June 26, 1956 E. H. SHATTUCK 2,751,661

YARN CRIMPING APPARATUS

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Fig. 1

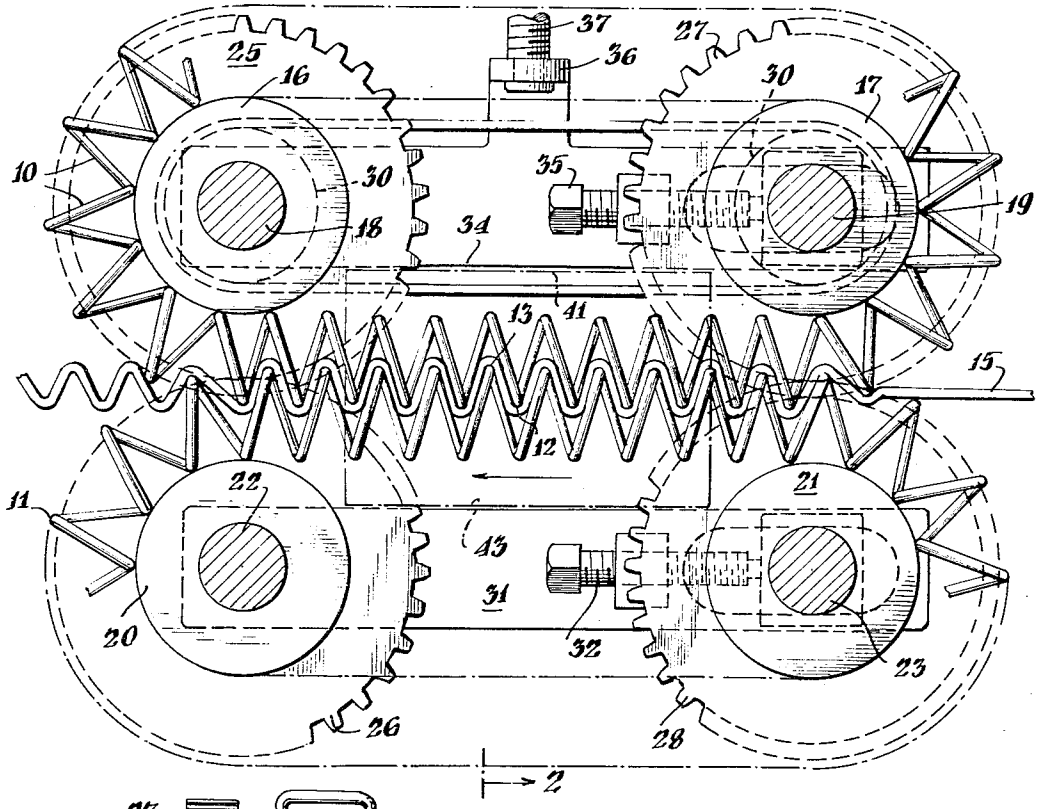
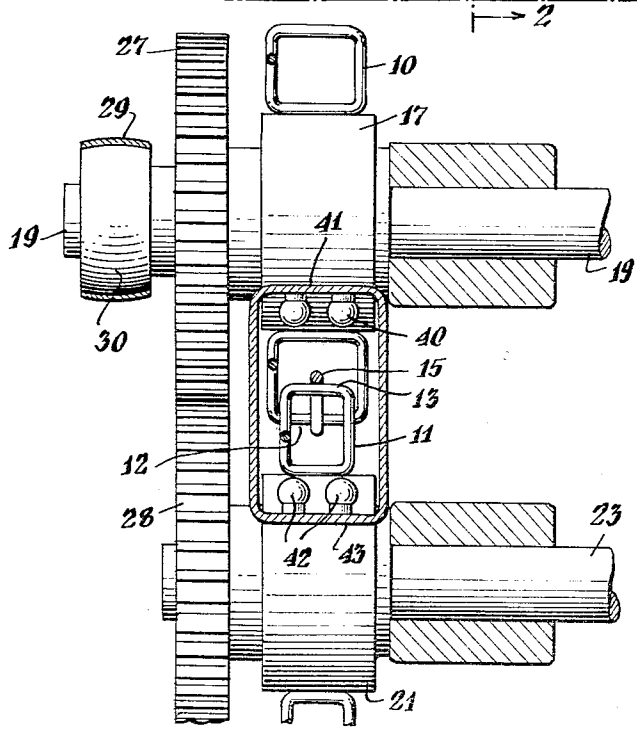


Fig. 2



INVENTOR

Ewart H. Shattuck

BY

ATTORNEY

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YARN CRIMPING APPARATUS

Ewart H. Shattuck, Wilmington, Del., assignor to Alexander Smith, Incorporated, Yonkers, N. Y., a corporation of New York

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7 Claims. (Cl. 28—1)

This invention relates to the crimping of filaments, tow or yarn and has for an object to provide crimping apparatus having novel and improved characteristics.

The invention is particularly applicable to continuous filament yarn composed of thermoplastic material such as nylon or the like and is adapted to produce in such yarn a crimp which can be readily controlled as to amplitude and frequency.

The features which are characteristic of this invention will be apparent from the following description taken in connection with the accompanying drawing forming a part thereof, in which:

Fig. 1 is a vertical longitudinal section through a crimping apparatus embodying the present invention; and

Fig. 2 is a vertical transverse section thereof taken on the line 2—2 of Fig. 1.

The present invention provides for the use of a pair of coiled springs of opposite pitch which are advanced continuously in interleaved relationship through a heating zone. The filament, tow or yarn to be crimped is gripped between the convolutions of the interleaved springs and is folded thereby to form a zig-zag crimp which is set in the filaments as they advance through the heating zone.

More specifically the invention is shown as comprising a pair of interleaved springs **10** and **11** of opposite pitch which are wound in the form of a rectangular coil so as to provide flat portions **12** and **13** respectively (Fig. 2) over which the filament **15** passes.

The spring **10** is fed around rolls **16** and **17** mounted on shafts **18** and **19** respectively. The spring **11** is fed around rolls **20** and **21** mounted on shafts **22** and **23** respectively.

Shafts **18** and **22** carry meshing gears **25** and **26** respectively. Shaft **19** and **23** carry meshing gears **27** and **28** respectively. The shafts **18** and **19** are shown as connected by suitable driving means such as a belt **29** engaging pulleys **30** on the two shafts. The shaft **18** may be driven by a suitable source of power not shown.

The shaft **22** is journaled in a supporting arm **31**. The shaft **23** is also journaled in the supporting arm **31**, but is provided with adjusting means shown as a set screw **32** by which the shaft may be adjusted in a direction to lengthen or shorten the pitch of the spring **11**.

The shaft **18** is journaled in a supporting bar **34**. The shaft **17** is likewise journaled in the supporting bar **34** but is provided with adjusting means shown as set screw **35** by which the shaft is longitudinally adjusted to conform to the adjustment of the shaft **23**. The supporting bar **34** is provided with a supporting ear **36** which is adjustably mounted on a set screw **37** so that the bar **34** can be adjusted transversely to vary the amount of intermesh of the springs **10** and **11**.

The driving gears are provided with teeth of sufficient length to remain in mesh during this adjustment.

In their intermeshed flight the two springs are fed through a heating zone shown as comprising an upper bank of infra red lights **40** disposed in a reflecting shield **41** and a lower bank of similar lights **42** carried in a reflecting shield **43** and positioned to reflect heat onto the filament as it passes along with the intermeshed springs through the heating zone.

In the operation of this device the yarn **15** which may comprise continuous filament nylon yarn for example is passed between the interleaved springs **10** and **11** where it is engaged by the straight portions **12** and **13** of the springs and is folded to form a zig-zag crimp. The springs **10** and **11** are driven in synchronism at a uniform speed and at a rate to subject the crimped yarn to the heating zone for the period of time necessary for setting the crimp prior to the release of the crimped yarn from the springs as they advance.

It is to be noted that the crimp frequency, that is the number of crimps per inch, may be controlled by adjusting the positions of the shafts **19** and **23** in the supporting bars **34** and **31** respectively by means of the set screws **35** and **32**. The crimp amplitude is determined by the overlap of the springs which may be controlled by suitable adjustment of the set screw **37**.

The heating means has been shown for convenience as banks of light. It is to be understood however that the filament may be heated by other means, for example by passing a heating current through the coiled springs so as to heat the springs to the temperature required for setting the crimp. In the latter form the heat will be applied to the point of greatest deformation of the filament, that is to the angular bends as the filaments pass over the straight portions **12** and **13** of the two springs. The springs may be made of a material having a suitable electrical resistance for developing the necessary heat.

Although a specific embodiment has been shown for purposes of illustration, various changes and adaptations may be made therein as will be apparent to a person skilled in the art.

What is claimed is:

1. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound coiled springs, means advancing said springs axially in interleaved relationship, means feeding the yarn to be crimped between said interleaved springs to be folded in zig-zag form thereby, and means heating the yarn for setting the crimp therein while in folded state between said springs.

2. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means advancing said springs axially in overlapping closed paths with the springs interleaved in the overlapping portions of said paths, means feeding the yarn to be crimped between said interleaved springs to be folded in zig-zag form thereby, and means heating the yarn for setting the crimp therein while held in folded state between said springs.

3. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means advancing said springs axiall y in overlapping closed paths with the springs interleaved in the overlapping portion of said paths, means feeding the yarn to be crimped between said interleaved springs to be folded in zig-zag form thereby, means heating the yarn for setting the crimp therein while held in folded state between said springs, and means for adjusting the pitch of said interleaved springs for varying the crimp frequency.

4. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means advancing said springs axially in overlapping closed paths with the springs interleaved in the overlapping portion of said paths, means feeding the yarn to be crimped between said interleaved springs to be folded in zig-zag form thereby, means heating the yarn for set-

ting the crimp therein, and means adjusting the overlap of said paths for varying the crimp amplitude.

5. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means including a pair of feed rolls for advancing each spring in a closed path with the two paths overlapping to bring the springs into interleaved relationship, means feeding the yarn to be crimped between the interleaved springs to be folded in zig-zag form thereby, for setting the crimp, and means for heating the yarn while confined between said springs.

6. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means including a pair of feed rolls for advancing each spring in a closed path with the two paths overlapping to bring the springs into interleaved relationship, means feeding the yarn to be crimped between the interleaved springs to be folded in zig-zag form thereby for setting the crimp, and means for heating the yarn while confined between said springs, gear means connecting said feed rolls for rotation in unison and means adjusting the rolls in a direction to vary the pitch of said springs.

7. Apparatus for crimping yarn or the like, comprising a pair of oppositely wound, endless, coiled springs, means including a pair of feed rolls for advancing each spring in a closed path with the two paths overlapping to bring the springs into interleaved relationship, means feeding the yarn to be crimped between the interleaved springs to be folded in zig-zag form thereby for setting the crimp, means for heating the yarn while confined between said springs, gear means connecting said feed rolls for rotation in unison, and means adjusting the rolls in a direction to vary the amount of overlap of said springs.

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