

by the doors 33 which are preferably arranged to slide upward and downward; and the lower edges of the doors, when the same are closed by being dropped downward, are

5 located just far enough above the ends of the chain pins 29, to permit a sheet traveling on the pins to pass underneath said edges. The interval between the lower edges of the doors 33, and the floor of the tunnel chamber are furthermore closed by the swinging shields 34 and 34^a, which are hinged to the lower edge of the doors 33. The middle shield 34, has its lower edge notched to correspond with the transverse contour of the track plates and the conveyer chains with the pins thereon, so that this plate will normally hang downward and close the middle portion of the interval between the lower edge of the door 33 and the bottom of tunnel chamber.

The middle shield 34 is made slightly longer than the width of the sheet ordinarily passing through the tunnel, so that this shield alone will ordinarily be deflected by a sheet in passing into and out of the ends of the tunnel. The swinging shields 34^a, are arranged to normally close the interval on each side of the middle shield 34, but are adapted to swinging on their hinges to permit the passing of a sheet of more than ordinary width. By means of these doors and swinging shields, it is evident that the tunnel chamber is substantially closed except for the temporary opening made by the swinging shield when a sheet is passing into or out of the ends of the tunnel; and when necessary for the purpose of providing a fresh supply of air into the tunnel for properly oxidizing the sheets therein, a series of lateral air ports 35 may be provided in the furnace and walls and the intervening tube 36; and air under pressure may be supplied into these ports, and also into the gas burners, by means of the pipe 37 and 37^a controlled by the valves 38 and 38^a leading from the main air pipe 39 which is connected with a suitable source of supply.

As preliminary steps in the general process of bluing the sheets by the improved method, we prefer to pickle the sheet-bars from which the sheets are rolled to remove all scales or oxidation thereon. After the sheets are rolled and sheared to proper size, they are then pickled to remove all oxidation on their surfaces, washed in water to remove all traces of the pickling acid and then while wet are preferably given one or two passes between cold rolls. This preliminary cold-rolling of the sheets is preferred because the partial finishing of the sheets at this stage of the process renders unnecessary an excessive cold-rolling thereof after the sheets have been blued and avoids the resulting undue hardening of the same.

After the wet cold-rolling, they are then annealed in the usual manner, and after being cooled and separated are ready for the bluing furnace.

For bluing the sheets, the tunnel chamber is heated as uniformly as possible throughout its entire length, to or somewhat in excess of the temperature required for oxidizing the sheets to make the desired color on their surfaces, as for instance, to a bright red heat, the doors and swinging shields on the ends being preferably closed to retain the heat in the chamber, and the conveyer chains are placed in operation. The sheets are then entered, one at a time, into the forward end of the tunnel chamber upon the pins of the conveyer chains, the swinging shield being temporarily opened in so doing; and are carried by the conveyer chains in succession through the tunnel chamber, to the rear end thereof, where they emerge by temporarily opening the swinging shields.

The speed of the conveyer chains is so proportioned to the length of the tunnel chamber and the heat therein, that the sheets will be retained within the chamber long enough to bring them to the temperature necessary for oxidizing the surfaces to the desired degree or particular color; and when the sheets emerge from the chamber they may be cooled by any of the well known and ordinary methods without affecting or varying the color.

A mere inspection of the sheets as they emerge from the rear end of the tunnel chamber will show the extent to which they have been oxidized within the chamber, that is to say, the color which has been produced thereon; and, if there is not sufficient oxidation to produce the desired color, the speed of the conveyer chains is first reduced to retain the sheets in the tunnel chamber during a longer period, and the heat in the chamber is then preferably increased so that the faster speed of the chains can be resumed.

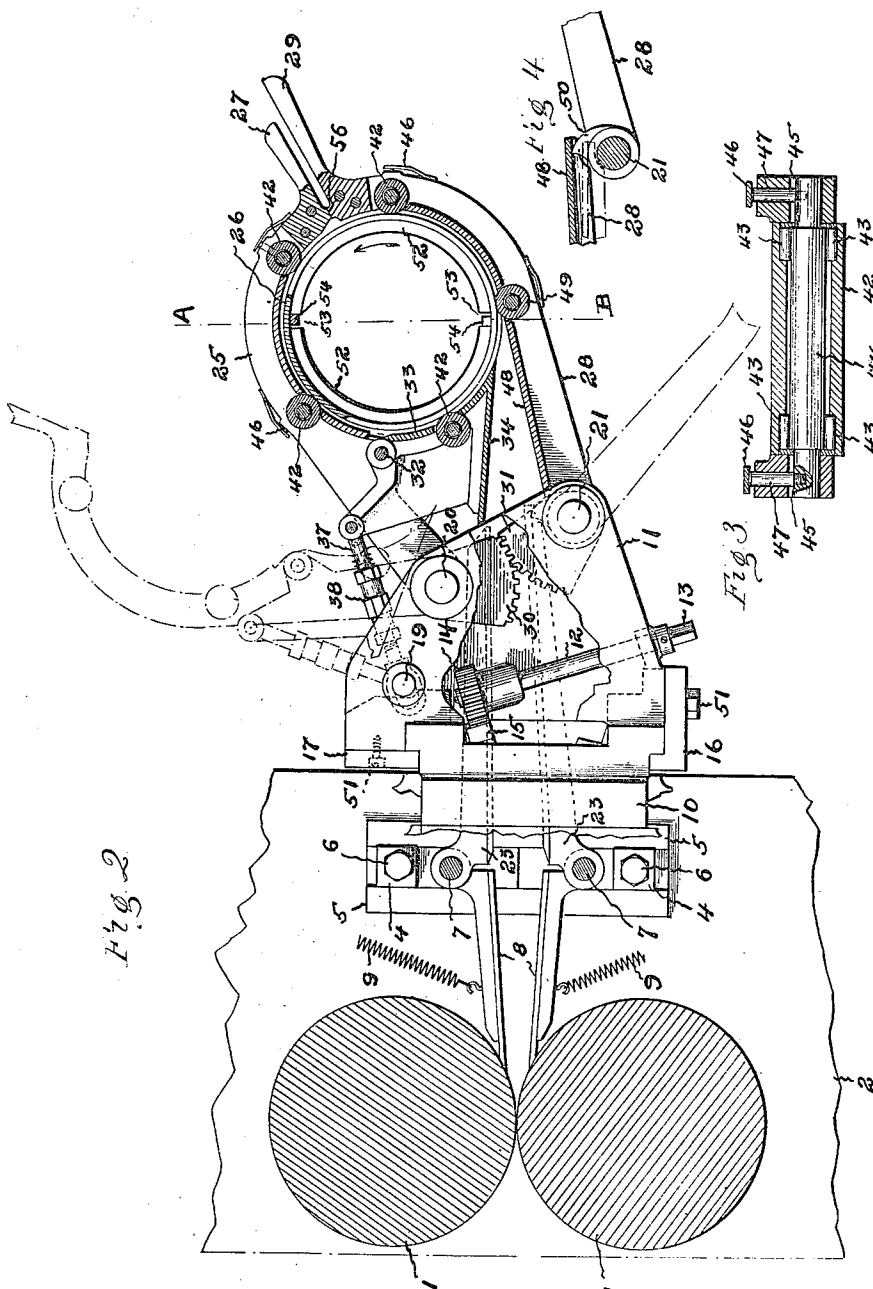
The oxidation of the sheets in the tunnel chamber takes up the oxygen of the heated atmospheric air therein and leaves the resultant nitrogen gas in the chamber; and in the event there is not sufficient supply of atmospheric air admitted and a corresponding displacement of the nitrogen gas by the temporary opening of the swinging shields at the end of the tunnel chamber to properly oxidize the sheets therein, additional atmospheric air is introduced into the chamber at such points and in such quantities as may be required through the lateral air ports in the sides of the furnace; the positive introduction of which atmospheric air under pressure serves to positively displace the nitrogen gas in the chamber, and thus replenishes and purifies the air within the chamber to

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1,141,771.

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3 SHEETS—SHEET 2.



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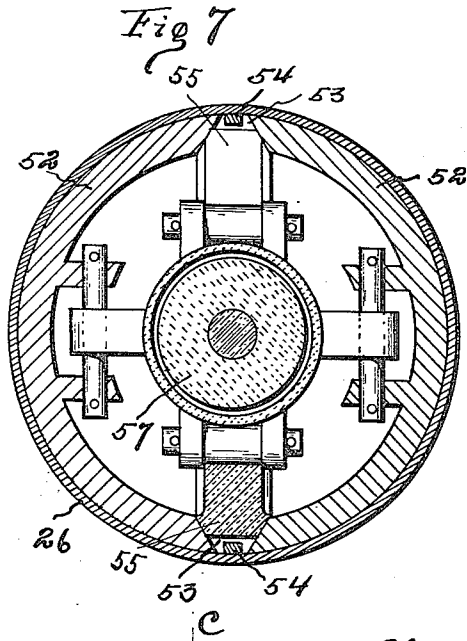
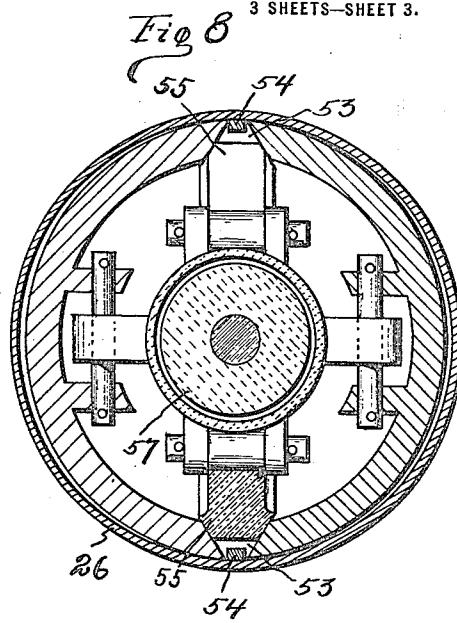
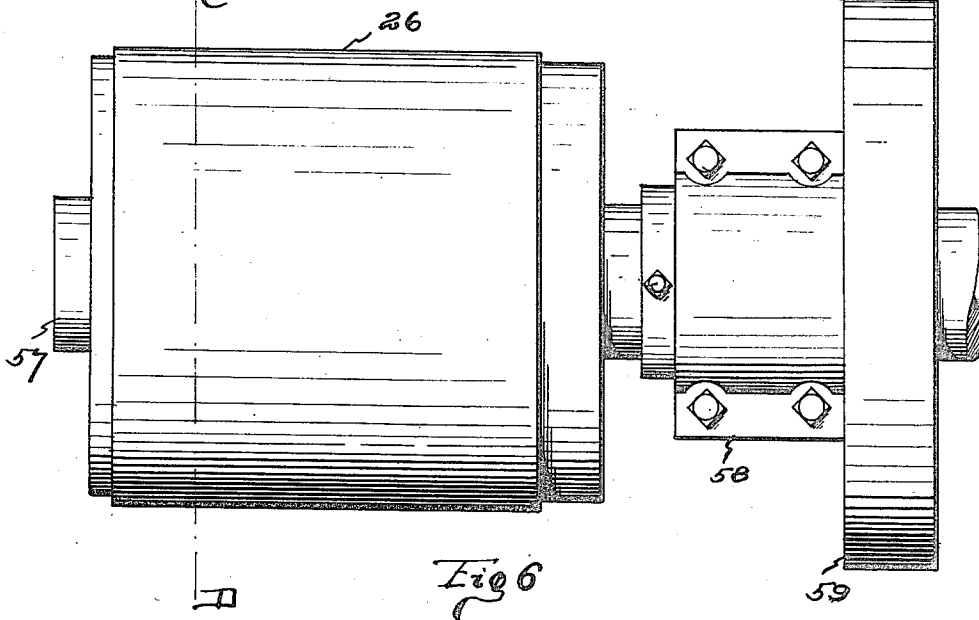
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UNITED STATES PATENT OFFICE.

WILLIAM H. CARPENTER, OF BRISTOL, CONNECTICUT.

SPOOLING DEVICE.

1,141,771.

Specification of Letters Patent.

Patented June 1, 1915.

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To all whom it may concern:

Be it known that I, WILLIAM H. CARPENTER, a citizen of the United States, residing at Bristol, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Spooling Devices, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to a new and improved spooling device, referring more particularly to means connected with a rolling mill, for winding a strip of metal around a spool or similar device, preferably, but not necessarily, mounted temporarily upon a collapsible winding mechanism.

It is the object of my invention, among other things, to provide a device of this character, wherein the metal strip may be coiled about a detachable sleeve or spool mounted upon a collapsible block; to engage the strip as close to the nip as is practically possible; to mount the device so that it may be moved substantially parallel with said rolls, whereby the space in front thereof may be quickly and easily cleared; and further, to so design all of the parts, that the device may be constructed at the minimum cost, may be readily and economically assembled, and will withstand very rough usage without derangement or injury.

To these, and other ends, my invention consists in the spooling device, having certain details of construction, and combinations of parts, as will be hereinafter described and more particularly pointed out in the claims.

Referring to the drawings, in which like numerals of reference designate like parts in the several figures, Figure 1 is a plan view of my improved device attached to a rolling mill, shown partly in section; Fig. 2 is a side elevation thereof, partly in section; Fig. 3 is an enlarged transverse sectional view of the arms and guide rolls; Fig. 4 is a fragmentary view of a portion of the circular arm and outer apron; Fig. 5 is a sectional view of the spool, taken upon line A—B of Fig. 2; Fig. 6 is a plan view of the spool, the collapsible block, and one form of supporting means for the latter; and Figs. 7 and 8 are sectional views of the spool and collapsible block, taken upon line C—D of

Fig. 6, the latter figure showing the block contracted and the former extended.

It is impossible to coil thin metal around a collapsible or separable block without a transverse ripple or wave being formed at the open space between the parts of the block. As this is objectionable, the metal is usually coiled about a solid block. In such cases it is customary to start the coil by hand, an extremely hazardous operation, resulting frequently in serious injury to the operator. After the coil is made it is difficult to satisfactorily remove it from the block without unnecessary delay and inconvenience. Many devices have been devised to overcome this, but none have been entirely satisfactory.

I have designed mechanism in my device that enables me to utilize all of the advantages of both the collapsible and solid blocks without the disadvantages of either and without hazard to the operator. This is accomplished by placing a metal spool over a collapsible block and winding the strip upon the spool, which is easily removed when loaded and an empty spool substituted, with little or no inconvenience and with the minimum expenditure of time and labor. After being removed from the machine loaded, the spool is preferably but not necessarily removed from the coil, before the same is unwound.

It is desirable in a spooling device that the influence of the coiling mechanism should be felt by the metal strip as close as possible to the nip, that is, the point where the end of the strip is bound by the second convolution of the strip at the completion of the first revolution thereof, and that it should perform its function by surrounding the spool as nearly like the human hands as possible, and should be moved out of operative position with substantially the same ease.

My device has all of the above and other desirable features, and is shown herein as applied to that general type of spooling mechanism, wherein the metal first contacts with the underside of the spool, as distinguished from the top side, that is, the over-block rather than the under-block type.

In the drawings, the numeral 1 designates the rolls, 2 the roll housings, and 3 an aux-

iliary housing, all of which are constructed in a manner well known in the art, and are therefore not herein shown in great detail.

The mechanism for guiding the metal from the rolls to the spooling device comprises the blocks 4 that are vertically movable in guideways 5 on the roll housings 2, and secured by means of the bolts or screws 6; shafts 7 journaled at each end in the blocks 4; the inner apron plates 8 that are pivotally mounted upon the shafts 7 with their inner ends held in engagement with the rolls 1 by the springs 9 that are secured to the said plates and a fixed part (not shown); and outer apron plates 23, also pivotally mounted upon the shaft 7 and extending outwardly. Supported at one end by the auxiliary housing 3 and one of the housings 2 at the other end, is the bracket plate 10, upon which the bracket 11 is laterally movable through a rotary shaft 12 mounted therein, having a squared head 13 at one end for the ready engagement of a crank handle (not shown), or similar device for turning the shaft and carrying a pinion 14 at its opposite end, which meshes into a rack 15 fixed to said bracket plate 10. A rotation of the shaft 12 moves the bracket 11 along the bracket plate 10 to any desired position, where it is secured by the clamp plates 16 and 17 that are separably secured to the bracket by screws or bolts 51.

Rotatably mounted in the bracket 11 and the standard 18, fixed to one of the housings 2, are the shafts 20 and 21, and fixed in said bracket is the shaft 19 that is supported at one end by said standard. The screws 22 are shown as a convenient means of securing the shaft 19 against rotation, but any other means may be used if desired. The upper of the outer aprons 23 is supported upon the shaft 19 by the arm 24 that is fixed to the apron and encircles the shaft. Fixed to the shaft 20 are the upper circular arms 25, which project upwardly and outwardly, and partly encircle the spool 26, being connected at their outer ends by a handle 27. Fixed to the shaft 21 are the lower circular arms 28, which project outwardly and upwardly, partly encircling the spool 26, and connected at their outer ends by a handle 29. Upon each of the shafts 20 and 21 are the sectors 30 and 31, the teeth of which mesh into each other, so that movement of one shaft insures a similar movement of the other shaft. Pivotaly mounted upon the pin 32 between the upper circular arms 25, is an auxiliary arm 33, having an extension apron 34 fixed to the underside thereof, which, in one position, fills the open space between the outer apron 23 and the spool 26, and terminates at its outer end adjacent to the lower arms 28. The limited open space between the end of the auxiliary apron 34 and the lower arms 28 prevents the metal from coiling up or

turning back upon itself without engaging the spool, and it also holds the end of the strip so tightly against the spool during its first coil that it insures the strip following the spool during the second coil instead of leaving it and buckling against the lower arms.

Encircling the shaft 19, and held against lateral movement thereon by the fixed collars 35, is the yoke 36, that is connected with the auxiliary arm 33 by the rod 37 and turn buckle 38, whereby their relative positions may be varied, and through which adjustment is imparted to the auxiliary arm 33. A spring 39 connects the rod 40 in the auxiliary arm 33, with a block 41 on the shaft 19, and exerts its tension so as to move said auxiliary arm upon the pin 32 toward the spool 26.

Mounted within the circular arms 25 and 28 and the auxiliary arm 33, are the rolls 42, that rotate upon the rolls 43 surrounding the shaft 44, the ends of which project through openings 45 in said arms of slightly larger diameter than said shaft. The shaft 44, and through it the rolls 42, are pressed inwardly by the springs 46 that bear against the pins 47 that project through the arms and are threaded, or otherwise secured, in the shafts 44 (see Fig. 3). The rolls yield sufficiently to permit several coils to be wound about the spool without affecting the relative position of the circular arms and can yield more at one end than the other, if necessary, so that the rolls are in contact with the coil, even though the block is drawn out of alinement by the pull thereon, a condition that commonly occurs.

I have not shown the collapsible block in its entirety, as the same does not constitute any part of my present invention, and any one of many forms of such blocks may be used. The form of block shown is of the Hawkins type and has two collapsible sections 52 that are held in an extended position by companion wedges 55 that enter the open spaces 53 between said sections. In Fig. 7 the sections are in their extended position with the outer faces thereof in contact with the inner face of the spool, and in Fig. 8 the sections are in their contracted position with the sections drawn inwardly and out of contact with said spool. The block is fixed on a shaft 57 that is journaled in a standard 58 and rotated by a pulley 59 or other convenient means. The ribs 54 within the spool 26 register with and enter the said open spaces 53 and hold the spool from rotation upon the collapsible block. When the spool 26 is in position for the coil, the circular arms are moved from the position shown by dotted lines in Fig. 2 to that shown by full lines in the same figure at which time the ends 56 of said arms abut against each other. This provides a fixed

stop, determining the relative position of the arms, spool and rolls. In the closed position of the arms there is no friction or weight on the spool except that of the yielding rolls. The metal passes between the rolls 1—1 and is guided by the aprons 8 and 23 onto the plate 48 fixed to the circular arms 28, and the end thereof contacts with the periphery of the spool 26 at substantially the same point as the roll 49 in the arm 28, which holds the metal against the periphery of said spool. The metal strip then travels with said spool upon the periphery thereof, passing successively the several rolls on the circular and auxiliary arms until the end thereof again comes opposite the roll 49, at which time the circular arms may be moved upon their pivot mountings away from the spool and the metal continues to be wound about the spool through the action of the winder. The arms are held manually in the position shown by full lines in Fig. 2 by grasping the handles 27 and 29, and after two or three turns of the metal about the spool, the same are opened manually, either by pushing downwardly upon the handle 29 or upwardly upon the handle 27, preferably the former, and the movement upon either one is transmitted to the other through the intermeshing sectors 30 and 31. During the movement of the arms 25 and 28 the auxiliary arm 33 moves upon its pivot mounting through the action of the spring 39 and the fork and turn buckle connection between the shaft 19 and pin 40. When the circular arms are opened the outer end of the lower outer apron 23 is lowered from its position, resting upon the cam 50 connected with the arms 28, as shown in Fig. 4 of the drawings, and contacts with the shaft 21.

I am aware that spools, cores and similar cylindrical bodies have been held by friction against rotation upon a collapsible device, but so far as I am at present advised, no one has heretofore produced a spool, core or similar cylindrical body that is held upon a collapsible device by an intermeshing engagement therebetween in addition to the frictional engagement. By the former method, as soon as the friction is released, the spool or core can rotate independently of the device upon which it is mounted, but with the latter, the friction may be imperfect or in fact entirely removed, yet there can be no relative movement of the spool or core upon the collapsible device until the intermeshing members are released from each other. And again, the power for rotating the spool or core is transmitted through the intermeshing parts irrespective of the frictional contact between the spool or core and the collapsible device.

There are minor changes and alterations that can be made in the details of my im-

proved device, aside from those herein suggested, and I would therefore have it understood, that I do not limit myself to the exact construction herein shown and described, but claim all that falls fairly within the spirit and scope of my invention.

Having described my invention; what I claim as new and desire to secure by Letters Patent, is:—

1. In combination with companion rolls; a non-removable collapsible block; a cylindrical spool having intermeshing engagement with said block, whereby the same may be placed on or taken off from said block; means for guiding a strip from said rolls to said spool; arms pivotally mounted between said rolls and block and arranged so that the ends thereof abut against each other when in their closed position; friction rolls within said arms substantially parallel with said spool; and means for yieldingly mounting said rolls, whereby the same will always maintain a substantial alinement with the axis of said collapsible block if the axis of said rotary collapsible block and arms are not in substantial alinement with each other.

2. In combination with companion rolls; a non-removable, collapsible block; a hollow, cylindrical spool, having an intermeshing engagement with said collapsible block, whereby it may be readily placed on or taken off from said block; means for guiding a strip from said rolls to said spool; companion shafts between said rolls and spool; an arm upon each of said shafts; an operative connection between said arms, whereby movement of one is transmitted to the other; an auxiliary arm pivoted to one of said arms and movable therewith; means for varying the relative position of said auxiliary arm with the arm to which it is connected; rolls mounted in said arms and auxiliary arm; and yielding means connected with the opposite ends of said rolls whereby one end thereof may yield a relatively greater distance than the opposite end thereof.

3. In combination with companion rolls and a rotary winding element; of means for guiding a strip of metal from said rolls to said winding element; means, movable toward and away from said winding element, for holding the strip against the periphery thereof; friction rolls mounted in said last mentioned means; and means at the opposite ends of said rolls that permit a relatively greater yielding action to said rolls at one end than at the other end.

4. In combination with companion rolls; a non-removable collapsible block; a cylindrical spool having intermeshing engagement with said block, whereby the same may be placed on or taken off from said block; means for guiding a strip from said rolls to said spool; arms pivotally mounted between

said rolls and block and arranged so as to be limited in their movement toward each other and hold a fixed relation toward each other when in their closed positions; friction rolls within said arms substantially parallel with said spool; and means for yieldingly mounting said rolls, whereby the same will always maintain a substantial alinement with the axis of said collapsible

block if the axis of said rotary collapsible 10 block and arms are not in substantial alinement with each other.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. CARPENTER.

Witnesses:

TESSA F. BUSKEY,
A. D. WILSON.