April 27, 1965 D. J. LAMB 3,180,003

CRIMPING DEVICE

Original Filed July 21, 1961

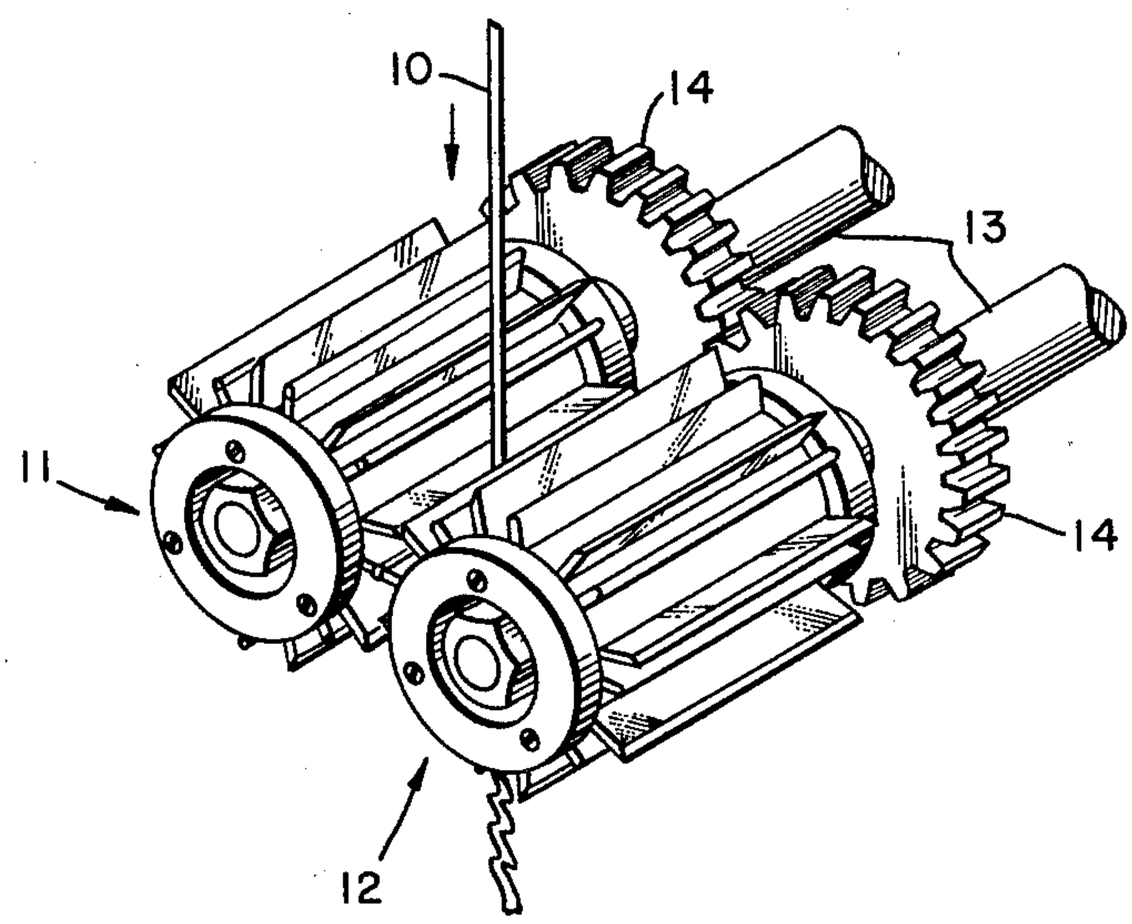

FIG. 1.

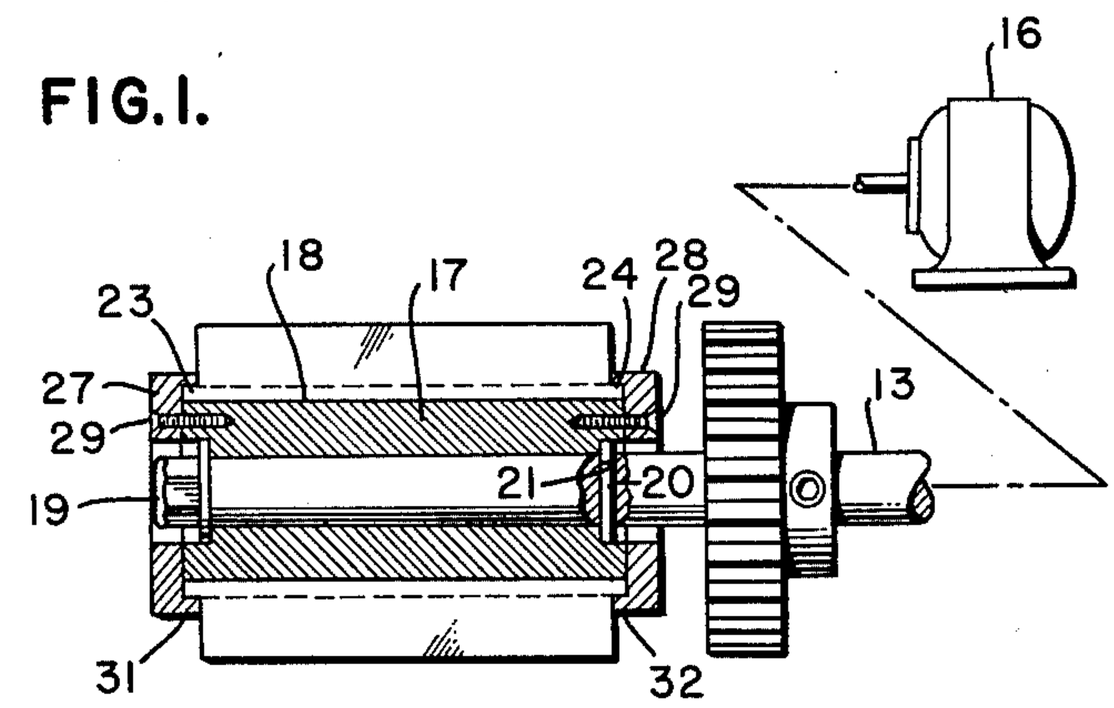

FIG. 2.

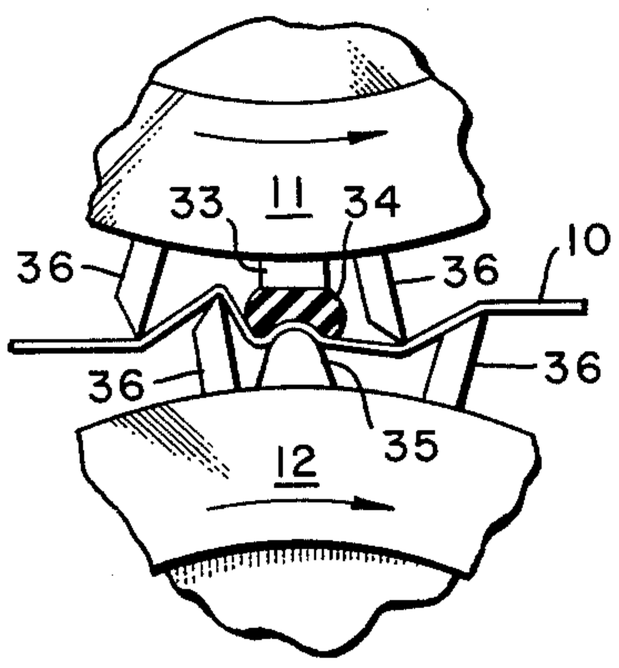

FIG. 3.

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CRIMPING DEVICE

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Original application July 21, 1961, Ser. No. 125,736, now Patent No. 3,140,525, dated July 14, 1964. Divided and this application Nov. 29, 1963, Ser. No. 326,801

6 Claims. (Cl. 28—1)

This application is a division of application Serial No. 125,736, filed July 21, 1961, now Patent Number 3,140,525.

This invention relates to crimping devices and more particularly to yarn or tow crimping gears having engaging and inter-meshing teeth whereby a yarn or tow is gripped by the engaged teeth and stretched across a sharp edge by the inter-meshing teeth thereby to impart a small crimp to the yarn or tow.

Conventional crimping gears used in the crimping of synthetic filaments or yarn are usually milled from a solid steel blank in a manner conventional in the production of gears. One of the disadvantages of this type of crimping gear is that damage to one tooth on the gear necessitates a replacement of the complete gear. Another disadvantage of conventional gears is that the amount of crimp imparted to the filament is limited by the spacing of the gear teeth. Another disadvantage of the conventional crimping gears is that a random crimp pattern cannot be obtained. With these problems in mind it is one of the objects of this invention to provide a novel and improved crimping gear.

Another object of this invention is to provide a crimping gear having replaceable teeth.

A further object of this invention is to provide a crimping gear having teeth of adequate strength.

Another object of this invention is to provide a pair of crimping gears which impart a random crimp to yarn.

A more specific object of this invention is to provide a pair of crimping gears wherein spaced teeth grip the yarn to pull it across sharp teeth and thereby crimp it as the teeth mesh.

One embodiment of this invention contemplates a crimping gear which is provided with a hub having a plurality of radial slots in which flat teeth are positioned and held by end plates. Replacement of a damaged tooth is accomplished by removing one of the end plates and substituting a new tooth for the damaged one. Teeth of various length and cross sections can be used to obtain a random crimp pattern. Also, spaced yarn-gripping teeth can be used to pull the yarn across sharp teeth and thereby simultaneously curl and crimp it as the sharp teeth mesh.

Other objects and advantages of the invention will become apparent when the following detailed description is read in conjunction with the appended drawings, in which:

FIGURE 1 is a perspective view showing a pair of gear teeth which illustrate the principles of the invention being used to crimp a yarn;

FIGURE 2 is a front view, partially sectioned, of one of the gears showing the manner in which the individual teeth are held on a hub; and

FIGURE 3 is a fragmentary end view of the gears shown in FIGURE 1.

Referring now in detail to the drawing, a pair of crimping gears **11** and **12** are shown crimping a yarn **10**. The gears are mounted on and driven by shafts **13** which are interconnected by gears **14**. The gears **11** and **12** are driven by a motor **16** connected to one of the shafts **13**. Each gear is provided with a hub **17** (FIG. 2) having therein a plurality of spaced radial slots **18** which extend longitudinally along the hub. These slots are selectively

spaced thereon and of different widths to accommodate the various teeth to be described herein below. The hub **17** fits onto and is secured on the shaft **13** between a nut **19** and a pin **20** extending through the shaft **13** and having its ends positioned in notches **21** in the hub. Each of the slots **18** receives a matching thin, flat elongated tooth having a pair of rectangular lugs **23** and **24** extending from the sides thereof.

A pair of end plates **27** and **28** secured to the hub **17** by bolts **29** are provided with cylindrical flanges **31** and **32**, respectively, which overlap the lugs **23** and **24** to hold the teeth in the slots **18** in the hub **17**. A study of FIGURE 2 will show that the end plates **27** and **28** rigidly secure the teeth in the slot **18**.

FIGURE 3 illustrates the crimping gears **11** and **12** having spaced yarn gripping teeth separated by sharp-edged teeth which mesh to a greater degree than the gripping teeth because the sharp-edged teeth are longer than the yarn gripping teeth. The gear **11** has spaced, flat-faced teeth **33** which are each covered with a thick layer **34** of rubber or some other resilient material and which are secured to the gear **11** in the manner described above. The gear **12** carries secured thereto as described above, rounded teeth **35** which cooperate with the flat-faced teeth **33** to grip the yarn **10** therebetween, the teeth **35** being spaced around the gear **12**. Following the teeth **33** and **35** (i.e., positioned between adjacent teeth **33** and **35**) on each of the gears **11** and **12** are sharpened teeth **36** across which the yarn is pulled as these teeth mesh. The pulling of the yarn **10** across these sharp-edged teeth will curl the yarn in the same way that a paper strip is curled when pulled across a knife edge. The mesh or overlap of the teeth **36** imparts a crimp to the yarn **10**. Thus, these gears simultaneously crimp and curl the yarn. The teeth **36** may have the sharp edges facing away from the gripping teeth **33** and **35** as shown in FIGURE 3. Several of the sharpened teeth **36** are positioned between adjacent flat-faced teeth **33** on the gear **11** and a like number are positioned between adjacent rounded teeth **35** on the gear **12**.

In operation of the crimping gears illustrated in FIGS. 1 and 2, the yarn is passed between the meshed gears where it is crimped and curled simultaneously by the teeth. By arranging the teeth in the manner illustrated, a crimp having less amplitude may be imparted to the yarn without spacing the teeth in such close proximity as to sacrifice the durability of the gears. Replacement of one tooth or a damaged tooth is affected by removing the end plate **27**, removing the desired tooth from its slot **18** and replacing it with another tooth. This obviously cannot be done with a conventional crimping gear.

To affect a random crimp, the gears may be provided with teeth having various cross sections and end configurations. Some of the teeth may be omitted from the gears to provide additional crimping variations. Also, some of the teeth may be smooth while others are roughened.

It is to be understood that the embodiment disclosed herein is merely illustrative and that this embodiment may be modified or amended and that numerous other embodiments may be contemplated without departing from the spirit and scope of the invention.

What is claimed is:

1. An apparatus for crimping a filament, comprising a pair of crimping gears, one of said gears having a plurality of gripping teeth, the other gear of said pair having a plurality of gripping teeth adapted to engage the gripping teeth of said one gear to grip the filament therebetween, and a like number of sharpened teeth positioned between said gripping teeth on each of said gears.

2. An apparatus for crimping a filament, comprising a pair of crimping gears having yarn gripping teeth, one

the other gear of said pair having a plurality of spaced teeth adapted to engage said flattened teeth to grip the of said gears having a plurality of spaced flattened teeth, filament therebetween, and each of said gears having sharpened teeth positioned between the yarn gripping teeth.

3. An apparatus for crimping a filament, comprising a pair of crimping gears having yarn gripping teeth, one of said gears having a plurality of spaced flattened teeth, the other gear of said pair having a plurality of spaced teeth adapted to engage said flattened teeth to grip the filament therebetween, and each of said gears having sharpened teeth positioned between the yarn gripping teeth, said sharpened teeth extending radially outwardly beyond said gripping teeth.

4. An apparatus for crimping a filament, comprising a pair of crimping gears having yarn gripping teeth, one of said gears having a plurality of spaced flattened teeth, the other of said pair having a plurality of spaced teeth adapted to engage said flattened teeth to grip the filament therebetween, each of said gears having meshing sharpened teeth positioned between the yarn gripping teeth for stretching said yarn across a sharp edge whereby a crimp is imparted thereto, and means for driving the gears.

5. An apparatus for crimping a yarn, comprising a first gear having removably attached thereto at spaced intervals a plurality of flattened teeth, each of said flattened teeth having secured thereto a layer of resilient material, a plurality of sharp-edged teeth removably attached to the first gear at spaced intervals between the flattened teeth, a second gear adapted to cooperate with the first gear and having removably attached thereto at spaced intervals rounded teeth adapted to engage the resilient

layers on the flattened teeth to grip the yarn therebetween, said second gear also having a plurality of sharp-edged teeth removably secured thereto at spaced intervals between the rounded teeth, and means for driving the gears.

6. An apparatus for crimping a filament, comprising a pair of hubs, each of said hubs having therein a plurality of spaced slots, a plurality of flattened teeth positioned in predetermined slots in one of the hubs and having at the sides thereof extended lugs, each of said flattened teeth having on the end thereof a layer of resilient material, a plurality of rounded teeth positioned in predetermined slots in the other hub and having at the sides thereof extending lugs, said rounded and said flattened teeth being positioned so as to engage each other to grip a yarn therebetween as the hubs are rotated, means for rotating the hubs, a plurality of sharpened teeth positioned in the slots in the hubs between the flattened teeth on the one hub and the rounded teeth on the other hub and having at the ends thereof extending lugs, and a plurality of end plates secured to the hubs at opposite ends thereof and having flanges which overlap the extending lugs on the teeth to hold said teeth in said slots.

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MERVIN STEIN, *Examiner.*

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,180,003 April 27, 1965

Douglas J. Lamb

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 72, after "one" insert -- of said gears having a plurality of spaced flattened teeth, --.

Signed and sealed this 23rd day of November 1965.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents