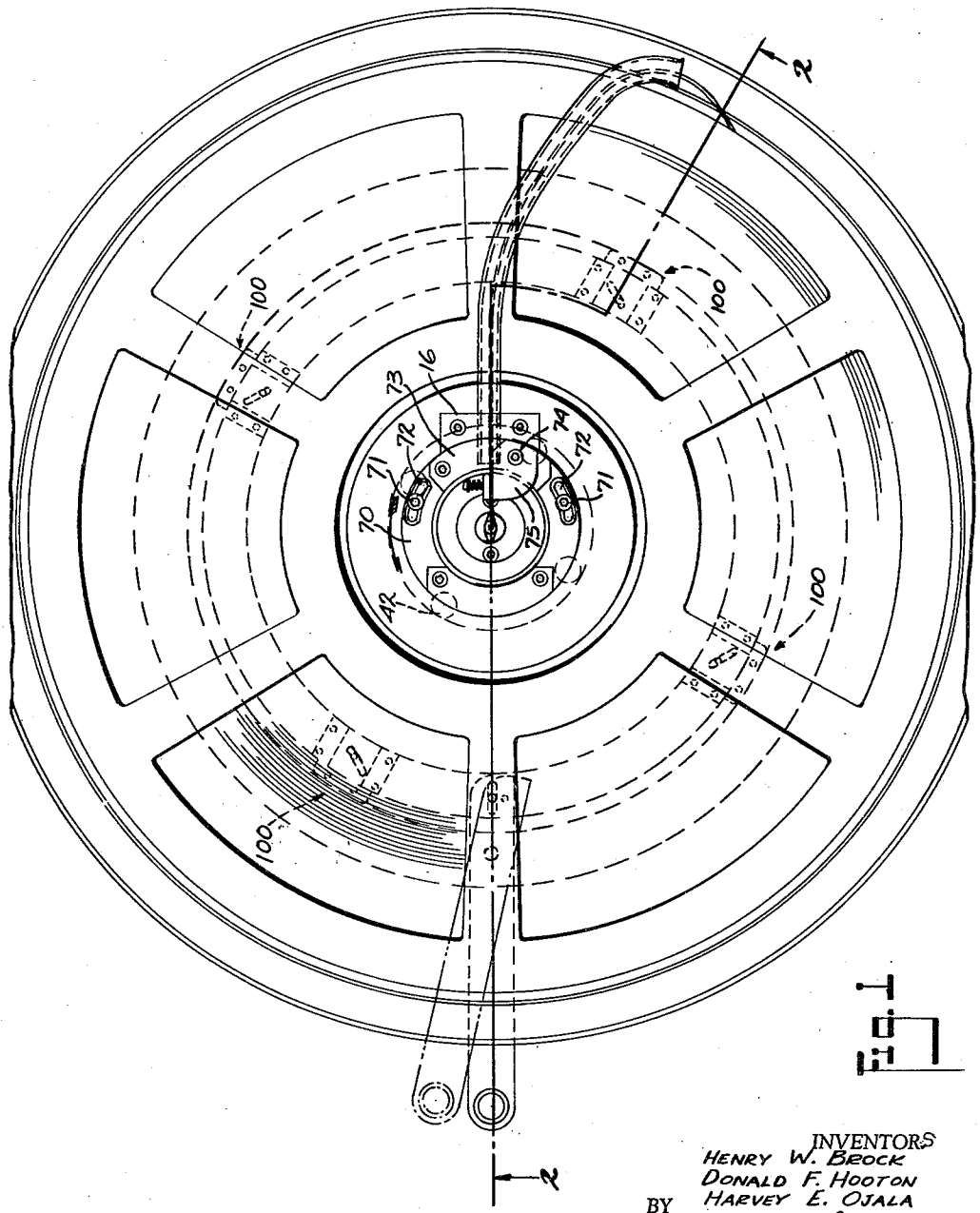
Sept. 11, 1962 H. W. BROCK ETAL 3,053,306

APPARATUS FOR MAKING STRIP STRUCTURES

Filed May 19, 1960 4 Sheets-Sheet 1



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APPARATUS FOR MAKING STRIP STRUCTURES

Filed May 19, 1960 4 Sheets-Sheet 2

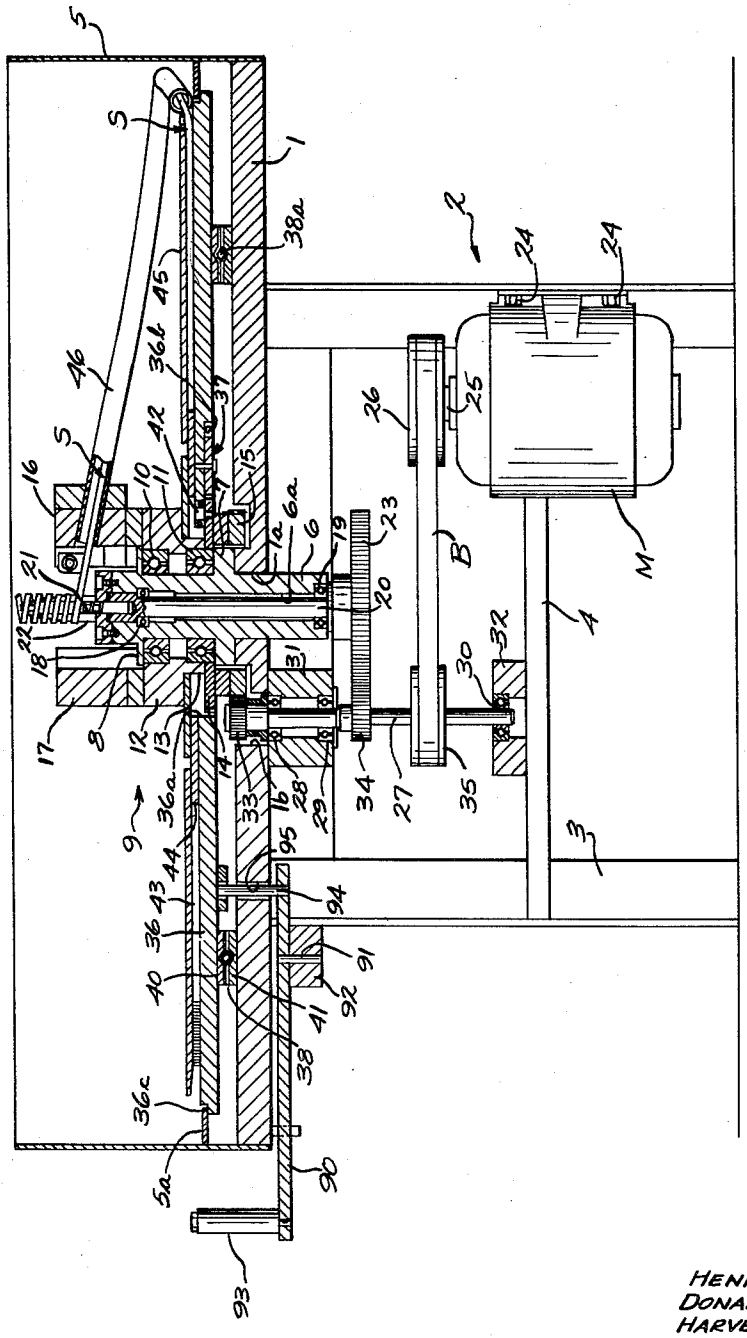


Fig. 2

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APPARATUS FOR MAKING STRIP STRUCTURES

Filed May 19, 1960 4 Sheets-Sheet 3

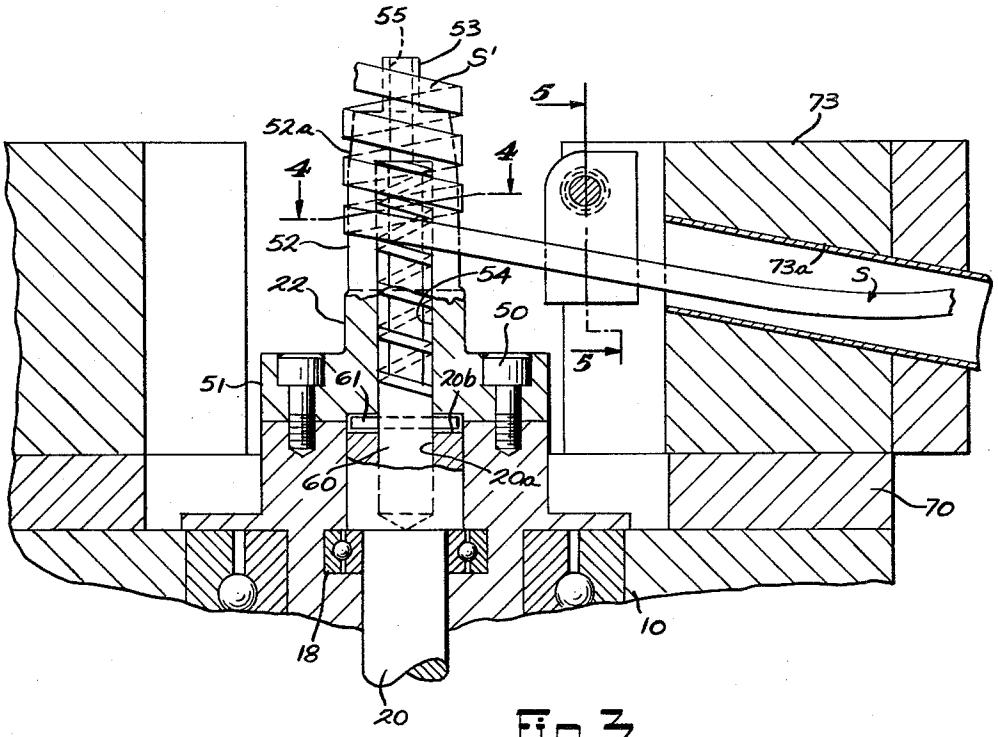


Fig. 3

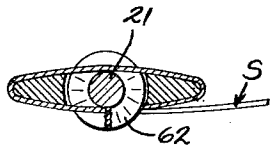


Fig. 4

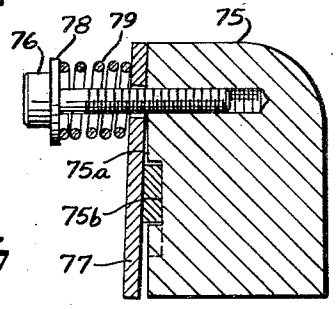


Fig. 5

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APPARATUS FOR MAKING STRIP STRUCTURES

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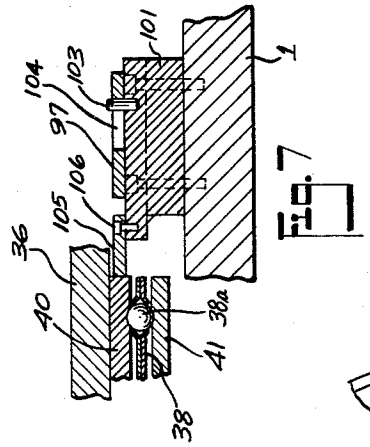


Fig. 7

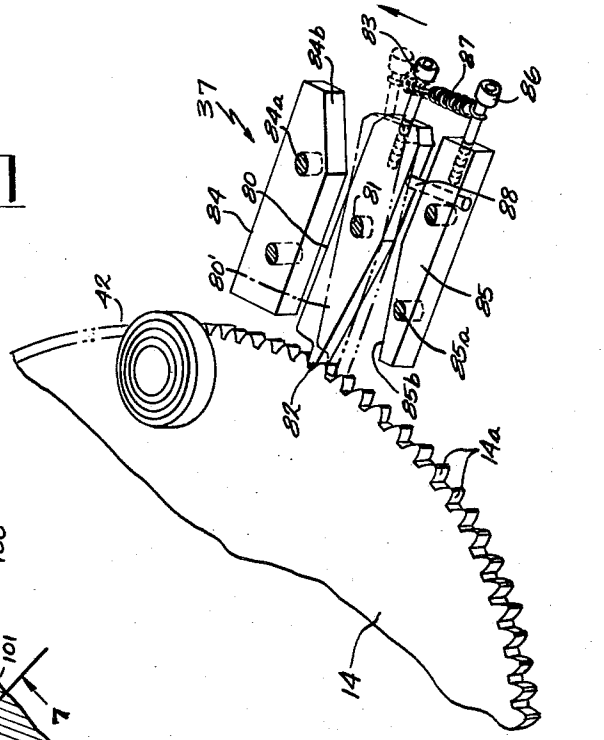


Fig. 8

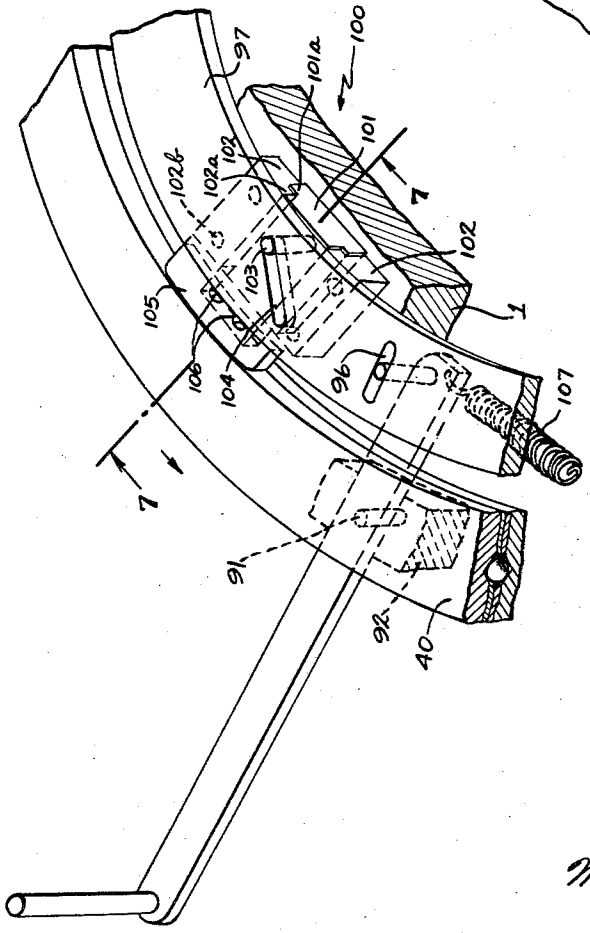


Fig. 6

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3,053,306

APPARATUS FOR MAKING STRIP STRUCTURES

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Filed May 19, 1960, Ser. No. 30,295
10 Claims. (Cl. 153—64)

This invention relates to apparatus for making a strip structure, and more particularly to apparatus especially designed to helically wind a flat metal strip, wire, or similar malleable strip material into a continuous strip structure having longitudinally interspaced coils preferably of elliptical shape. One such use for a strip structure formed by the apparatus of this invention is as the flexible core of a sealing strip, trim strip, window channel, and the like used in the weather stripping of automobiles. When so used, said helical strip structure is preferably flattened by any suitable means not to be considered a part of the apparatus of the present invention, and thereafter transversely bent or otherwise folded into any desired shape, and then utilized to anchor weather-stripping material thereto. In this manner, the completed weather stripping assembly may partake of various shapes while yet being sufficiently flexible to enable the same to readily accommodate a plurality of configurations of body openings in said automobile.

It is therefore an object of this invention to provide apparatus for making a helical strip structure wherein strip material is fed continuously upon a mandrel so as to be wound into uniformly interspaced coils of elliptical shape.

Another object of this invention is to provide apparatus for making a strip structure and which includes means automatically conveying the helical strip structure from the mandrel during the coiling operation.

A still further object of this invention is to provide apparatus for making a strip structure and wherein a reel of strip material, while being wound upon the aforesaid mandrel, is provided with means allowing for automatic changes in the rate of unwinding of said strip material commensurate with the diminishing size of the reel.

Yet another object of this invention is to provide apparatus as above referred, having all of the above features and which is easy to manufacture and maintain, has few moving parts, and is highly durable in use.

Further objects of this invention and the invention itself will become readily apparent from the following specification and the accompanying drawings, in which said drawings:

FIG. 1 is a top plan view of apparatus embodying the concepts of this invention;

FIG. 2 is a section taken along the line 2—2 of FIG. 1;

FIG. 3 is an enlarged detail section of the mandrel and winding head as shown in FIG. 2;

FIG. 4 is a section taken along the line 4—4 of FIG. 3;

FIG. 5 is a section taken along the line 5—5 of FIG. 3;

FIG. 6 is a perspective view of a braking device associated with the machine;

FIG. 7 is a section taken along the line 7—7 of FIG. 6; and

FIG. 8 is a perspective view of an escapement device associated with the machine.

The embodiment of apparatus of this invention, as herein illustrated and described, comprises generally, a fixed or stationary mandrel projecting centrally upwardly above a revolvable table upon which is supported a reel of stripped metal, wire, or the like. A winding head is mounted to rotate about the mandrel, and a worm conveyor is mounted within the stationary mandrel. In operation the winding head and the worm conveyor are rotatably driven at the same speed, and the table upon which the reel of strip material is positioned is rotated at a speed not less than that of the worm conveyor and the winding head. As the machine rotates, the strip material unwinds from the reel, is fed onto the stationary mandrel by means of the winding head, and is removed upwardly from said mandrel by the rotating worm conveyor. An important feature of the present machine relates to the means utilized whereby the rotatable table is able to selectively rotate faster than either the winding head or the worm conveyor and hence commensurate with the rate at which the strip material is being unwound from the reel.

Referring now to the drawings in all of which like parts are designated by like reference characters and particularly to FIG. 2, at 1 there is shown a stationary base supported by a suitable frame 2. The frame 2 comprises a plurality of vertical legs 3 and a horizontally disposed cross member 4 secured in any suitable manner to said legs. The base 1 is preferably circular in shape and is provided with a circumferentially continuous, vertically upstanding safety shield 5.

The base 1 is centrally apertured at 1A to receive a vertically upstanding spindle 6 which is rigidly mounted to the base 1. The spindle 6 projects downwardly below the base 1 a substantial distance and is longitudinally centrally bored as indicated at 6*a*. Said spindle is also provided with a pair of annular flanges 7 and 8 disposed preferably in longitudinal spaced relation therealong. The spindle 6 is disposed within the aforesaid bore 6*a* so that the lowermost flange 7 rests upon the top surface of the base 1, the flange 8 being thus spaced upwardly therefrom a suitable distance, as may best be seen in FIG. 2.

The spindle 6 rotatably supports a winding head assembly generally indicated at 9 upon bearings 10 and 11 carried on said spindle and positioned immediately below and above the flanges 8 and 7, respectively. The winding head assembly 9 is seen to include a supporting sleeve 12 mounted on the aforesaid bearings and thus rotatable therewith, said sleeve being likewise diametrically reduced at its lower end as indicated at 13 adjacent the lower bearing 11. A ratchet gear 14 is concentrically secured to the lowermost edge of the sleeve 12 adjacent said reduced portion 13. Spaced downwardly from the ratchet gear 14 and mounted unitarily with the winding head assembly 9 there is provided a second, diametrically slightly smaller gear 15.

The uppermost surface of the supporting sleeve 12 provides mounting means for a tension guide 16. A counterweight 17 is mounted upon said sleeve diametrically opposite the tension guide 16 whereby the winding head assembly 9 is maintained in perfect rotational balance. From the foregoing it will be understood, therefore, that the winding head assembly 9 comprises the tension guide and counterweight 16—17, the supporting sleeve 12, and the gears 14—15, all of which are adapted to unitarily rotate upon the bearings 10 and 11 of the spindle 6.

The longitudinal bore 6*a* of the spindle 6 is provided with upper and lower internal bearings 18 and 19, respectively, for rotatively supporting a conveyor drive shaft 20. The uppermost end of the conveyor shaft 20 provides mounting means for an upwardly projecting, worm conveyor 21 which extends upwardly within a fixed hollow mandrel 22. The mandrel 22 is secured to the uppermost end of the spindle 6 adjacent the tension guide 16. A gear 23 of the same size as the gear 15 is fixedly mounted to the lowermost end of the conveyor shaft 20.

Power means for rotating the winding head assembly 9 and the worm conveyor 21 comprises an electric motor M secured to the frame 2 by means of bolts 24 whereby the

drive shaft of said motor is vertically positioned. The upwardly projecting end of the drive shaft **25** is provided with a belt pulley **26**. A main shaft **27** is positioned parallel with and spaced from the conveyor drive shaft **20** and is journalled in bearings **28** and **29** adjacent its uppermost end and in a bearing **30** adjacent its lowermost end. The bearings **28** and **29** are mounted within a downwardly projecting collar **31** secured to the base **1**, and the lower bearing **30** is mounted within an upwardly projecting collar **32** of the cross member **4**. The uppermost end of the main shaft **27** carries a pinion **33** which projects loosely through an aperture **1***b* in the base **1** and meshes with the gear **15** of the winding head assembly **9**. Below the bearing **29** and the collar **31**, said main shaft is provided with a second pinion **34** identical in size with pinion **33** and meshing with the gear **23** of the conveyor drive shaft **20**. Intermediate the pinion **34** and the bearing **30**, said main shaft is also provided with a belt pulley **35** which is connected to the belt pulley **26** of the motor by means of a pulley belt B.

From the above description it will be readily understood that the motor M rotates the main shaft **27** which in turn causes rotation of the winding head assembly **9** and the worm conveyor **21** through the pinion-gear assemblies **33—15** and **34—23**, respectively. Since the pinion-gear ratios are preferably the same in each case, the winding head assembly and worm conveyor are caused to rotate at the same speed.

The ratchet gear **14** of the winding head assembly **9** is adapted to drive a rotatable table shown at **36** through a one-way or overrunning clutch mechanism indicated generally at **37**. The table **36** is circular in form and is centrally apertured at **36***a* to fit loosely over the ratchet gear **14**. The table **36** is supported in spaced relation above the upper surface of the base **1** by a bearing **38**. The bearing **38** comprises upper and lower, ring-shaped race sections **40** and **41** respectively, having hardened steel ball bearings **38***a* interposed therebetween. The race section **40** is secured in any suitable manner to the lower surface of the table **36**, and the race section **41** is similarly fixed to the upper surface of the base **1**. The table **36** is maintained in concentric relation to the spindle **6** by means of a plurality of circumferentially evenly interspaced, roller bearings **42** which are rotatably secured to the ratchet gear **14** adjacent the outer periphery of said ratchet gear (FIG. 8). The roller bearings **42** are so mounted that they project uniformly beyond the circumference of the ratchet gear and make rolling contact with the inner periphery of the aperture **36***a* of the table **36**. The table **36** is of such thickness that the upper surface thereof is substantially aligned with the upper end of the roller bearing **42**, and the lower surface of said table is substantially coincidental with the lower surface of the ratchet gear **14**. The overrunning clutch mechanism, to be herein later fully described, is positioned within an upwardly directed recess **36***b* in the bottom surface of the table **36** adjacent the inner periphery thereof.

It will be noted that the outer periphery of the table **36** is downwardly stepped at **36***c* and is overlapped by a circumferentially continuous, horizontal baffle **5***a* welded or otherwise suitably secured to the inner surface of the safety shield **5**. The baffle **5***a* prevents the stripped material from accidentally falling down below the edge of the table where it might become tangled.

A reel **43** of flat, strip material S is placed upon the rotatable table **36** around a centering spool or disk **44**. A retainer plate **45** of slightly larger diameter than the reel **43** rests upon said reel to prevent tangling of the stripped material as it comes off the reel and to maintain the reel flatwise upon the table during the unwinding thereof. A tubular guide **46** is secured at one end thereof to the tension guide **16** of the winding head assembly **9** and extends generally radially outwardly to a point just beyond the periphery of the retainer plate **45** (FIG. 1). The strip material from the reel **43**, as indicated at S, is threaded through the tubular guide **46** whereby it is directed to the tension guide **16** and the mandrel **22**.

Referring now particularly to FIG. 3, the mandrel **22** is secured to the uppermost end of the spindle **6** by means of bolts **50** which extend downwardly through suitable apertures in a circular base portion **51** of the mandrel, said bolts being screw-thread fitted into the upwardly directed end of the spindle. The upper portion of the mandrel upon which the strip material S is wound is generally flattened or elliptical in section as clearly shown in FIG. 4. As seen from one of the longer sides thereof, said flattened portion **52** tapers upwardly at a slight rate of taper as indicated at **52***a*, the uppermost end of said elliptical portion being provided with a vertically upwardly directed, integral collar **53**. The mandrel **22** is provided with a longitudinal, concentric bore **54** which extends from the bottom of the mandrel upwardly to within a short distance of the uppermost end of the elliptical portion **52**. The bore **54** is of such diameter as to exceed the transverse thickness of said elliptical portion whereby said elliptical portion is bifurcated in the area of the bore **54**. A relatively smaller bore **55** is provided from the larger bore **54** through the uppermost end portion of the mandrel and the upstanding collar **53**.

The worm conveyor **21** comprises a lowermost shank portion **60** seated within an upwardly open socket **20***a* of the conveyor drive shaft **20**. The worm conveyor **21** is adapted to rotate with the conveyor drive shaft **20** by means of a transversely disposed pin **61** projecting through a suitable, diametrically directed aperture in said worm conveyor shank **60**. The ends of the pin **60** project radially outwardly beyond the shank **60** and are seated within a transverse groove **20***b* in the uppermost end of the conveyor drive shaft **20**.

Above the shank **60** the worm conveyor is provided with helical threads **62** so longitudinally interspaced that the spaces between adjacent teeth are adapted to loosely and slidably receive the strip material S as it comes from the tension guide **16**. As best seen in FIG. 4, the threads **62** project outwardly beyond the flattened sides of the hollow mandrel **22** whereby the strip material S is vertically engaged between adjacent ones of said helical threads. It will be clearly seen that upon rotation of the worm conveyor **21** in a counterclockwise direction as seen in FIG. 4, the elliptical coils which have been formed upon the mandrel **22** will be conveyed upwardly and off the end of said mandrel. It will also be noted that since the strip material S is held vertically captive between adjacent threads **62**, the spacing of each coil relative to the preceding coil will be uniform.

As the strip material S is formed into coils indicated at S, and conveyed upwardly off the end of the mandrel **22**, it is preferably engaged by other means, not herein shown, which subject the coiled strip to further processing such as flattening, bending, folding, or the like. It will be understood that these subsequent operations may be done in any suitable manner and do not form a part of this invention.

Referring now to FIGS. 1, 3, and 5, the tension guide **16** is securely mounted upon an adjustment ring **70** of the same circumferential dimensions as the supporting sleeve **12** and adjustably secured to the same by means of a pair of bolts **71** projecting through arcuate slots **72** in said adjustment ring (FIG. 1).

The tension guide **16** comprises a heavy base **73** secured to the adjustment ring **70** by means of bolts **74**. An arm **75** projects inwardly from the base **73** and is disposed horizontally opposite the elliptical portion **52** of the mandrel **22**. As best shown in FIG. 5, the arm **75** is provided with one flat, vertical face **75***a* which is substantially disposed in a plane radiating from the center or axis of the mandrel. The vertical face **75***a* is provided with an oblique, flat bottomed groove **75***b*

of a depth which is slightly less than the thickness of the strip material S and having a width slightly in excess of the width of said strip material. Above the groove 75*b*, the arm 75 is tapped to receive a threaded bolt 76. The bolt 76 projects horizontally outwardly perpendicular to the face 75*a* and has telescoped thereover an apertured tension plate 77 which extends downwardly from said bolt and overlaps the oblique groove 75*b*. A washer 78 is also telescoped over the bolt 76, and a coil spring 79 is interposed between the washer 78 and the tension plate 77 to bias said tension plate against the face 75*a*.

Strip material S from the reel 43 is seated in the groove 75*b* and subjected to tension by the plate 77 just prior to being fed upon the mandrel 22. The angle of the groove 75*b* is substantially similar to the pitch of the thread 62 of the worm conveyor 21 whereby the strip material S is fed upon said worm conveyor at the optimum angle. It will be clearly seen that by tightening or loosening the adjustment bolt 76 the tension of the spring 79 on the tension plate 77 can be varied to provide various degrees of resistance to the strip as it passes through the tension guide.

The base 73 is provided with a downwardly oblique aperture 73*a* into which the tubular guide 46 is securely, telescopically interfitted. The obliquity of the aperture 73*a* is such as to feed the strip material S into the groove 75*b* of the arm 75 without causing binding of the strip within the groove. As best shown in FIG. 1, the tubular guide 46 extends outwardly from the base 73 to a point adjacent the baffle 5*a* to receive the strip material S as said strip material leaves the reel 43.

In the initial setup of a machine according to the present invention it is preferred that the tension guide 16 be located circumferentially relative to the worm conveyor 21 whereby the strips will be engaged by the threads 62 at the proper angle. To ensure this engagement, the groove 75*b* should be aligned with the space between adjacent threads 62 of the worm into which the strip material S is to be fed. In accomplishing the precise adjustment, the bolts 71 are loosened and the entire tension guide 16 is arcuately moved to the proper position after which the bolts 71 are again tightened. Such adjustment is possible because of the arcuate slots 72 which allow the adjustment ring 70 to be rotated slightly relative to the bolts 71.

The counterweight 71 is for the purpose of balancing the winding head assembly and is of such weight as to counter-balance the weight of the tension guide 16 and the tubular guide 46 attached thereto.

The overrunning clutch mechanism 37 which is positioned within the recess 36*b* in the lower side of the table 36 is well shown in FIG. 8. Said overunning clutch mechanism comprises an elongated, pivoted pawl 80 pivotably mounted to the table 36 by means of an upwardly directed pivot pin 81. The pivot pin 81 is located in the medial region of the pawl 80, one end of said pawl having a longitudinally directed finger portion 82 which normally engages teeth 14*a* of the ratchet gear 14. An elongated bolt 83 is thread fitted into the end of the pawl 80 opposite the finger 82 and projects longitudinally outwardly therefrom a substantial distance. Limiting members 84 and 85 are fixedly secured to the table 36 on either side of the pawl 80 in any suitable manner such as by pins 84*a* and 85*a* respectively. The limiting member 84 is tapered or beveled at 84*b* adjacent the end thereof which is directed away from the ratchet gear 14. The tapered portions 84*b* and 85*b* are so complementarily inter-related as to allow pivotal movement of the pawl 80 in a counterclockwise direction as seen in FIG. 8 to a position wherein the finger 82 of said pawl is pivoted out of engagement with the teeth 14*a* of the ratchet gear 14. This disengaged position is shown in broken lines at 80'.

The limiting member 85 is provided with a longitudinally projecting bolt 86 similar to the bolt 83 of the pawl 80. The outer ends of the bolts 83 and 86 are resiliently biased towards each other by an interconnecting coil spring 87. A stop 88 is mounted in the limiting member 84 and comprises a rod directed laterally from said limiting member and abutting the edge of the pawl intermediate the pivot pin 81 and the outwardly directed end of said pawl.

From the foregoing it will be understood that the pawl 80 is normally biased in a clockwise direction whereby said pawl abuts the stop 88, and the finger 82 engages the teeth 14*a* of the ratchet gear 14. The ratchet gear 14 is driven unitarily with the winding head assembly 9, and through the pawl 80 thus engaged with the ratchet wheel, the table 36 is caused to rotate upon the bearing 38 at a speed at least as great as that of the ratchet wheel 14 and the associated winding head assembly. It will be noted, however, that the table 36 can rotate at a speed in excess of the ratchet wheel 14 at which time the pawl 80 simply pivots as shown at 80' whereby the finger 82 slides over the ratchet teeth 14*a*.

The purpose of the overrunning clutch mechanism 37 will be readily understood in connection with the general operation of the machine of this invention. Operation of the motor M causes the winding head assembly 9, the worm conveyor 21, and the table 36 to rotate in a counterclockwise direction as the machine is viewed in FIG. 1. Strip material S from the reel 43 is then unwound and pulled through the tubular guide 46 and the tension guide 16 to be wound into elliptical coils about the fixed or non-rotating mandrel 22 from which the coiled strip is conveyed by the worm conveyor 21. The tension guide 16, by means of the arm 75 and the tension plate 77, exerts sufficient resistive effort upon the unwinding strip material as to cause it to conform closely to the shape of the mandrel and wherein the bends in the metal take a permanent set in the desired shape.

As the strip material S unwinds from the reel 43 and said reel becomes smaller in circumference, it will be necessary for the reel to rotate at a progressively increasing speed. The table 36 is free to rotate in a counterclockwise direction at whatever speed is necessary to feed the strip onto the mandrel due to the overruning clutch mechanism 37 which allows said table to move ahead of, or to rotate faster than, the ratchet gear 14 and the winding head assembly 9.

If for any reason it is necessary to turn the machine off before all of the strip material has been unwound from the reel 43, the table 36 is prevented from overriding the ratchet gear 14 and the winding head assembly 9 by means of a braking device, a detail of which is shown in FIG. 6.

Referring now specifically to FIGS. 1, 2 and 6, the braking mechanism comprises a control lever 90 pivoted upon an upwardly projecting pin 91 mounted in a block or support 92 which projects laterally from the frame 2. The control level 90 is positioned directly under and is slightly spaced from the stationary base 1 and is provided at its outwardly directed end with a handle 93. An inwardly directed end of the control lever 90 is provided with an upwardly directed, elongated stud 94 which projects upwardly through a suitable arcuate slot 95 in the stationary base 1. The upwardly directed end of the stud 94 projects above the upper surface of the base 1 and into a radially directed slot 96 of an actuating ring 97.

The actuating ring 97 encompasses the spindle 6 and its associated parts and is spaced radially inwardly a short distance from the bearing 38 upon which the table 36 revolves. The actuating ring is positioned substantially on a level with the race section 40 which is secured to the lower surface of the table 36. The actuating ring 97 is supported at a plurality of circumferentially evenly spaced points of said ring by means of individual brakes 100. It will be understood that all of the brakes 100

are identical in construction and operation and, therefore, only one of said brakes will be herein described in detail.

Referring now specifically to FIG. 6, the brake **100** comprises a slide **101** which is laterally outwardly stepped at either lateral edge adjacent the bottom thereof as indicated at **101***a*. The slide **101** is positioned directly beneath the actuating ring **97** and is adapted to slide on a path radiating from the center of the machine. The slide **101** movably rests upon the upper surface of the stationary base **1** and is maintained against lateral movement by means of a pair of guide blocks **102** secured to the base **1** by means of bolts **102***b*. The guide blocks **102** are positioned on either side of the slide **101** and are complementarily inwardly stepped at **102***a* to overlap the steps **101***a* of the slide whereby said slide is maintained against vertical as well as lateral movement.

A cam follower pin **103** projects vertically upwardly from the slide **101** and into an obliquely directed cam slot **104** in the actuating ring **97**. The slide **101** projects radially outwardly beyond the outer periphery of the actuating ring **97** and is provided on its cover surface with a brake shoe **105** which is secured thereto by means of a pair of bolts **106**. By referring to FIG. 7, it will be noted that the brake shoe **105** is closely adjacent and in a plane which the race section **40** of the bearing **38**.

It will be readily seen that by pivoting the control lever **90** by means of the handle **93** about the pivot pin **91**, the actuating ring **97** is made to move in a circumferential direction within the limits allowed by the cam follower pin **103** in the cam slot **104** and the movement of the brake shoe **105** against the race section **40**. The control lever **90** is normally biased in a clockwise or nonbraking position by a return spring **107** connected to the inner end of the control lever **90** and anchored in any suitable manner to the frame of the machine. In this position the cam follower pin **103** is located in the most clockwise directed end of the cam slot **104** and the slide **101** is withdrawn radially inwardly to its furthest point whereby the brake shoe **105** is withdrawn slightly from the inner peripheral surface of the race section **40**. By pivoting the lever **90** in a counterclockwise direction, or from the broken to the full line positions of FIG. 1, the actuating ring **97** is caused to move circumferentially in a clockwise movement. The cam slot **104** then acts upon the cam follower pin **103** to cam the slide **101** radially outwardly thereby bringing the brake shoe **105** into braking contact with the race section **40**. Release of the handle **93** allows the lever **90** and the actuating ring **97** to return to their nonbraking position under bias of the return spring **107**.

It will, of course, be understood that all of the brakes **100** are actuated simultaneously to bring all of the brake shoes **105** into contact with the inner periphery of the race section **40** at the same instance. By applying the brakes **100** at the moment when the machine is turned off, the rotating table **36** is held back and prevented from overriding the rest of the machine thereby entangling any strip material which may remain upon the reel **43**.

The machine as set forth above represents a preferred embodiment of this invention which is particularly adapted for high speed production of continuous lengths of elliptically coiled stock. Once the setup operation is complete, an entire reel of the strip material may be coiled without further manipulation of the machine. Whenever it is necessary to stop the machine before the reel has been completely emptied, the braking mechanism is used to overcome the inertia of the rotating table thereby effectively preventing tangling of the strip.

It will be understood that many departures from the details of this invention as herein described and illustrated may be made without, however, departing from the spirit thereof or the scope of the appended claims.

What is claimed is:

1. An apparatus of the type described comprising stationary coiling means, means rotatably mounting a reel of strip material concentrically with said coiling means, said strip material secured at one end to said coiling means, means causing rotation of said reel and mounting means relative to said coiling means, and conveyor means mounted within said coiling means having operating parts thereof projecting laterally beyond said coiling means and engaging said strip and progressively conveying it from said coiling means in its coiled form.

2. An apparatus of the type described comprising stationary coiling means, means rotatably mounting a reel of strip material concentrically with said coiling means, said strip material secured at one end to said coiling means, means causing rotation of said reel and mounting means relative to said coiling means, a worm conveyor mounted within said coiling means having helical teeth projecting laterally beyond said coiling means and engaging said strip and progressively conveying it from said coiling means in its coiled form.

3. An apparatus of the type described comprising stationary coiling means, means rotatably mounting a reel of strip material concentrically with said coiling means, said strip material secured at one end to said coiling means; a worm conveyor mounted within said coiling means having helical grooves engaging said strip, means causing rotation of said reel and mounting means to wind said strip upon said coiling means, and means causing rotation of said worm conveyor whereby said strip is progressively conveyed from said coiling means in its coiled form.

4. An apparatus of the type described comprising stationary coiling means, means rotatably mounting a reel of strip material concentrically with said coiling means, said strip material secured at one end to said coiling means, means gripping said strip material positioned between said reel and said coiling means and exerting tension thereon, a worm conveyor mounted within said coiling means having helical grooves engaging said strip, means causing rotation of said reel and mounting means and winding said strip upon said coiling means, and means causing rotation of said worm conveyor whereby said strip is progressively conveyed from said coiling means in its coiled form.

5. A coiling machine of the type described comprising a hollow stationary mandrel of generally flattened form in section having a worm conveyor longitudinally, concentrically mounted therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically with said mandrel, means revolving said mount and means revolving said worm conveyor, a reel of strip material positioned concentrically upon said mount, a free end of said strip secured to said mandrel whereby as said mount rotates said strip material is wound upon said mandrel, said strip engaged between adjacent of said helical teeth whereby the rotation of said worm conveyor progressively removes said strip material from said mandrel in its coiled form.

6. A coiling machine of the type described comprising a hollow stationary mandrel of generally flattened form in section having a worm conveyor longitudinally, concentrically mounted therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically with said mandrel, means revolving said mount and means revolving said worm conveyor, a reel of strip material positioned concentrically upon said mount, a free end of said strip secured to said mandrel whereby as said mount rotates said strip material is wound upon said mandrel; means gripping said strip material positioned between said reel and said coiling means and exerting tension thereon, said strip engaged between adjacent of said helical teeth whereby the rotation of said

worm conveyor progressively removes said strip material from said mandrel in its coiled form.

7. A coiling machine of the type described comprising a hollow stationary mandrel of generally flattened form in section having a worm conveyor longitudinally, concentrically mounted therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically with said mandrel, means revolving said mount and means revolving said worm conveyor, a reel of strip material positioned concentrically upon said mount, a free end of said strip secured to said mandrel whereby as said mount rotates said strip material is wound upon said mandrel, guide means directing said strip material from said reel to said mandrel, said strip engaged between adjacent of said helical teeth whereby the rotation of said worm conveyor longitudinally progressively removes said strip material from said mandrel in its coiled form.

8. A coiling machine of the type described comprising a hollow stationary mandrel of generally flattened form in section having a worm conveyor longitudinally, concentrically mounted therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically with said mandrel, drive means causing rotation of said worm conveyor and said mount, overrunning clutch means interposed between said drive means and said mount and allowing free wheeling of said mount in its direction of rotation, a reel of strip material positioned concentrically upon said mount, an end of said strip secured to said mandrel whereby as said mount rotates said strip material is wound upon said mandrel, said strip engaged between adjacent of said helical teeth whereby the rotation of said worm conveyor progressively removes said strip material from said mandrel in its coiled form.

9. A coiling machine of the type described comprising a hollow stationary mandrel of generally flattened form in section having a worm conveyor longitudinally, concentrically mounted therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically around said mandrel, a winding head mounted coaxially with said mandrel, drive means causing rotation of said worm conveyor, winding head, and mount, overrunning clutch means interposed between said drive means and said mount and allowing free wheeling of said mount in its direction of rotation, a reel of strip material positioned concentrically upon said mount, said strip material threaded through said winding head secured to said mandrel whereby as said mount rotates said strip material is wound upon said mandrel, said winding head having tension means exerting a resistive effort upon said strip, said strip engaged between adjacent of said helical teeth whereby the rotation of said worm conveyor progressively removes said strip material from said mandrel in its coiled form.

10. A coiling machine of the type described comprising a vertically disposed, hollow, stationary mandrel of generally flattened sectional form having a worm conveyor mounted coaxially therein, said conveyor having helical teeth projecting laterally beyond the flattened sides of said mandrel, a revolvable mount positioned concentrically with and below said mandrel, a winding head mounted coaxially with and adjacent said mandrel, drive means causing rotation of said worm conveyor, winding head, and mount, overrunning clutch means interposed between said drive means and said mount and allowing free wheeling of said mount in its direction of rotation during operation of said machine, braking means actuatable to prevent overriding of said mount when said machine is being stopped, a reel of strip material positioned concentrically upon said mount, said strip material threaded through said winding head and fastened to said mandrel whereby when said mount rotates, said strip material is wound upon said mandrel, said winding head having tension means exerting a resistive effort upon said strip, guide means mounted to said winding head and directing said strip material from said reel to said winding head, said strip engaged between adjacent of said helical teeth whereby the rotation of said worm conveyor progressively removes said strip material from said mandrel in its coiled form.

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