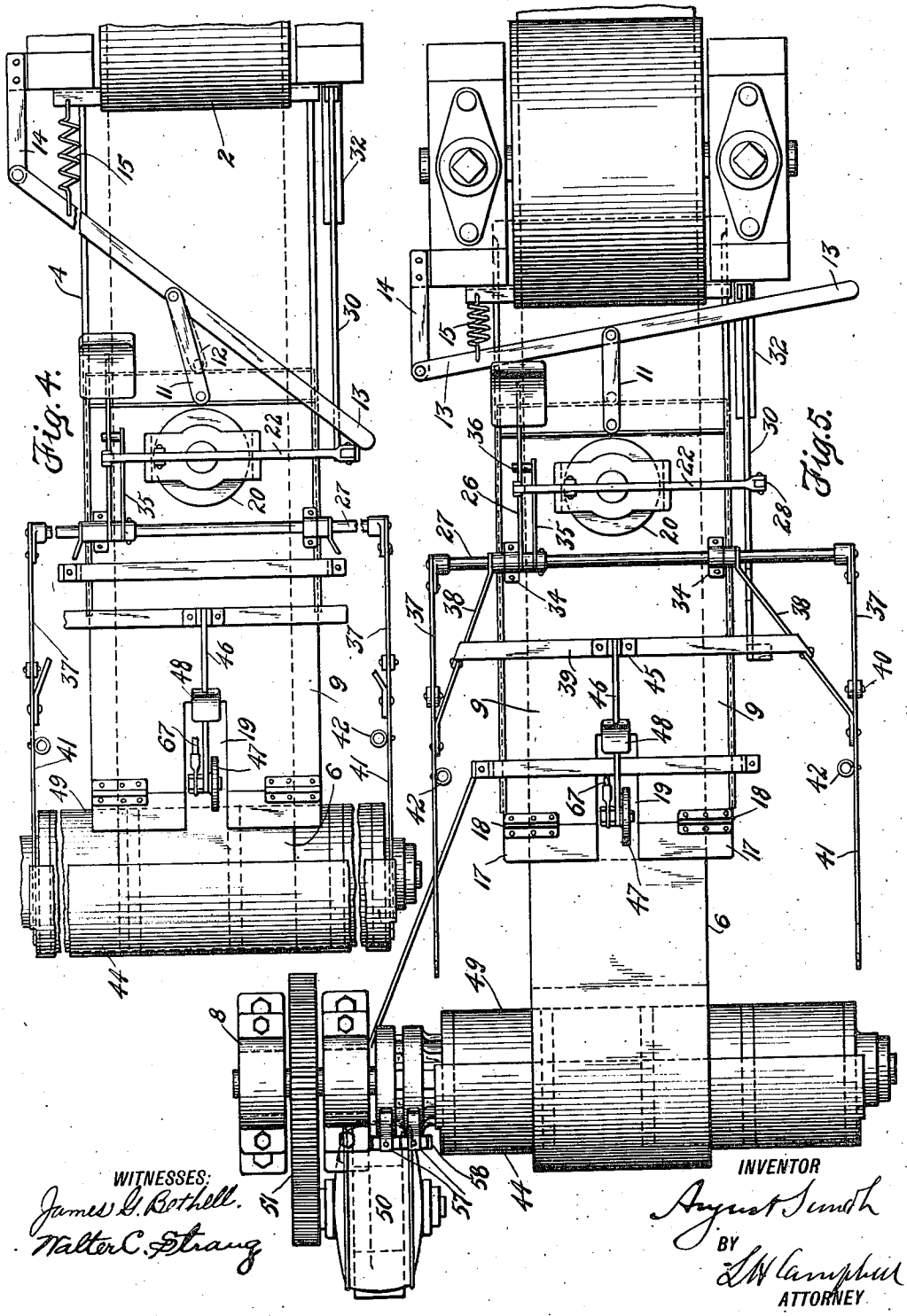


Fig. 4.

Fig. 5.

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4 SHEETS—SHEET 3.

Fig. 6.

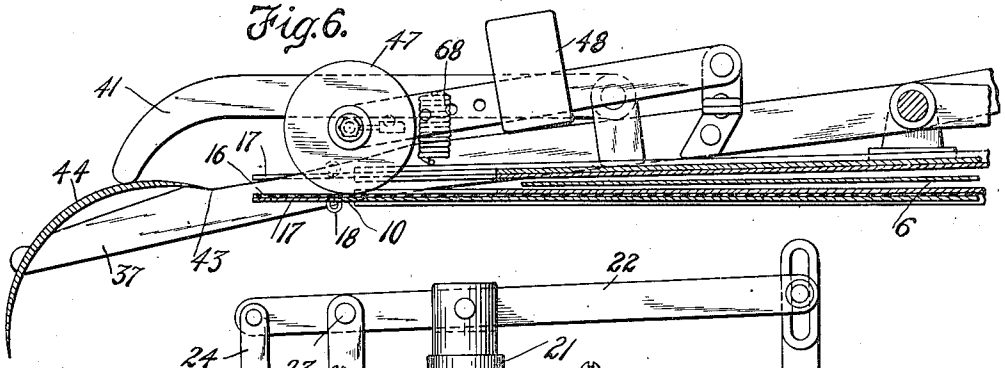


Fig. 7.

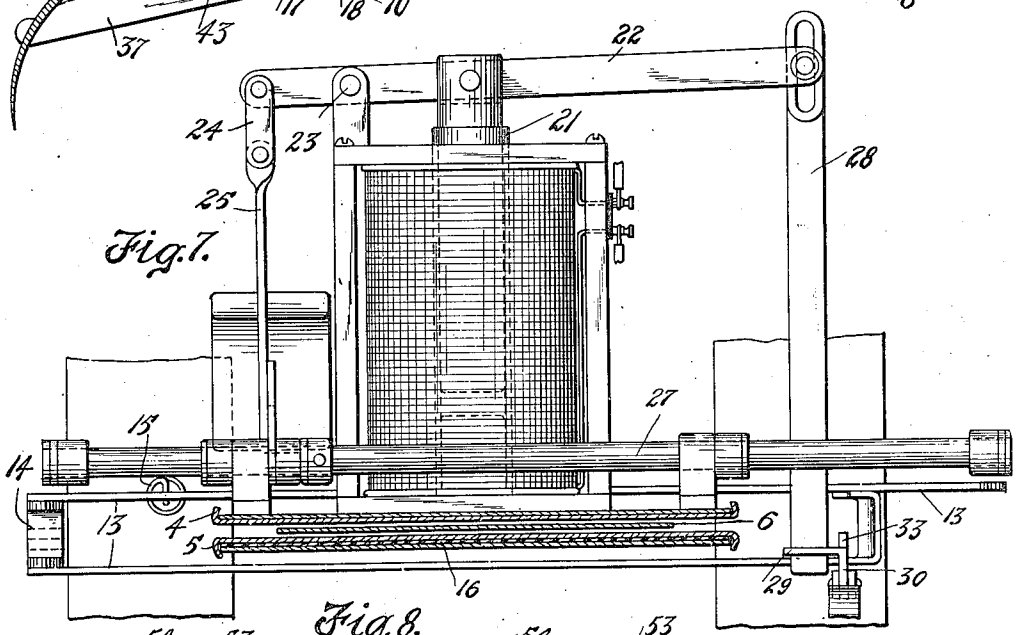


Fig. 8.

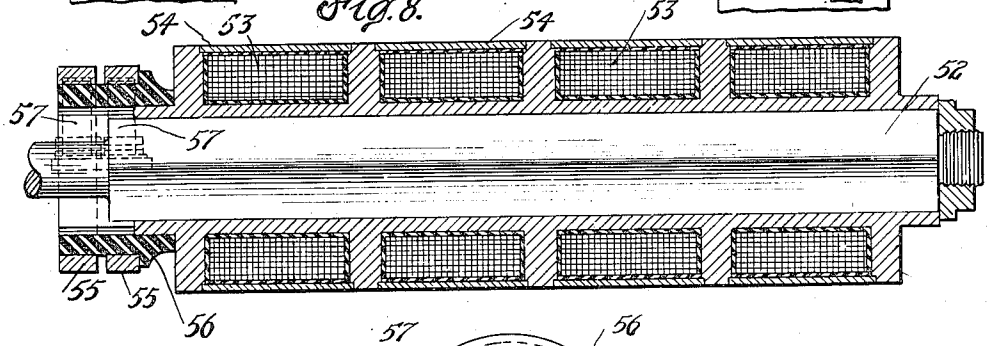
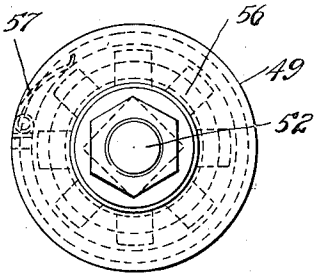


Fig. 9.



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4 SHEETS—SHEET 4.

Fig. 10.

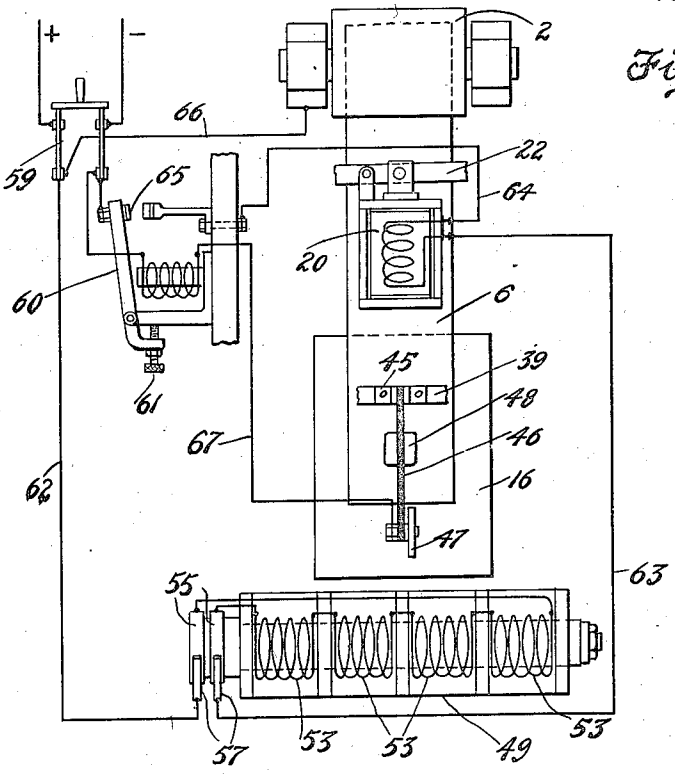
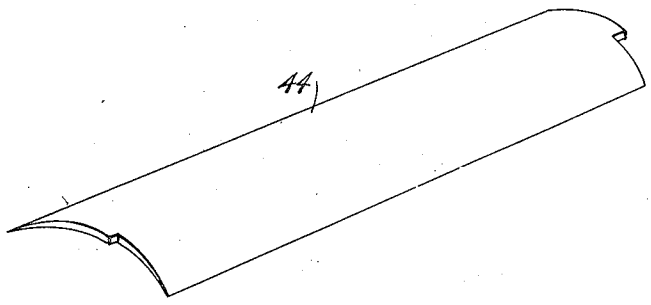


Fig. 11.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC BLOCKING MECHANISM FOR STRIP-MILLS.

1,230,941. Specification of Letters Patent. Patented June 26, 1917.

Application filed January 20, 1915. Serial No. 3,255.

To all whom it may concern:

Be it known that I, AUGUST SUNDH, a citizen of the United States, residing in Hastings-upon-Hudson, in the county of Westchester and State of New York, have invented a new and useful Improvement in Automatic Blocking Mechanism for Strip-Mills, of which the following is a specification.

My invention relates to strip mills, and is directed more particularly to mechanism for automatically blocking or reeling the strip, after it passes the rolls of the mill.

One object of the invention is the provision of automatic means for guiding, conveying and blocking the strip in such manner as entirely to obviate the necessity of personal attention on the part of the operator and thereby remove the cause of frequent and often serious accidents which are prevalent in machines of this nature in which the blocking is effected either partially or wholly by hand.

Another object of the invention is the provision of automatic means for introducing the strip onto the block and for effecting a driving engagement therebetween.

Another object of the invention is the provision of automatic means for effecting a driving engagement between the strip and block substantially at the instant that the strip reaches the block so that the latter exerts a pull on the strip and thereby not only prevents any buckling in the strip between the rolls and the block but also insures that the strip shall be properly fed onto the block and grasped and conveyed around with the block so as to be uniformly wound thereon to any desired amount.

A further object of the invention is the provision of automatic blocking mechanism in which the block may rotate at a high speed so as to enable the strip mill to operate up to its maximum capacity.

A still further object of the invention is the provision of a device of the class described involving automatic features in part electrical which enable one to attain the several objects herein set forth as well as others which will appear hereinafter in a simple, practical and efficient manner, devoid of all complication and which may be adjusted or regulated properly to operate at any speed upon any strip material up to the full capacity of the strip mill.

Other objects of the invention will appear hereinafter, the novel combinations of elements being pointed out in the annexed claims.

The accompanying drawings illustrate one embodiment of my invention in which Fig. 1 shows the strip being guided toward the block; Fig. 2 is a view similar to Fig. 1, the strip having engaged the block and been clamped thereon; Fig. 3 shows the device of the invention in connection with a strip mill, the blocking being partially completed; Fig. 4 is a plan view of Fig. 2; Fig. 5 is a plan view of Fig. 3; Figs. 6 and 7 are enlarged detail views of certain parts of the device; Fig. 8 is a sectional view of the magnetic block; Fig. 9 is an end view of Fig. 8; Fig. 10 is a wiring plan or diagram of the electrical circuits; Fig. 11 is a perspective view of a magnetic clamping member.

Like reference characters denote similar parts throughout all of the figures.

My invention, considered broadly, aims to accomplish automatic blocking, and while I am aware that others have attempted to produce a machine for blocking automatically, such machines, while lessening to a great extent the element of danger to those who are in charge of their operation, are only in part automatic and are not altogether satisfactory, leaving much to be desired in the way of further improvement. The present invention is designed to render the process of blocking entirely automatic from the moment the strip is fed to the strip mill until the blocking is completed, hence there is no necessity for hand operation during the process of blocking and the great danger to the workman which heretofore existed is absolutely done away with.

Considered broadly, the invention comprises, in connection with a strip mill, a guide for directing the strip to the block, means associated with the block for connecting the strip thereto, and means, for thereafter automatically effecting the withdrawal of the guide from its initial position adjacent the block so that the latter may reel up or block a strip of almost unlimited

length without interference from any part of the mechanism.

Referring to the drawings, I show a strip mill 1 comprising the usual rolls 2 and 3 in front of which is arranged a guide table comprising upper and lower horizontal members 4 and 5, respectively, spaced apart and having their edges bent over so as to form troughs which are secured at one end to the mill by suitable brackets 6', 6', and toward the other end by a bracket 7 which is bolted to the pedestal 8. Upon these troughed members 4 and 5 and in sliding engagement therewith are slides 9 and 10, each of which is connected by links 11 and 12, respectively, to a double arm lever 13 pivoted at one end to a stationary bracket 14 secured to the mill. A stiff tension spring 15 is fixed at one end to the mill and its other end is connected to the double arm lever 13, so that the action of the spring tends to maintain the slides 9 and 10 in their retracted position as shown in Figs. 3 and 5. To the upper surface of the lower slide 10 I secure a sheet of flexible insulating material 16 (see Figs. 6 and 7) the purpose of which will appear farther on. The left hand end of each of the slides 9 and 10 carries a sheet metal flap 17 which are secured thereto by means of spring hinges 18, the arrangement being such that these flaps normally form a continuation of the slides, but may under certain conditions be swung upwardly upon their hinges. The upper slide 9 as well as the upper flap 17 is cut away so as to form a rectangular opening 19.

Secured to the upper slide 9 is an electromagnet 20 of the solenoid type having a movable upper core 21. A lever 22 is operatively connected to the magnet core 21 and is pivoted at 23 to a bracket carried by the magnet frame. One end of this lever is connected by a link 24 to a rod 25, the other end of the rod being connected to a weighted arm 26 loosely pivoted upon the shaft 27. The other end of the magnet lever 22 is adjustably secured by a slot and pin connection to a depending rod 28 whose lower end is normally in vertical alinement with a stop 29 carried by a lever 30. This lever is pivoted at 31 to some stationary object such as the frame of the mill and is pressed upwardly by means of a spring 32. At a position intermediate the ends of the lever 30 is a catch 33 which is adapted to engage and latch the lower arm of the double arm lever 13 when the latter is moved into its extreme left hand position as shown in Figs. 1, 2 and 4.

The shaft 27 upon which is loosely pivoted the weighted arm 26 is rotatably mounted in bearings 34, 34, secured to the upper slide 9 and pinned thereto is an arm 35 to which is secured a pin 36 which is positioned beneath, and normally held down by, the weighted arm 26. At each end of the shaft 27 is secured one of a pair of substantially horizontal arms 37, 37, which are stiffened by means of stays 38, 38, and a cross piece 39, all connected together. Intermediate the ends of each arm 37 is a bracket 40 to which is pivoted a finger 41 which bears against its corresponding arm by reason of a tension spring 42. The left hand end of each arm 37 is notched at 43, 43, so as to receive and support a crescent shaped clamp member or shoe 44, which latter is made of magnetic material such as sheet iron or steel having a portion cut away at each end as clearly shown in Fig. 11, and is normally held in proper position on the arms 37, 37 by reason of the spring pressed fingers 41, 41. The cross piece 39 carries at its center a bracket 45 to which is pivoted a rod 46, at or near the end of which is mounted a roller 47 made of light conducting material. The rod 46 is provided with a series of holes 68 into which the pin carrying the roller may be secured so as to vary the position of the roller along the rod. The rod 46 also carries a weight 48 and either the rod or bracket are made of insulating material so that the roller 47 is thoroughly insulated from all metal parts of the device. It will be noted that the roller 47 is located over the cut away portion 19 in the upper slide 9, and bears against the insulation 16 secured to the lower slide by the aid of the weight 48. A roller of fairly large diameter is best adapted for the roller 47. The roller should be as light as possible, and by reason of its light weight and comparatively large diameter will offer the minimum of resistance to the passage of the strip from the mill, and reduce the liability of buckling of the strip, due to its engagement with the roll, to a very small degree.

The block 49 is rotatably mounted in suitable supports or bearing pedestals 8, 8, and may be revolved by any suitable power driving mechanism, although the same is preferably driven by a separate electric motor 50 connected directly thereto or through a belt or reduction gearing 51. The block is arranged to be magnetized and, as shown in Fig. 8, comprises a cylindrical member mounted on a squared shaft 52, and having a plurality of annular grooves in which are located thoroughly insulated magnet windings 53, 53. Surrounding each magnet winding is a shell of brass or other non-magnetic material 54, 54, the surface of the block being finished off so as to present a smooth unbroken cylindrical surface throughout its length. At one end of the block I provide a pair of collector rings 55, 55, which are insulated from each other and from the block by means of suitable insulation 56, and are connected to the windings 53, 53. Brushes 57, 57, are carried by an

insulated support 58, secured to a pedestal 8, and bear against the collector rings 55, 55, (see Figs. 5 and 10).

By referring to Fig. 10, the electrical circuits will be seen. In this figure, a hand switch 59 is used to connect the wiring system to the source of current supply designated by × and —. A conductor 62 leads to the left hand brush 57, from whence current is conducted through all of the magnet windings 53 of the block in series to the other brush 57 and continues by the conductor 63 through the solenoid of magnet 20 and by the conductor 64 to one of the normally open contacts 65 of a relay 60. The other contact of the relay is connected to the — main. Another circuit may be traced from the main switch 59 by way of the conductor 66 which is grounded to some part of the apparatus such as one of the bearings of the mill roller 2. The strip 6 is also grounded, hence the circuit continues through the strip to the insulated roller 47, when these parts are in contact, and by the conductor 67 to and through the magnet winding of the relay 60. In this figure the strip 6 has not as yet engaged the roller 47, hence the relay contacts remain open and no current can flow to the solenoid magnet 20 or the magnets 53 of the block. The position of the movable arm of the relay 60, and the distance apart of the relay contacts 65 may be adjusted within wide limits by an adjusting screw 61. By this means, I am enabled to vary the time which the contacts 65 take in closing after the circuit to the relay magnet is closed.

The operation of the device just described is very simple and is as follows: First the crescent clamp is placed in proper position on its supporting arms 37, 37, under the spring pressed fingers 41, 41, as shown in Figs. 1, 4 and 6. The lever 13 is now grasped, and forced in a left hand direction against the action of the tension spring 15, this movement of the lever carrying the slides 9 and 10 into their extreme left hand position as shown, for example, in Figs. 1 and 4, and also carrying the lever beyond the catch 33 on the lever 30, which immediately springs up and latches the lever 13 and slides 9 and 10 in position. The block is now revolved and a strip is introduced between the rolls of the mill. As the latter leaves the rolls, it passes between the guide members 4 and 5, of the guide table over the insulation 16 and quickly reaches the roller 47 which up to this time rested on the insulation. The relative position of the parts at this time are shown in Fig. 1. A circuit is at once completed through the magnet of relay 60 and the latter is energized to close its contacts 65. By this time, the advancing end of the strip has been introduced between the crescent clamp member 44 and the surface of the block and the relay contacts having been by this time closed on each other, the circuit to the solenoid 20 and magnet windings of the block is completed. The solenoid at once operates both to raise the weighted arm 26 out of engagement with the pin 36 and also to force the rod 28 downwardly against the stop 29 of lever 30. The lifting of the weighted arm 26 permits the crescent clamp 44 and supporting arms 37 to move downwardly by reason of their own weight and also by the magnetic pull on the crescent clamp due to the block. The downward pressure on the stop 29 forces the lever 30 in a downward direction against the action of the spring 32 thereby removing the catch 33 from engagement with the double arm lever 13 and the latter is at once drawn backwardly by the spring 15, carrying with it both of the slides 9 and 10 and all of the parts carried thereby. In the meanwhile the crescent clamp 44 has been deposited on the block, the end of the strip being located between the two, and the block being magnetized, the clamp is strongly held in clamping position. The relative position of parts at this time are shown in Fig. 2. The rotation of the block pulls the strip through the guide table and conveys it around the block, and as the latter continues to rotate at high speed the strip is very soon completely blocked and may readily be removed from the block in the usual manner after the latter comes to rest, the block and crescent clamp automatically becoming demagnetized as soon as the strip passes beyond the roller 47, since the circuit to the relay will be opened at that point and the contacts 65 will move apart. The solenoid 20 is demagnetized simultaneously with the block and hence the weighted arm 26 is free to drop and bear upon the pin 36, which causes the clamp supporting arm 37 to move upwardly into proper position to receive the crescent clamp for a subsequent operation of the device.

In reviewing the operation, it will be observed that the roller 47 makes electrical contact with the strip before the end of the same has reached the block, but even so, the relay 60 requires an appreciable time to close its contacts, and the block and solenoid 20 like other electromagnetic apparatus possess a certain time constant. Therefore, the time required for the strip to pass from the roller 47 to the block and into clamping position is the same as that required to overcome the inertia of the parts and for the proper magnetization of the block and operation of the solenoid 20.

Since it may be desired to block different strips at different speeds and since it is desired that the crescent clamp shall always grasp the strip when it reaches the proper position, which may be either under one

horn only of the crescent clamp or under both horns as shown in Fig. 2, it becomes of advantage to be able to adjust the mechanism so as to effect the desired result. This I do in either one or both of two ways, to wit: By shifting the position of the roller toward or away from the block or by varying the position of the movable arm of the relay 60 by means of the screw 61.

The automatic withdrawal from the block of the clamp supporting arms and all connected parts is of great advantage in that it permits one to block a strip of almost unlimited length and without attention on the part of the operator or fear of injury or crowding any of the parts of the apparatus. It is of advantage to have this withdrawal take place as soon as possible after the strip is clamped to the block, but owing to the inertia of the slides and connected parts the withdrawal can not very well be effected instantly but will require an appreciable length of time. Hence it follows that if the block be revolving at high speed the crescent clamp may be carried around a complete revolution and engage the flaps 17 on the ends of the slides. These flaps being carried by the spring hinges 18 are free to ride up over the clamp and hence no injury can result to the slides. The same conditions may exist with respect to the clamp supporting arms 37, but owing to the fact that the solenoid 20 has already raised the weighted arm 26 out of engagement with the pin 36, the clamp supporting arms 37 may be carried upwardly by the clamp without any appreciable opposition and without danger of injury to the same.

Another feature of the invention which possesses great merit, and upon which, in a large measure, is due the successful operation of the device, is found in the method and means for effecting the clamping of the strip to the block. For example, as the strip leaves the rolls of the mill, it is guided and pushed forward until its advancing edge enters between the block and clamp. The strip reaches this position before its advancing edge is deflected from a horizontal path hence there is no tendency for the strip to buckle between the rolls and the block, as the pushing action of the rolls remains uniform. As soon as the strip is positioned between the clamp and block, the clamp at once forces the strip against the block so as to form a driving connection therebetween, and the rotation of the latter pulls and conveys the end of the strip around with the block against any possibility of it becoming detached therefrom, and constrains the strip to assume a circular form, with its first convolution snugly wound on the block, thereby insuring the proper reeling of the strip until the blocking process is completed. In some cases I prefer that the clamp shall not be drawn down on the block until after the end of the strip has been pushed by the rolls into a position such as shown in Fig. 2, in which the strip is deflected through a small arc before the clamp is actuated. Whether or not the advancing end of the strip be partially or wholly engaged by the clamp may be determined beforehand by the adjusting means provided for that purpose, and will depend in a large measure upon the thickness and nature of the strip. In neither case is there any appreciable tendency for the strip to buckle.

As before pointed out, I prefer to employ a driving means for the block which shall be of moderate power and separate from the mill driving means, since among other things it enables me to revolve the block at a peripheral speed slightly in excess of that of the rolls. For this reason the block in revolving will always maintain a tension on the strip from the instant the clamp operates until the strip block is completed. By reason of this, not only will the block be uniformly and snugly wound, but also any tendency toward buckling of the strip is entirely obviated.

While I have disclosed one embodiment of my invention, I desire not to be limited to the precise construction and arrangement of parts as shown, since it is obvious that one skilled in the art could readily make various changes therein without departing from the spirit and scope of the invention.

What I claim is:—

1. The combination with a block of a strip mill, of clamping means for clamping the strip to the block, and means controlled by the feeding movement of the strip to control the clamping means.

2. The combination with a block of a strip mill, of clamping means for clamping the strip to the block while the block is rotating, and means controlled by the feeding movement of the strip for controlling the clamping means.

3. The combination with a block of a strip mill, of automatic means for clamping the strip to the block, and means controlled by the feeding movement of the strip for controlling said automatic clamping means.

4. The combination with a block of a strip mill, of automatic means for clamping the strip to the block while the block is rotating, and means controlled by the feeding movement of the strip for controlling said automatic clamping means.

5. The combination with a block of a strip mill, of clamping means for clamping the strip to the block, electro-magnetic means for operating said clamping means, and means operable by the feeding movement of the strip for controlling said electro-magnetic means.

6. The combination with a block of a strip mill, of a clamping means for clamping the strip to the block, electro-magnetic means for operating said clamping means, and electro-magnetic means operable by the feeding movement of the strip for controlling the first mentioned electro-magnetic means.

7. The combination with the rotatable block of a strip mill, means for guiding the strip from the mill to the block, means to secure the strip upon the block, and means controlled by the feeding movement of the strip to withdraw the guiding means as soon as the strip is secured upon the block.

8. The combination with the rotatable block of a strip mill, means for guiding the strip from the mill to the block, magnetic means to secure the strip to the block, and automatic means controlled by the feeding movement of the strip to withdraw the guiding means as soon as the strip is secured to the block.

9. The combination with the rotatable block of a strip mill, means for guiding the strip to the block, and means dependent upon the position of the strip with respect to the block for withdrawing the guiding means.

10. The combination with the rotatable block of a strip mill, means for guiding the strip to the block, and automatic means dependent upon the movement of the strip for effecting the withdrawal of the guiding means.

11. The combination with the rotatable block of a strip mill, means for guiding the strip to the block, and electrically controlled means dependent upon the movement of the strip for effecting the withdrawal of the said guiding means.

12. The combination with the rotatable block of a strip mill, means for guiding the strip to the block, and automatically controlled electrical means dependent upon the extent of movement of the strip for effecting the withdrawal of the said guiding means.

13. The combination with the rotatable block of a strip mill, of a strip guide between the mill and block, means to clamp the strip to the block, and automatic means controlled by the feeding movement of the strip to effect the withdrawal of the said guiding means at the instant the strip is clamped to the block.

14. The combination with the rotatable block of a strip mill, of a strip guide between the mill and block, means to clamp the strip to the block, and automatic means to effect the withdrawal of the said guiding means at the instant the strip is clamped to the block.

15. The combination with the rotatable block of a strip mill, of means for guiding the strip from the mill to the block, means for effecting an engagement between the strip and block, and means coacting with said engaging means for effecting the withdrawal of the guiding means.

16. The combination with the rotatable block of a strip mill, of means for guiding the strip from the mill to the block, means for effecting an engagement between the strip and block, and automatic means for effecting simultaneously the operation of the engaging means and the withdrawal of the said guiding means.

17. The combination with the rotatable block of a strip mill, of means for guiding the strip from the mill to the block, means for effecting an engagement between the strip and block, and automatically controlled electromagnetic means for effecting simultaneously the operation of the engaging means and the withdrawal of the said guiding means.

18. The combination with the rotatable block of a strip mill, of electromagnetic means for clamping the strip to the block, a source of electrical supply, and means dependent upon the position of the strip relative to the block for closing a circuit to said clamping means from the source of electrical supply.

19. The combination with the rotatable block of a strip mill, of electromagnetic means for clamping the strip to the block, and means controlled by the feeding movement of the strip for effecting the energization of said electromagnetic clamping means.

20. The combination with the rotatable block of a strip mill, of electromagnetic means for clamping the strip to the block, strip guiding means movable toward and away from the block, electromagnetic means for effecting the movement of said guiding means, and means controlled by the feeding movement of the strip for effecting the operation of said clamping and strip guiding means.

21. The combination with the rotatable block of a strip mill, of a strip guide adjacent the block, means for withdrawing the guide from the block, means for clamping the strip to the block, and electromagnetic means for controlling the clamping and guiding means whereby the guide is automatically withdrawn from the block at substantially the instant the strip is clamped.

22. The combination with the rotatable block of a strip mill, means to guide the strip from the mill to the block, means to effect a connection between the strip and block, and automatically controlled means simultaneously to effect said connection and a movement of said guiding means away from the block.

23. The combination with the rotatable block of a strip mill, means for magnetizing the block, means for guiding the strip from the mill to the block, magnetic means for

effecting the withdrawal of the guiding means from the block, and automatic means for simultaneously energizing said block and the magnetic means for effecting the withdrawal of the guide.

24. The combination with the rotatable block of a strip mill, a guide between the block and mill, electrically controlled means for moving the guide away from the block, electrically controlled means for clamping the strip to the block, and automatic means for effecting the simultaneous operation of both of said electrically controlled means.

25. The combination with the rotatable block of a strip mill, a magnet for effecting an engagement between the strip and block, a guide for the strip, a magnet for causing the guide to recede from the block, and automatic means for concurrently energizing said magnets.

26. The combination with the rotatable block of a strip mill, a magnet for effecting an engagement between the strip and block, a guide for the strip, a magnet for causing the guide to recede from the block, and means controlled by the feeding movement of the strip for effecting the simultaneous energization of said magnets.

27. The combination with the rotatable block of a strip mill, a magnet for effecting an engagement between the strip and block, a guide for the strip, a magnet for causing the guide to recede from the block, and a relay controlled by the feeding movement of the strip adapted to effect the energization of said magnets.

28. The combination with the rotatable block of a strip mill, of a magnet for effecting an engagement of the strip and block, a guide for the strip, a magnet for permitting the guide to recede from the block, a contact device coöperating with the strip for closing a circuit to said magnets, and means for varying the position of said contact device with respect to the block.

29. The combination with the rotatable block of a strip mill, of a magnet for effecting an engagement of the strip and block, a guide for the strip, a magnet for permitting the guide to recede from the block, a relay for closing a circuit to said magnets, means for varying the time constant of the relay, and means controlled by the feeding movement of the strip for closing a circuit to the relay.

30. The combination with the rotatable block of a strip mill, of means to guide the strip from the mill to the block, a clamp for securing the end of the strip to the block, automatic means for withdrawing the guide from the block, and a yielding extension of the guide for permitting the guide to be deflected independent of said withdrawing means in case the guide and clamp contact with each other.

31. The combination with the rotatable block of a strip mill, of a clamp separate from the block, means for guiding the strip between the clamp and block, and means for applying the clamp to the strip to clamp the strip upon the periphery of the block.

32. The combination with the rotatable block of a strip mill, of a clamp separate from the block, means for guiding the strip between the clamp and block, and automatic means for drawing the clamp into clamping engagement with the strip and block when the strip reaches a predetermined position.

33. The combination with the rotatable block of a strip mill, of a clamp outside the winding surface of the block, means for guiding the strip between the clamp and block, and electromagnetic means for moving the clamp into clamping position on the strip.

34. The combination with the rotatable block of a strip mill, of a clamp adjacent the block, means for guiding the strip between the clamp and block, and automatic means for moving the clamp into clamping position on the strip.

35. The combination with the rotatable block of a strip mill, of a clamp adjacent the block, means for guiding the strip between the clamp and block, and normally inert electromagnetic means for effecting a clamping of the strip between the clamp and block, and a contact device for energizing said magnetic means as soon as the strip has moved into position between the block and clamp.

36. The combination with the rotatable block of a strip mill, of a clamp, means for holding the clamp out of contact with the block, means for guiding the strip between the clamp and block, normally inert magnetic means for moving the clamp against the strip and block, and means for releasing said clamp holding means when the magnetic moving means becomes active.

37. The combination with the rotatable block of a strip mill, of a clamp, means for supporting said clamp out of contact with the block, means for guiding the strip between the clamp and block, normally inert electromagnetic means for effecting a mutual attraction between the clamp and block, and means for releasing said clamp holding means to permit the clamp to engage the strip and block upon the energization of the electromagnetic means.

38. The combination with the rotatable block of a strip mill, of a clamp, means for supporting said clamp out of contact with the block, means for guiding the strip between the clamp and block, normally inert electromagnetic means for effecting a mutual attraction between the clamp and block, and means for releasing said clamp holding means to permit the clamp to engage the

strip and block simultaneously with the energization of the electromagnetic means.

39. The combination with the rotatable block of a strip mill, of a guide for directing the strip from the mill to the block movable toward and away from the block, a catch for maintaining the guide in position adjacent the block, an electromagnet for releasing the catch, an electromagnet for effecting the clamping of the strip to the block, and automatic means for energizing said electromagnets whereby the guide is withdrawn from the block at substantially the same instant the strip is clamped to the block.

40. The combination with the rotatable block of a strip mill, of a guide for directing the strip from the mill to the block movable toward and away from the block, a catch for maintaining the guide in position adjacent the block, an electromagnet for releasing the catch, an electromagnet for effecting the clamping of the strip to the block, and means dependent for its operation upon the position of the advancing end of the strip with respect to the block for closing a circuit to said electromagnets to effect simultaneously the withdrawal of the guide and the operation of the clamp.

41. The combination with the rotatable block of a strip mill, of a guide for directing the strip from the mill to the block, means for moving the guide toward the block, means for moving the guide away from the block, a catch for maintaining the guide in position adjacent the block, and automatic means for releasing the catch to permit the guide to recede from the block as the strip commences to wind on the block.

42. The combination with the rotatable block of a strip mill, of a guide for directing the strip from the mill to the block, means for moving the guide toward the block, a spring for moving the guide away from the block, a catch for maintaining the guide in position adjacent the block, a magnet for releasing the catch, a magnet for clamping the strip to the block, a contact roller carried on the guide, and an electric circuit including both magnets and the roller adapted to be completed when the strip engages the roller in its passage from the mill to the block whereby the guide is automatically withdrawn from its position adjacent the block at substantially the instant the strip is clamped to the block.

43. The combination with the rotatable block of a strip mill, of a shoe for clamping the strip to the block, an electromagnet for clamping the shoe on the block, a support for the shoe, a weight normally acting on the support for holding the shoe away from the block, an electromagnet for raising the weight out of engagement with the support to permit the shoe to engage the block, and automatic means for energizing both of said electromagnets.

44. The combination with the rotatable block of a strip mill, of a shoe for clamping the strip to the block, an electromagnet for clamping the shoe on the block, a support for the shoe, a spring pressed finger for yieldingly holding the shoe to the support, a weight normally acting on the support for holding the shoe away from the block, an electromagnet for raising the weight out of engagement with the support, and automatic means for simultaneously energizing said electromagnets.

45. A strip mill winding block comprising magnetizable material, an armature to clamp the strip to the block, and means operable by the feeding movement of the strip to effect the magnetization of the block to cause the said armature to clamp the strip to the block.

46. A strip mill winding block comprising magnetic material, a winding embodied in said block, an external armature, and means operable by the feeding movement of the strip for closing a circuit to said winding, to cause the armature to clamp the strip to the block.

47. A strip mill winding block comprising a rotary cylindrical magnet, a winding embodied in said magnet, an armature for the magnet, and means for introducing the strip between the magnet and its armature and for energizing said magnet.

48. A strip mill winding block comprising a rotary cylindrical magnet, a winding embodied in said magnet, an armature for the magnet, means for supporting said armature out of contact with the magnet, and means for introducing the end of the strip between the armature and magnet and for energizing the magnet whereby the magnet, its armature and the end of the strip revolve as a unit.

49. A strip mill winding block comprising a rotary electromagnet, an armature concentric with said magnet and means for directing the end of the strip between the magnet and armature.

50. A strip mill winding block comprising a rotary electromagnet, an armature concentric with said magnet, means for directing the end of the strip between the magnet and armature, and means controlled by the strip for effecting an engagement between the magnet, armature and strip.

51. A strip mill winding block comprising a rotary electromagnet, an armature partially surrounding said magnet, means for maintaining said armature at rest while the magnet is rotating, means for directing the strip between the magnet and armature, and means to energize the magnet and thereby effect a clamping of the strip between the magnet and armature.

52. A strip mill winding block comprising a rotary block of substantially cylindrical form, a clamping member partially encircling said block and removed therefrom, means for holding said member at rest while the block is rotating, means for directing the end of the strip between the block and clamping member, and electromagnetic means for effecting a driving engagement between the block, clamping member and the strip whereby the clamping member, block and end of the strip rotate as a unit.

53. In a device adapted to wind a strip fed from a strip mill, the combination of a block, an electric circuit controlled by the feeding movement of the strip, a relay controlled by said circuit, and means controlled by said relay to effect an engagement between the strip and the block.

54. In a device adapted to wind a strip fed from a strip mill, the combination of a block, a grounded electric circuit controlled by the feeding movement of the strip, a relay controlled by said grounded circuit, and means controlled by said relay to effect driving engagement between the strip and the block.

55. In a device adapted to wind a strip fed from a strip mill, the combination of a block, an electric circuit controlled by the feeding movement of the strip, a relay controlled by said circuit, and constructed to effect an engagement between the strip and the block.

56. In a device adapted to wind a strip fed from a strip mill, the combination of a block, a grounded electric circuit controlled by the feeding movement of the strip, a relay controlled by said grounded circuit, and an electric device controlled by said relay and constructed to effect a driving engagement between the strip and the block.

57. In a blocking device adapted to wind a strip fed from a strip mill, guiding means for the strip between the strip mill and the blocking device, a relay, a grounded electric circuit for said relay, an electric contact device in the path of the strip and insulated from the ground and connected in the relay circuit, an insulated portion in the guiding means for said contact device to rest on, whereby the circuit for the relay is complete when the strip fed from the strip mill reaches the contact device.

58. In combination with a block adapted to wind a strip fed from a strip mill, magnetic means for effecting engagement between the strip and the block, a relay controlling said magnetic means, an electric circuit for said relay operated by the feeding movement of the strip as the latter comes from the mill.

59. In a device adapted to wind a strip fed from a strip mill, the combination of a magnetizable block, a winding for said block, an armature for said block, means to charge the winding to magnetize the block to attract the armature at the moment when the strip has entered between the block and the armature, to secure the strip to the block, said means being operated by the feeding movement of the strip.

60. In a device adapted to wind a strip fed from a strip mill, the combination of a rotatable block of magnetizable material, a winding for said block, an armature for said block, means to hold said armature stationary, and means controlled by the feeding movement of the strip to close a circuit and charge the winding, and magnetize the block, and thereby to attract the armature to secure the strip to the block to cause the armature to revolve with the block and the strip to be wound on the block.

61. In a device adapted to wind a strip fed from a strip mill, the combination of a block, an electric circuit controlled by the feeding movement of the strip, a relay controlled by said circuit, and means controlled by said relay to clamp the strip to the block.

62. In a device adapted to wind a strip fed from a strip mill, the combination of a block, a grounded electric circuit controlled by the feeding movement of the strip, a relay controlled by said grounded circuit, and means controlled by said relay to clamp the strip to the block.

63. In a device adapted to wind a strip fed from a strip mill, the combination of a block, a grounded electric circuit controlled by the feeding movement of the strip, a relay controlled by said grounded circuit, and an electroresponsive device controlled by said relay and constructed to clamp the strip to the block.

64. In combination with a block adapted to wind a strip fed from a strip mill, magnetically operable means for clamping the strip to the block, a relay controlling said magnetically operable means, and an electric circuit for said relay operated by the feeding movement of the strip.

65. In a device adapted to wind a strip fed from a strip mill, the combination of a block, a relay comprising an electromagnet for operating the relay, a circuit for the electromagnet which includes the strip to be wound, and means controlled by said relay to effect an engagement between the strip and the block.

66. In a device to wind a strip fed from a strip mill, the combination of a block, a relay comprising an electromagnet for operating the relay, a circuit for the electromagnet which includes the strip after the circuit has been closed by feeding movement

of the strip, and means controlled by the relay to effect an engagement between the strip and the block.

67. In a device to wind a strip fed from a strip mill, the combination of a block, clamping means for clamping the strip to the block, a relay controlling said clamping means, an electromagnetic means for controlling said relay, a circuit for said means closed by movement of the strip and including the strip.

68. In a device to wind a strip fed from a strip mill, the combination of a block, clamping means to clamp the strip to the block, an electrical device controlling said clamping means, a relay controlling said electrical device, and a circuit adapted to be closed by movement of said strip controlling the operation of said relay and which circuit includes the strip to be wound.

69. In a device to wind a strip fed from a strip mill, the combination of a block, guiding means for the strip between the strip mill and block, clamping means to clamp the strip to the block, a relay controlling the operation of said clamping means, a contact device in the path of movement of the strip from the mill, a circuit controlling said relay including said strip, the strip adapted when moved into engagement with said contact device to close the said relay controlling circuit.

70. In combination with a block adapted to wind a strip fed from a strip mill, clamping means to clamp the strip to the block, electromagnetic means controlling said clamping means, a relay controlling said electromagnetic means, a grounded circuit for operating said relay, the circuit including the strip, a contact device in the path of movement of the strip, this circuit being closed by contacting of the contact device and said strip, to effect the operation of the electromagnetic means and which effects the operation of the clamping means.

71. In combination with a block adapted to wind a strip fed from a strip mill, clamping means to clamp the strip to the block, electromagnetic means controlling the said clamping means, a relay controlling said clamping means, adjustable electromagnetic means for operating said relay, a grounded circuit for said adjustable electromagnetic means, which circuit includes the strip to be wound, means coöperating with said strip to close the circuit for the electromagnetic means to cause the relay to operate the clamping means to clamp the strip to the block at a predetermined instant.

72. In combination with a block adapted to winding strips fed from a strip mill, clamping means to clamp the strip to the block, electrical means controlling the operation of said clamping means, a roller in the path of movement of the strip as it is fed from the mill, a grounded electric circuit, said strip and roller being included in the grounded circuit, electrical means, the circuit for which is closed by the engagement of the strip with the said roller, to cause the electrical means controlling the operation of the clamping means to function.

73. The combination with a magnetizable block of a strip mill, means to magnetize said block, and an external armature for said block for conveying the strip coming from the strip mill around the block.

74. In combination with a magnetizable block of a strip mill, means to magnetize said block, an external armature for said block, said armature and block coöperating to convey the strip coming from the strip mill around the block.

75. The combination of a magnetizable revolving block of a strip mill, means to magnetize said block as it revolves, an external armature adapted to be attracted by said block as it revolves when said block becomes magnetized, said armature and block adapted to carry the strip coming from the strip mill around with the block.

76. The combination of a rotatable block of a strip mill, a winding for said block, an armature suspended a distance from said block, and automatic means for closing a circuit for the winding of the block, and for relieving the armature whereby the strip will be clamped to the block and conveyed around the block.

77. The combination with a revolving block of a strip mill, means to guide the strip from the mill to the block, and means to magnetize the block as it revolves, and a suspended armature adapted to be released and automatically clamp the strip coming from the strip mill to the block when said block is revolving.

78. In metal coiling apparatus, a rotary magnetic block, and means for magnetizing the same automatically by the material to be coiled; substantially as described.

79. In metal coiling apparatus, a rotary magnetic block, an energizing circuit therefor, and a controlling circuit closed automatically by the strip to be coiled; substantially as described.

80. In metal coiling apparatus, a rotary drum, and means for magnetizing the drum automatically by the metal to be coiled as it is brought into a definite position with respect to the drum; substantially as described.

81. In an apparatus for coiling metal strips, a magnetic drum, an energizing circuit connected therewith, and means to close said circuit, actuated automatically by an electric current passing through the strip; substantially as described.

82. In an apparatus for coiling metal strips, a magnetic drum or block, an energizing circuit therefor, and a controlling circuit for said energizing circuit, including the metal strip; substantially as described.

83. In a machine of the class described, the combination of a rotary block, mechanism for feeding the stock toward the block, and electro-magnetic means controlled by the stock for causing the block to wind the stock thereon.

84. In a machine of the class described, the combination of a block adapted to receive the stock, and means operating electrically through the stock for causing the block to wind the stock thereon.

85. In an automatic blocker, the combination of a block, a carrier adapted to clamp the material on the block, and means for holding the carrier in clamping position by magnetic action; substantially as described.

86. In an automatic blocker, the combination of a rotary block, a member adapted to clamp the material on the peripheral portion of the block between said member and the block, and means for holding said member in clamping position relative to the block by magnetic action as the block rotates; substantially as described.

87. In an automatic blocker, the combination of a rotary block, means for feeding the stock to the block, an element for clamping the stock on the periphery of the block, and means for operating said element automatically to clamp the stock on the block as the stock reaches a predetermined position relative to the block.

88. In blocking apparatus, the combination of a block adapted to receive the stock, an element for clamping the stock on the periphery of the block, and means operating electrically through the stock for causing said element to clamp the stock on the block.

89. In blocking apparatus, the combination of a rotary block, means from which the stock may be fed to the block, spaced from said block to form a gap, an element for securing the stock on the periphery of the block and means controlled by the bridging of such gap by the stock for operating said element.

90. In blocking apparatus, the combination of a rotary block, mechanism from which the stock may be fed to the block, a member for clamping the stock on the periphery of the block, and electrical means controlled by the stock for causing said member to clamp the stock on the block.

91. In blocking apparatus, the combination of a rotary block, mechanism from which the stock may be fed to the block, a member for securing the stock on the periphery of the block, and means, comprising an electric circuit, including the stock itself, and closed by the stock when the latter reaches a predetermined position relative to the block, for causing the stock to be secured on the block by means of said member.

92. In automatic blocking apparatus, the combination of a block, a member for clamping the material on the periphery of the block, an electromagnet for actuating said clamping member, and an energizing circuit for said electromagnet; substantially as described.

93. In automatic blocking apparatus, a rotary block, a member for clamping the material on the periphery of the block, an electromagnet for actuating said clamping member carried by the block, and an energizing circuit for said electromagnet; substantially as described.

94. In automatic blocking apparatus, the combination of a rotary block, means to rotate the same, a member for clamping the stock on the block, means for actuating said member, and means for automatically controlling the operation of said actuating means; substantially as described.

95. In automatic blocking apparatus, the combination of a rotary block, means to rotate the same, a member for clamping the stock on the block, an electromagnet for actuating said member, means for energizing said electromagnet, and automatic controlling means for said energizing means; substantially as described.

96. In automatic blocking apparatus, the combination of a rotary block, means to rotate the same, a member for clamping the stock on the block, means for actuating said member and means controlled by the stock for operating said actuating means during the rotation of the block when the stock reaches a predetermined position relatively to the block; substantially as described.

97. In metal coiling apparatus, a rotary magnetic block, and automatic means for demagnetizing the same automatically by the material being coiled; substantially as described.

98. In metal coiling apparatus, a rotary magnetic block, and automatic means for magnetizing and demagnetizing the same by the material being coiled; substantially as described.

99. In metal coiling apparatus, a rotary magnetic block, an energizing circuit therefor, and a controlling circuit closed and opened automatically by the strip to be coiled; substantially as described.

100. In metal coiling apparatus, a rotary block, a presser coöperating therewith, and means to magnetize the block automatically by the metal strip as it is introduced between the presser and the block; substantially as described.

101. In apparatus for coiling metal strips, a magnetic drum or block, an energizing circuit therefor, and a controlling circuit hav-

ing an automatic switch to close said energizing circuit; substantially as described.

102. In apparatus for coiling metal strips, a magnetic drum or block, an energizing circuit therefor, and a controlling circuit including the strip itself and also including a solenoid switch which opens and closes the energizing circuit; substantially as described.

103. In an automatic blocker, the combination of a magnetic drum or block, an energizing circuit therefor, and a controlling circuit including an automatic switch for said energizing circuit, a source of current, and means for supporting the strip as it passes to the block; substantially as described.

104. In an automatic blocker, a magnetic drum or block, an energizing circuit therefor, and a controlling circuit for said energizing circuit, including means for supporting the strip as it moves toward the block; substantially as described.

105. In combination, a magnetic reel for winding material, and means controlled by the passage of such material to the reel for controlling the energization thereof.

106. In a machine of the class described, a block adapted to receive the stock, means associated with the block for effecting the attachment of the stock thereto, and means for causing the rotation of the block to wind the stock thereon, one of said means operating electrically through the stock so as to be controlled by the stock.

107. In apparatus such as described, the combination of a rotary block on which the stock is adapted to be attached and wound, mechanism from which the stock may be fed toward the block, and means, comprising an electric circuit, including the stock itself and closed by the stock when the latter reaches a predetermined position relative to the block, for causing the stock to be attached to the block as the latter rotates.

108. In apparatus such as described, the combination of a rotary block on which the stock is adapted to be attached and wound, mechanism from which the stock may be fed toward the block, and electrical means for governing a part of the operation of the block comprising a circuit adapted to include the stock as a part thereof.

109. The method of coiling material, which comprises confining such material between a rotary block and a carrier of magnetic material, and magnetizing the block to clamp the carrier on such material; substantially as described.

110. The method of coiling material which comprises supporting a carrier of magnetic material in proximity to a rotary magnetic block, conducting the material to be coiled into the space between the carrier and the block, and then magnetizing the block to clamp the carrier on such material; substantially as described.

111. The method of coiling material, which comprises attaching such material to a rotary magnetic block by means of a carrier which adheres to the block by magnetic attraction; substantially as described.

112. The method of coiling material, which comprises confining such material between a rotating magnetic block and a separate carrier of magnetic material which adheres to the block; substantially as described.

113. The method of coiling non-magnetic material, which comprises rotating a suitable drum or block, confining between the drum or block and a suitable carrier of magnetic material the end portion of the stock to be coiled, and magnetizing the block to cause the adhesion to the block of the carrier and the stock to be coiled; substantially as described.

114. The method of coiling non-magnetic material, which comprises rotating a suitable magnetic block, magnetizing the block, and holding the material to be coiled to the periphery of the block by confining it between the latter, and a separate carrier of magnetic material which adheres to the block by magnetic attraction; substantially as described.

115. The combination with an electromagnetic blocker for coiling a metal strip, of means controlled by the position of the strip itself for magnetizing and demagnetizing the blocker.

116. In an automatic blocker for non-magnetic material, a magnetic block, means for magnetizing said block, and a clamp for such material arranged to coöperate with said block.

117. In an automatic blocker for non-magnetic material, a block, means to magnetize the same, and a carrier of magnetic material to carry the non-magnetic material around the block.

118. In an automatic blocker for non-magnetic material, a block, a carrier, and means for automatically clamping the material on the block by means of the carrier when the material reaches a predetermined position relative to the block.

119. In an automatic blocker for non-magnetic material, a block, a carrier, and means for magnetizing the block automatically when the material reaches a definite position relative to the same.

120. In apparatus for blocking strips and the like, the combination of a rotary block, a magnetic carrier, means to support the carrier in proximity to the block, and means to magnetize the block and carrier automatically when the strip reaches the carrier.

121. In an automatic blocker, the combination of a block, means to rotate the same,

a member adapted to secure the material on the periphery of the block, and electro-magnetic means for operating said member at a predetermined instant.

122. In an automatic blocker, the combination of a rotary block, a member adapted to secure the material on the periphery of the block, between said member and a portion of the block, means for operating said member, and electrical means for controlling the operation of said member.

123. In an automatic blocker, the combination of a rotary block, means to rotate the same, a member for securing the stock on the block, and means for automatically clamping the stock on the block by means of said member.

124. In an automatic blocker, the combination of a rotary block, means to rotate the same, a member for securing the stock on the block, and means for automatically clamping the stock on the block by means of said member when the stock reaches a predetermined position relative to the block.

125. In blocking apparatus, the combination of a rotary block, means to rotate the same, mechanism from which the stock may be fed to the block, a member for clamping the stock on the periphery of the block, means for actuating said member, and means controlled by the stock for causing said member to clamp the stock on the block.

126. In automatic blocking apparatus, the combination of a rotary magnetic block adapted to receive the stock, magnetic means for clamping the stock onto the periphery of the block, and windings in the block so arranged as to produce magnetic flux uninfluenced by the rotation of the block.

127. In an automatic blocking apparatus, the combination of a rotatable block constructed of magnetic material, windings in said block, and means for securing the strip to the block, the magnetic material and windings of said block being so placed and arranged that their magnetic lines will concentrate themselves toward the strip securing means, irrespective of whether the block is standing still or rotating.

128. In automatic blocking apparatus, the combination with a rotary magnetic block adapted to receive the stock, said block having an axially disposed core and annular projections therefrom, windings about said core between said projections, and an armature longitudinally disposed in respect of said block for clamping the stock to the periphery of the block.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

AUGUST SUNDH.

Witnesses:
WALTER C. STRANG,
JAMES G. BETHELL.