July 29, 1924. 1,503,128

H. H. LELAND ET AL

PROCESS AND APPARATUS FOR COATING CORSET STEELS

Filed April 17, 1922 4 Sheets-Sheet 1

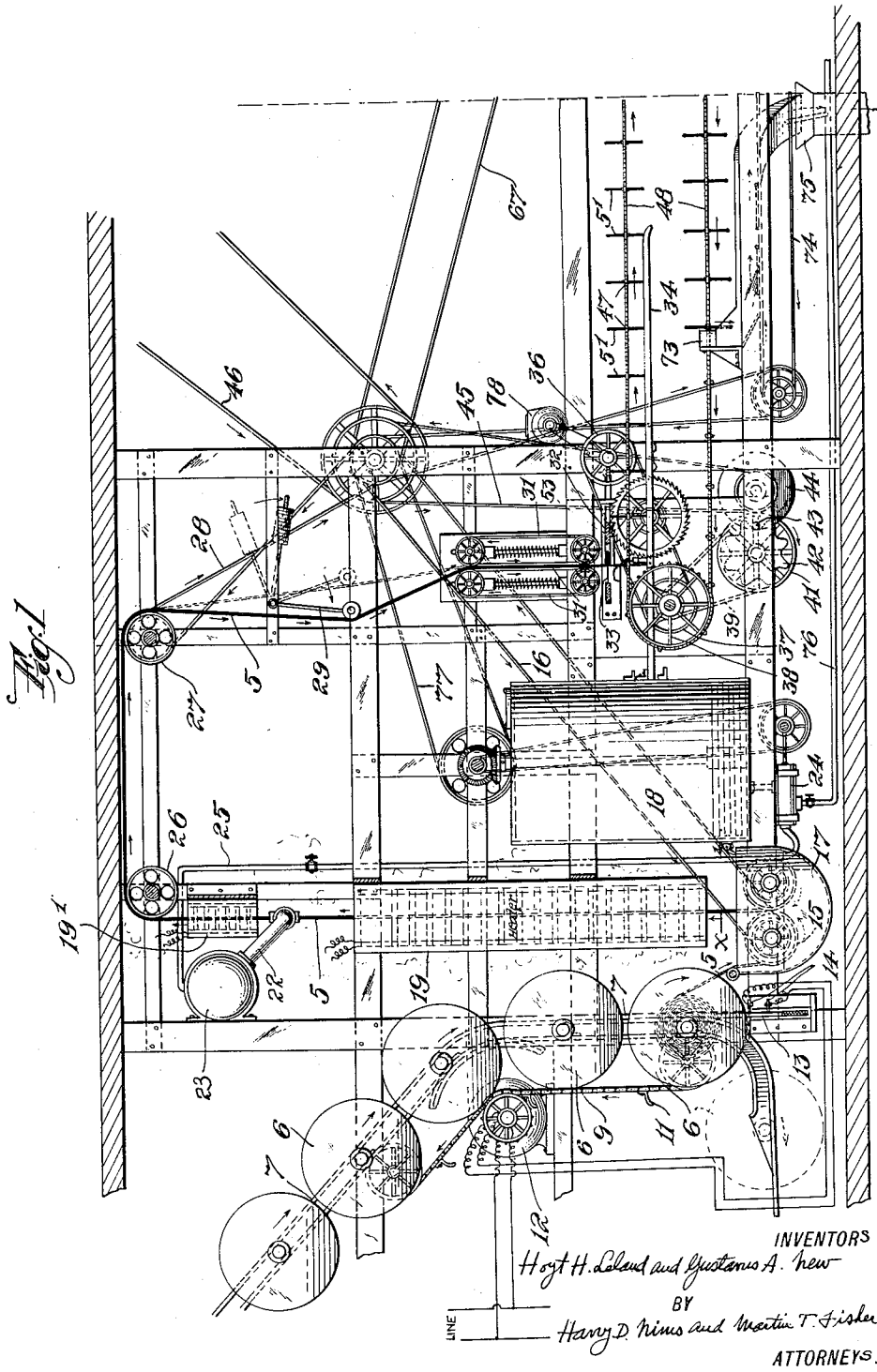


Fig. 1

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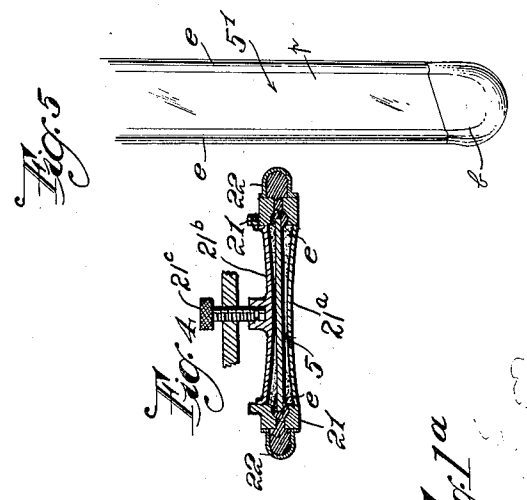


Fig. 5

Fig. 4

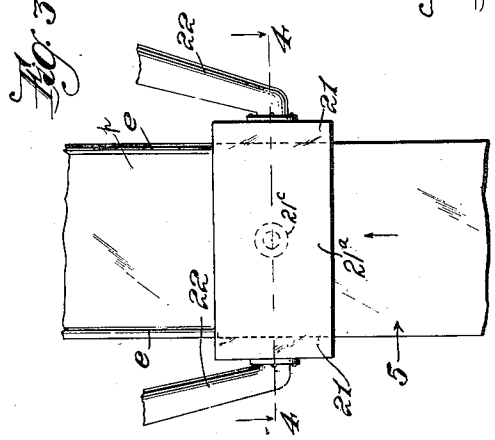


Fig. 3

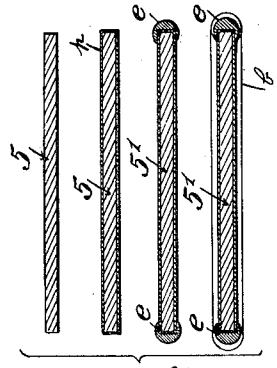


Fig. 2

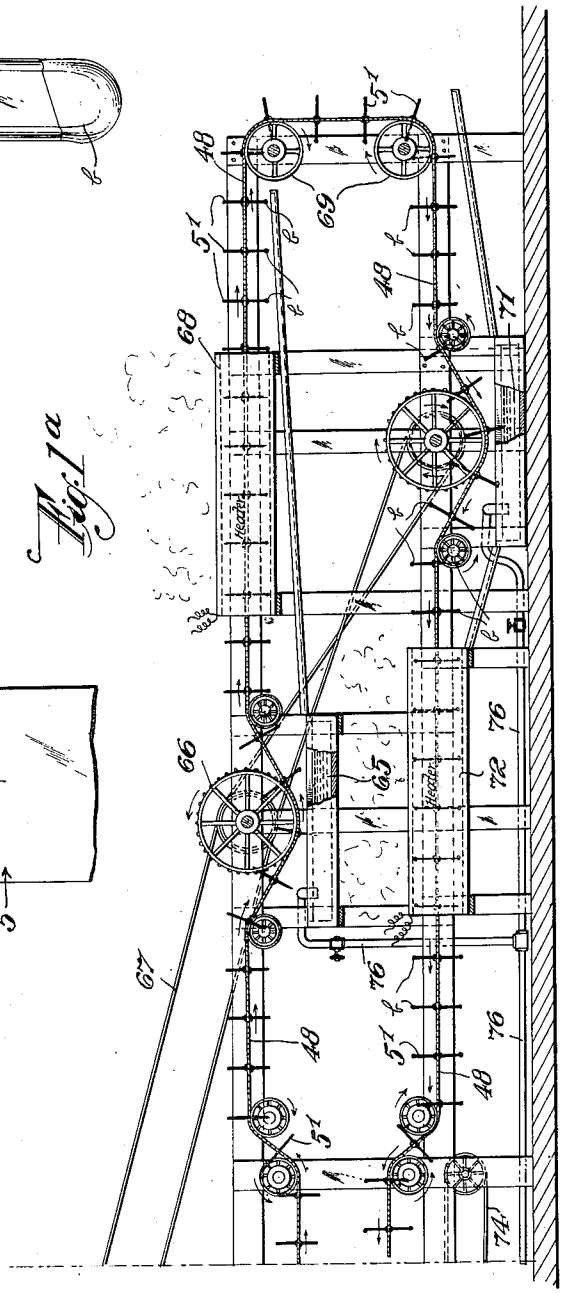


Fig. 1a

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Fig. 6

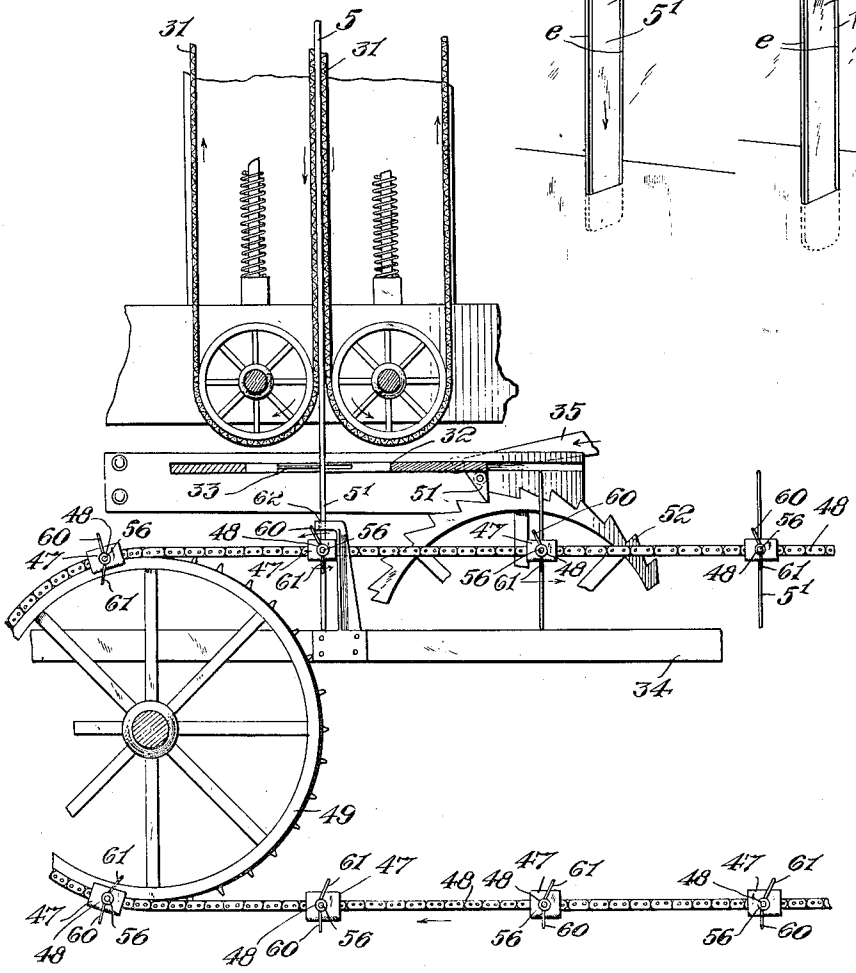
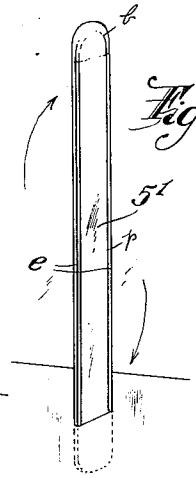


Fig. 7

Fig. 8



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PROCESS AND APPARATUS FOR COATING CORSET STEELS

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Fig. 9

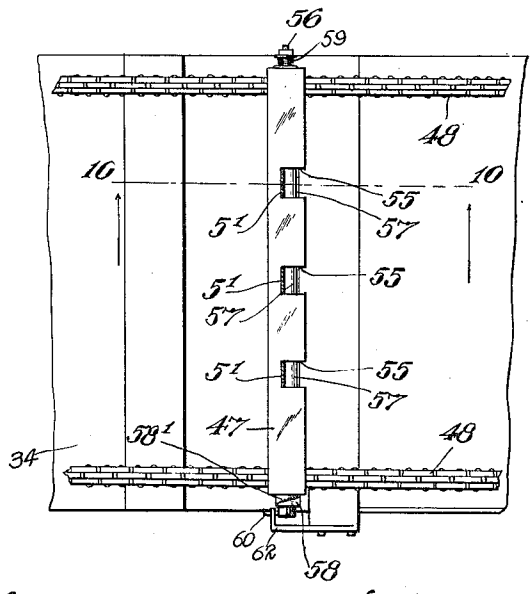


Fig. 10

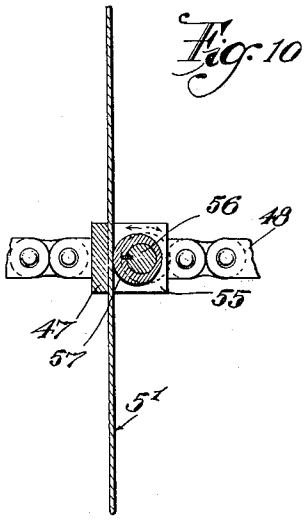


Fig. 11

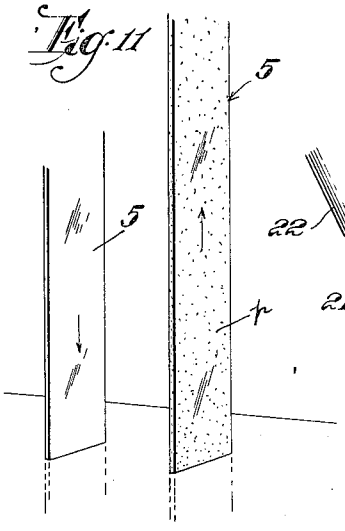


Fig. 12

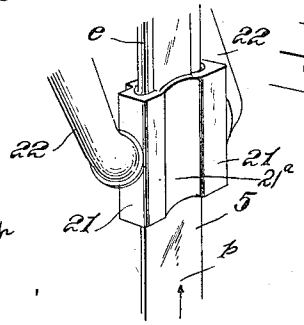
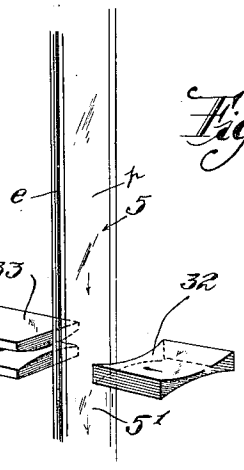


Fig. 13



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Patented July 29, 1924. 1,503,128

UNITED STATES PATENT OFFICE.

HOYT HARRISON LELAND, OF EAST ORANGE, NEW JERSEY, AND GUSTAVUS A. NEW, OF NEW YORK, N. Y., ASSIGNORS TO L. S. & N. CORPORATION, A CORPORATION OF NEW YORK.

PROCESS AND APPARATUS FOR COATING CORSET STEELS.

Application filed April 17, 1922. Serial No. 554,000.

To all whom it may concern:

Be it known that we, HOYT H. LELAND and GUSTAVUS A. NEW, both citizens of the United States, and residents, respectively, of East Orange, in the county of Essex and State of New Jersey, and New York city, in the county and State of New York, have invented new and useful Improvements in a Process and Apparatus for Coating Corset Steels, of which the following is a specification.

This invention is in a process and apparatus for making corset bones or corset steels from a continuous metallic ribbon, by coating, drying and cutting operations, and in the improved corset steel resulting therefrom.

A corset bone usually consists of a piece of spring steel; however, the edges and ends of the steel are liable to cut through the fabric of the corset, and the metal is liable to rusting from dampness and perspiration. Such steels have therefore been protected by enclosing them in a sheath of cloth or celluloid, and by capping the ends with a metal cap for rounding them off, for preventing such cutting through and such rusting.

The application of the cloth or celluloid sheath to a corset steel is a somewhat difficult operation; the sheath must be glued or cemented tightly in place, so that a smooth finish is had; even then, it is liable to crack and to work loose. In working with celluloid, it has to be warmed to overcome its normal brittleness, and there is always danger of fire when using such a highly combustible material. Where cloth is used, there is little protection afforded against dampness and perspiration.

The essence of this invention is in coating a corset steel with a liquid coating material instead of cloth or celluloid, a process which gives a highly satisfactory product at much less expense than the prior methods. The coating composition that it is preferred to use has as a base India kauri gum and China wood oil, as fully set forth in the application of Gustavus A. New, filed April 15, 1922, Serial No. 553,110. This coating material is strongly adherent to the metal; it is waterproof and acidproof, so that it is not affected by dampness or perspiration; it is also fireproof, so that there is no danger of fire in making the article or in handling the finished product. It is flexible, and conforms to bending of the metal without cracking.

The use of a liquid coating very much simplifies the manipulative steps involved in making a corset steel. A long metallic strip is run continuously through a bath of the coating material which adheres readily; the wet coated strip then passes into an oven, preferably electrically heated, where it is dried. This gives a primary coating over the metallic strip. In order to round off the edges of the strip, an additional or "edging" coat of the coating material is applied. The coating here used is slightly more viscous than that in the primary coating bath, and is of sufficient viscosity to give a well-rounded edge. The strip may be run through another heater to dry this coat. As a slight variation of the above, the edging coating may be applied to the strip before the drying of the primary coating. In this case, the two coatings are dried simultaneously.

The coated strip, with its rounded edges, now goes to a cutting device, which cuts the strip into appropriate lengths for corset steels. To round off the cut ends, the pieces are gripped by an endless carrier, one end of each piece is dipped into a bath of coating material, the pieces are turned over and the other end of each piece is dipped into another bath. The coating material here used is sufficiently viscous so that a substantial amount of it will adhere to the end of the steel strip to form a rounded "bud." After each dipping operation, the strips may be run through a heater for drying the buds on the ends of the steels.

While the corset bone is preferably made of spring steel, other materials might be used; and while the process and apparatus are described in connection with making corset bones or corset steels, it should be understood that the invention is not necessarily limited to this particular product, but may be used for producing other coated articles

One embodiment of an apparatus for carrying out the invention is shown in the accompanying drawings. This apparatus is purely illustrative, and it should be understood that the several process steps may be carried out in apparatus other than is here shown.

Referring now to these drawings,

Fig. 1 is a side view of part of the apparatus; Fig. 1ª is a continuation to the right of Fig. 1; Fig. 2 shows sectional views through the corset steel at successive stages of the coating operation; Fig. 3 is an enlarged side view of the edging device; Fig. 4 is a section on the line 4—4 of Fig. 3; Fig. 5 is a perspective view of one end of the finished steel; Fig. 6 is an enlarged view, partly in section, of the cutting mechanism and associated parts; Figs. 7 and 8 are perspective views illustrating the end dipping operation; Fig. 9 is a plan view, enlarged, of the carrier for the cut strip; Fig. 10 is a section on the line 10—10 of Fig. 9; Figs. 11, 12 and 13 are perspective views illustrating the primary coating operation, the edge coating operation and the cutting operation respectively.

Referring now to these drawings, in which similar reference characters are used to indicate similar parts, the strip of material, which in this case is a ribbon of spring steel about half an inch wide, is indicated at 5; this strip is carried on a reel 6, rotatably mounted in a vertically extending guideway 7. A number of similar reels are carried in the guideway 7, their progress down such guideway being controlled by a chain 9, provided with shoulders 11 for engaging with the several reels. The operation of the chain is controlled by the motor 12, which in turn is controlled by the spring pressed arm 13 bearing against the steel ribbon and which moves upwardly, under the influence of its spring, as the ribbon is unwound; when the reel is substantially empty, this arm closes the circuit through the motor at the contacts 14, thereby throwing the motor in operation and causing it to eject the empty reel and to move a full one to proper position.

The strip 5 is guided through a tank 17 containing a liquid coating composition, preferably of the character described in the above-mentioned application of Gustavus A. New, the basis of this composition being India kauri gum and China wood oil. The strip is guided and drawn through the tank 17 by the rollers 15 therein, which are driven from the power belt 16.

After strip 5 has thus been given its primary coating, it passes vertically upward into a heater or dryer 19, passing slowly and continuously through this heater at a rate such that it will be properly dried. When using a coating composition of the character described in the above-mentioned application, the length of this heater should be about twelve feet and the temperature about 450° Fahrenheit. Such figures of course vary with operating conditions.

Referring for the moment to Fig. 2, the primary coating applied to the strip as just described is indicated at *p*. It will be noted that the corners of the strip are somewhat sharp and in order to round them off, the edging coating shown at *e*, Fig. 2, is applied by the edging device 21 shown in Figs. 1, 3 and 4. This edging device comprises front and back plates 21ª and 21ᵇ, respectively, which each present a convex face toward the strip 5. Both these plates are more or less flexible and one, 21ᵇ, is adjustable toward and away from the strip 5 by a thumb screw 21ᶜ. These two plates squeeze and guide the coating composition toward the edges of the strip 5 and aid in giving a well-rounded edge. A coating composition of preferably the same character as that in the tank 17 is used for the edging coating. This coating material is applied to the edging device through inclined hollow arms 22 leading from the tank 23. The coating composition here used is of sufficient viscosity so as to form a well rounded edge as shown at *e*, Fig. 2. The coating composition may be supplied to the tank 23 by the pump 24 and pipe 25.

After the strip is thus edged as described, it may be run through another heater 19′ for drying the edging coating.

The edging coating has just been described as being applied to the steel strip after the primary coating has been applied and dried. However, it is equally feasible to apply the edging coating to the steel strip just after it comes out of the tank 17 and before it passes to the heater 19; that is to say the edging coating may be applied to the strip at the point marked X; in this case both the primary coating and edging coating will be dried at the same time in the dryer 19.

The strip 5 is now guided over rollers 26 and 27, the latter of which is power driven by the belt 28. The strip is led past a slack-take-up device 29 and then is led between the downwardly running sides of a pair of endless belts 31, shown in more detail in Fig. 6. These belts are intermittently driven as will be described below.

The automatically operated cutting device will now be described. Such cutting device comprises a pair of cutting elements 32 and 33, Fig. 13, so designed as to leave a rounded end, as more particularly shown in Figure 7.

The belts 31 feed the strip 5 down between the cutting elements, until the lower end of the strip 5 contacts against the table 34. The cutting elements are then operated

to cut off a strip 5′ of the proper length for a corset steel.

One of the knives, such as 33, is fixed, while the other, 32, is pivoted to an arm 35 connected to a spoke of the wheel 36, which is driven by a pulley from a sheave 37 on the wheel 38. The wheel 38 is in turn driven by belt 39 from a wheel 41, which is provided with a star-shaped gear 42, in turn driven by pin 43 on a wheel 44, which is driven by belt 45 from the power belt 46. The use of the pin 43 and star-shaped gear 42 gives an intermittent drive.

After the strip 5 is fed downwardly by the belts 31 onto the table 34, the strip passes into engagement with a carrier bar 47, which is transversely mounted on a pair of carrier chains 48 turning on sprocket wheels one of which is indicated at 49. The carrier bar shown at Fig. 9 is intended to carry three of the cut strips 5′ and of course it could be arranged to carry any reasonable number. If more than one strip 5 is being treated the elements of the machine thus far described will be duplicated as necessary, so that three strips 5, provided with their respective primary and edging coatings, will be delivered to the carrier bar 47.

After one or more of the strips 5′ have been cut, the sprocket wheel 49 is moved forward a short distance sufficient to carry away the cut strips and to bring a new carrier bar 47 in position to receive additional strips 5′. This intermittent forward feed is effected by the intermittently operated gear 42.

After one or more strips 5′ are cut off, the knife 32 moves to the right and in so doing a gravity operated pawl 51 thereon engages with a ratchet wheel 52 to move it clockwise a short distance, thereby moving the belt 53 which is connected up to drive the feed belts 31. This will feed a fresh section of the strip 5 down onto the table 34.

Each carrier bar 47, of which there are a number, is provided with one or more slots 55, each slightly wider than strip 5; running lengthwise of the bar 47, through the slots, is a rod 56, on which are keyed a number of eccentrics 57, one eccentric in each slot, as shown in Fig. 10. The rod 56 has a cam 58 on one end, which cam rides on a second cam 58′ fixed on bar 47; the contacting faces of the two cams are roughened, so that they tend to hold any position in which they are set. A spring 59 bearing against a washer held on the rod 56 keeps the roughened faces of the cams constantly in contact. On the end of the rod 56 are fingers 60 and 61 for turning the rod 56 so that the eccentrics 57 are in gripping or releasing position. Turning the fingers 60 and 61 counter-clockwise causes the strips 5′ to be gripped; the roughened faces of the cams holds the eccentrics in gripping position. Turning the fingers in the opposite direction releases the strips.

Referring to Fig. 6, just after the piece 5′ is cut off and the chain 48 moves to the right, the locking finger 60 engages against a lug 62 which turns the rod and eccentrics to gripping position.

With the strips in the carrier bars 47, the chain, guided by suitably guide wheels, carries the strips 5′, in vertical positions, to a coating bath 65. The chain 48, adjacent bath 65, passes over a sprocket 66 so that the lower ends of the strips 5′ are dipped into coating bath 65, thereby forming on the dipped ends a rounded portion or "bud". The sprocket 66 may be power driven by the belt 67.

Strip 5′ with one end dipped, now passes through a heater or dryer 68 for drying the dipped ends.

Carrier 48 now reverses its direction of travel by passing over the rollers 69 and so reverses the strips 5′. The other ends of the strip 5′ are now dipped into another bath 71 and are dried in another heater 72, thus completing the coating and dipping operations.

The finished strips are carried along until the locking finger 61 engages with a lug 73 which causes it and rod 56 to turn clockwise to release the finished strips, which fall onto an endless belt 74, and which are carried thereby to a delivery chute 75.

The coating material in baths 65 and 71 is of sufficient viscosity to give a well rounded bud on the end of the strip. In case the same coating material is used in the baths 65 and 71, such coating material may be supplied from tank 18 by the pipes 76. The coating material in the tank 18 should be kept well stirred by any suitable power operated means, driven by the belt 77.

Instead of applying the liquid coating composition in the manner described, it might be applied by spraying, particularly as concerns the application of the primary coating.

In order to count the number of articles made, a counting device 78 may be connected up to the knife-operating wheel 36.

The operation of the machine may be briefly summarized: The strip is supplied with its primary coating and its edging coating, and dried. It is then fed down, between the cutters, through the carrier bar and onto the table 34. One of the cutters moves to the left and cuts off a piece of proper length. Sprocket 49 now moves the upper stretch of the carrier chains 48 to the right, whereupon lug 62 engages with the locking finger 60 to lock the cut strip in place. The carrier continues moving, bringing an empty carrier bar into position for receiving strip 5; by the time such carrier bar is in position, the backward move-

ment of knife 33 has moved wheel 52, causing a fresh section of strip 5 to be fed downwardly onto table 34. The carrier chains 48 move slowly and intermittently, dipping first one end and then the other of the strips 5'. The strips are released from the carrier bar by the lug contacting with the locking finger.

While this invention has been described with particular relation to the manufacture of corset steels, it should be understood that it is not limited to that particular article, but may be used in other relations; that it is not limited to the use of the particular coating composition which has been described as the preferred composition to use; that the mechanical details of the machine are purely illustrative, and that accordingly the invention is not limited to such details, but is capable of broader interpretation as expressed within the scope of the appended claims.

We claim as our invention:

1. The process of coating strip material with a liquid coating composition comprising applying a primary coating to the strip of material, drying the primary coating, then applying an edging to the strip of material.

2. The process of coating strip material with a liquid coating composition comprising applying a primary coating to the strip of material, heating the strip for drying and hardening the primary coating, then applying an edging to the strip of material.

3. The process of coating strip material with a liquid coating composition comprising applying a primary coating to the strip of material, heating the strip for drying and hardening the primary coating, then applying an edging to the strip and heating again for drying and hardening the edging.

4. The process of coating strip material, comprising running the strip through a coating bath, edging the strip with a coating material for rounding off the edges, cutting the strip into appropriate lengths, and dipping the ends of the strip into a coating bath for rounding them off, the coating treatments being followed by heat treatments for drying the coatings as applied to the strip.

5. An apparatus for coating strip material, comprising a coating bath, a device for applying a coating to the edge of the strip, heating means, and means for guiding the strip material through the bath, the edging device and the heating means.

6. An apparatus for making corset bones or similar articles, comprising means for coating a strip of material with a liquid coating composition, means for cutting the material into appropriate lengths and means for dipping the ends of the cut lengths into a coating bath for rounding off such ends.

7. An apparatus for making corset bones or similar articles, comprising means for coating a continuous strip of material, means for cutting the coated strip into appropriate lengths, and an endless carrier for receiving the lengths so cut and for dipping each end of such lengths into a bath of coating material.

8. An apparatus for making corset bones or similar articles, comprising means for coating a continuous strip of material, means for cutting the strip into appropriate lengths, an endless carrier, two coating baths arranged adjacent to the carrier, the carrier serving to receive a cut piece, to dip one end thereof into one bath, to turn it over, and to dip the other end thereof into the other bath.

9. An apparatus for making corset bones or similar articles, comprising means for coating a continuous strip of material means for supplying additional coating material to the edges of the strip for rounding off such edges, means for cutting the coated and edged strip into appropriate lengths, and an endless carrier for dipping both ends of the cut lengths into a bath of coating material, for rounding off such ends.

10. An apparatus for coating corset bones or similar articles, comprising coating means, a heater, means for leading a strip of material continuously through the coating means and the heater, means for cutting the strip into appropriate lengths, means for dipping both ends of the cut lengths into a coating bath for rounding them off, and heating means for drying the ends so dipped.

11. An apparatus for making corset bones or similar articles, comprising means for coating a continuous strip, automatically operated means for cutting the strip into appropriate lengths, and an endless carrier for receiving the cut pieces and for dipping both ends of such pieces into a coating bath.

12. An apparatus for making corset bones or similar articles, comprising means for continuously coating a strip of material, means for cutting the coated strip into appropriate lengths, carrying means including an endless carrier, and automatically operated gripping devices on the endless carrier for receiving the cut lengths, said carrying means serving to dip both ends of the cut lengths into a bath, and to release them after the ends have been thus dipped.

13. An apparatus for making corset bones or similar articles, comprising means for coating a metallic strip, means for applying an additional coating to the edge of the strip for rounding the edges thereof, means for drying the strip, an endless carrier, means for cutting the strip into proper lengths and delivering them to the carrier, two baths of coating material, adjacent to the carrier, the carrier serving to dip one

end of each piece of strip into one bath, to turn it over and to dip the other end into the other bath.

14. An apparatus for coating a strip of material comprising means for applying a primary coating to the strip of material, means for applying an edging coating to the strip of material, a dryer, and means for progressing the strip of material continuously through both said means and the dryer.

15. An apparatus for coating a strip of material comprising means for applying a primary coating to the strip of material, means for applying an edging to the strip of material, a dryer arranged between the first and second named means, and means for progressing the strip of material successively through the first means, the dryer, and the second means.

16. In a machine of the character described, the combination of means for applying a primary coating to a strip of material, means for cutting the strip into appropriate lengths, and means for applying a protecting bud to the ends of the pieces thus cut.

17. In a machine of the character described, the combination of means for applying a primary coating to a strip of material, means for cutting the strip into appropriate lengths, and means for dipping the cut ends of the shorter lengths into a bath for forming a protecting bud thereon.

18. In a machine of the character described, the combination of means for applying a primary coating to a strip of material, means for applying an edging to the strip of material, means for cutting the strip into appropriate lengths, and means for applying a protecting bud to the ends of the pieces thus cut.

19. In a machine of the character described, the combination of means for applying a primary coating to a strip of material, means for applying an edging to the strip of material, means for cutting the strip into appropriate lengths, and means for dipping the cut ends of the shorter lengths into a bath for forming a protecting bud thereon.

20. In a machine of the character described, the combination of a bath containing a liquid coating composition, means for continuously running a strip of material through the bath for applying a primary coating thereto, means for cutting the strip into short lengths, and means for forming a protecting bud on the ends of said short lengths.

21. In a machine of the character described, the combination of a bath containing a liquid coating composition, means for continuously running a strip of material through the bath for applying a primary coating thereto, means for drying and hardening the primary coating, means for cutting the strip into short lengths, and means for forming a protecting bud on the ends of said short lengths.

22. In a machine of the character described, the combination of a means for continuously applying a primary coating to a strip of material, means for thereafter and continuously applying an edging to the strip, means for cutting the strip into short lengths, and dipping means for forming protecting buds on the ends of the cut lengths.

23. In a machine of the character described, the combination of means for continuously applying a primary coating to a strip of material, means for thereafter and continuously applying an edging to the strip, means for drying and hardening the primary coating and the edging means for cutting the strip into short lengths, and dipping means for forming protecting buds on the ends of the cut lengths.

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