Jan. 12, 1954 G. E. NORDSTROM 2,665,541

MACHINE FOR MAKING CORD FROM TWISTED WEB MATERIAL

Filed June 7, 1951 3 Sheets-Sheet 1

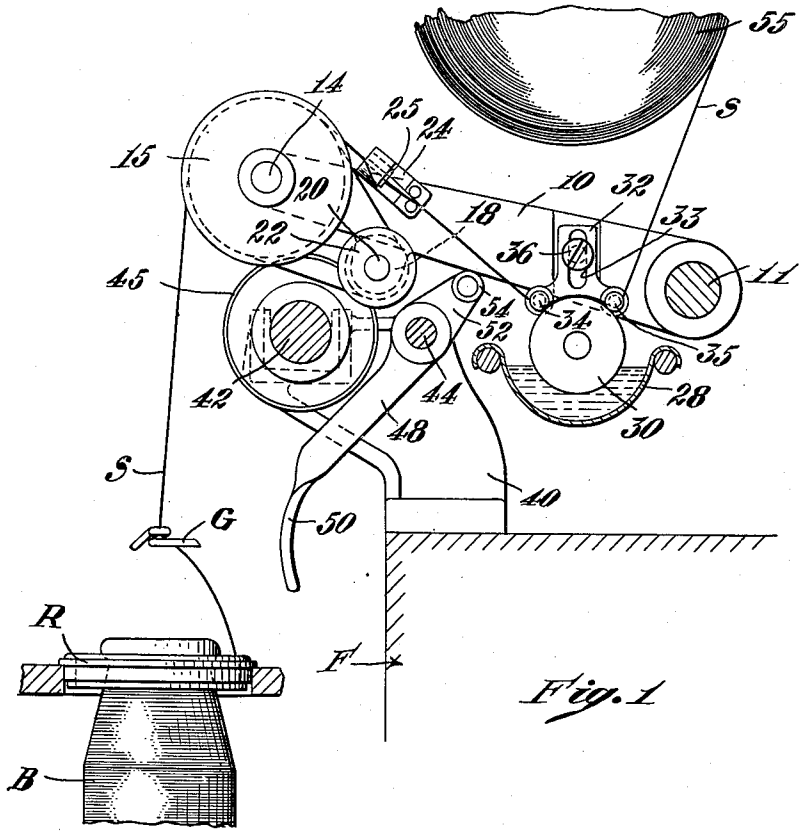


Fig. 1

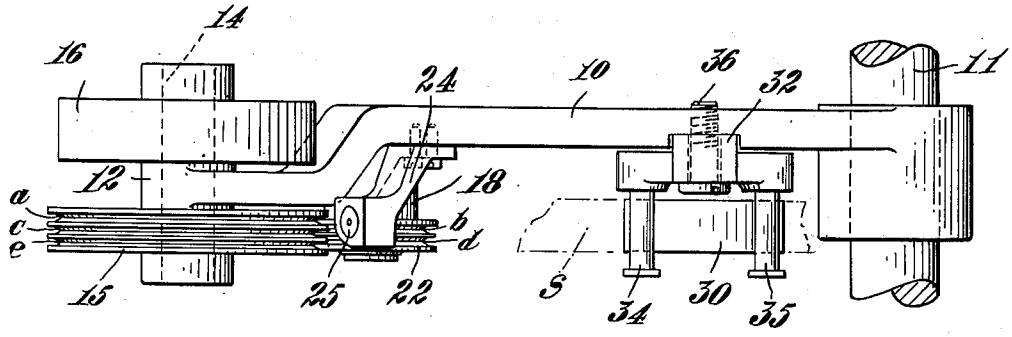


Fig. 2

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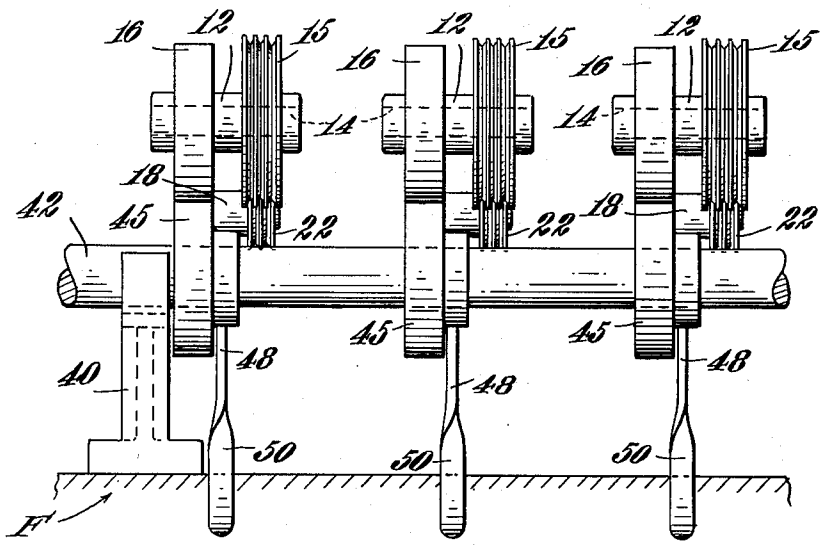


Fig. 3

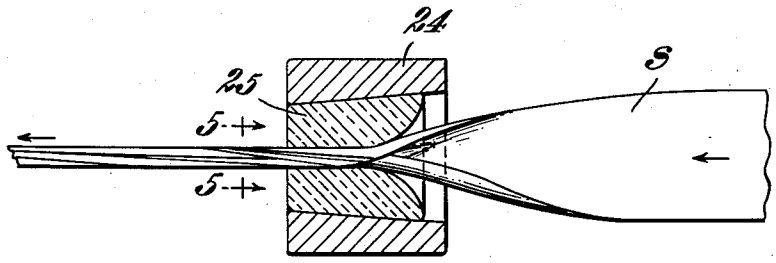


Fig. 4

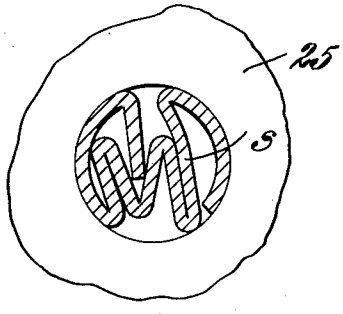


Fig. 5

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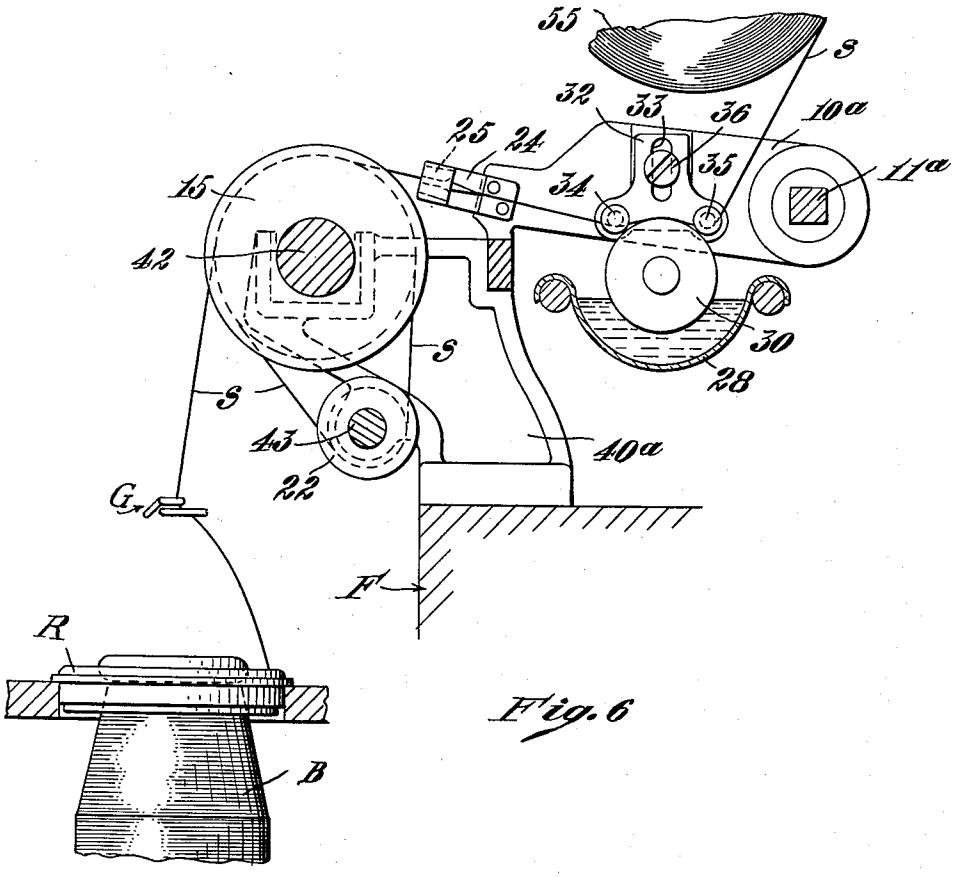


Fig. 6

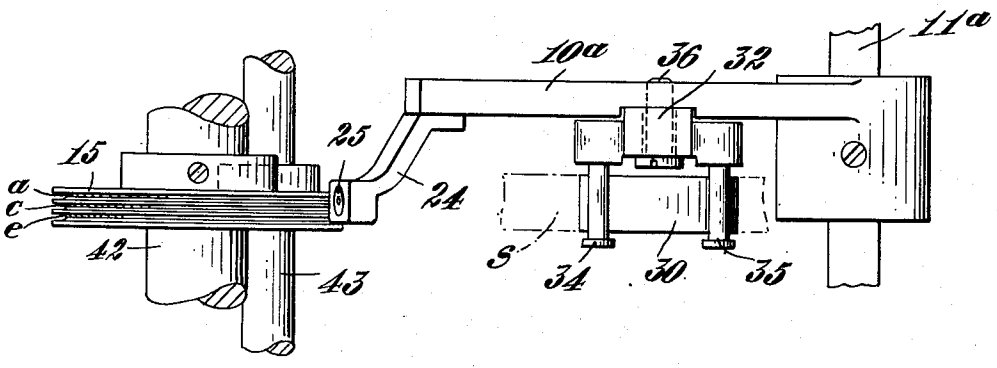


Fig. 7

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UNITED STATES PATENT OFFICE

2,665,541

MACHINE FOR MAKING CORD FROM TWISTED WEB MATERIAL

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Application June 7, 1951, Serial No. 230,330

9 Claims. (Cl. 57—32)

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This invention relates to a machine for making a twisted strand or cord from one or more continuous lengths of paper, cellophane or the like web material cut into strip form, and more particularly to a strip feeding and treating mechanism operating in conjunction with a conventional spinning frame.

The principal objects of the invention are to provide an efficient and reliable mechanism of simplified construction for drawing the web material from the supply roll, then crumpling or crushing the strip, flexing the crushed strip and feeding it to the spindle; and to provide a machine which is so designed that in event the strip or cord breaks, the draft or feeding of the strip ceases, thus providing a "stop motion."

Further objects relate to features of construction and will be apparent from a consideration of the following description and the accompanying drawings, wherein:

Fig. 1 is a side elevation of a spinning machine having a feeding and treating mechanism constructed in accordance with the present invention and providing a single operating unit;

Fig. 2 is an enlarged top plan view of the mechanism shown in Fig. 1;

Fig. 3 is a front elevation showing a plurality of the units illustrated in Figs. 1 and 2;

Fig. 4 is an enlarged diametrical section through the die illustrating the manner in which the strip material is crushed;

Fig. 5 is an enlarged section on the line 5—5 of Fig. 4;

Fig. 6 is a view, similar to Fig. 1, but showing a modified embodiment; and

Fig. 7 is an enlarged top plan view of the mechanism shown in Fig. 6.

In accordance with the present invention the machine comprises a twisting frame which may be of conventional design and construction having the usual yarn guide and associated spindle operating in conjunction with my improved feeding and treating mechanism which comprises an arm or bracket mounted on the frame above the level of the yarn guide and supporting a die through which the strip material is drawn and crushed. A pair of spaced rolls having peripheral grooves in approximate alignment are mounted above the yarn guide and one of these rolls is positioned so as to receive the crushed strip material from the delivery end of the die, and one of these rolls being driven by any suitable means and the other roll being freely rotatable. The crushed strip material passes back and forth between the grooves of the rolls so as to subject the crushed strip material to a plurality of flexing movements preparatory to the twisting or spinning. After passing back and forth between the grooved rolls, the crushed and flexed strip material then passes to the yarn guide and

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is subjected to the twisting or spinning action of the spindle.

The flexing action to which the crushed strip material is subjected is governed by the number and type of peripheral grooves, and, as here shown, V-grooves are preferred since they tend to roll and crush the strip material more effectively than grooves of other cross-sectional shape. By the time the crushed strip material is presented to the yarn guide it has been thoroughly flexed and rolled and/or otherwise worked, and hence is conditioned for twisting.

An important feature inherent in the operation of the grooved rolls, only one of which is driven, is that the action of the driven roll when combined with the pull of the spindle effects a steady uniform feeding of the strip material, but if a break occurs between the grooved roll and the spindle, the slack that immediately develops prevents further feeding and thus, in effect, produces a stop motion.

Referring to Figs. 1 to 5, the particular embodiment therein shown comprises a conventional twisting frame F, such as manufactured by Whitin Machine Works, including a yarn guide G and an associated ring R and spindle carrying the bobbin B, all of which parts are well-known in the art. For each spindle on the frame there is provided a strip feeding and treating mechanism comprising an arm 10, the inner end of which is pivotally supported on a line shaft 11 mounted in any suitable manner on the frame F, the free end of the arm 10 extending outwardly above the yarn guide G and being formed with a boss 12 bored to provide a bearing for a stub shaft 14 which projects laterally from each side of the arm. Pinned or otherwise secured to one of the projecting ends of the shaft 14 is a roll 15 formed with three V-shaped peripheral grooves *a*, *c* and *e* (Fig. 2), and pinned or otherwise secured to the other projecting end of shaft 14 is a driven wheel or drum 16, the rotation of which rotates the grooved roll 15.

The underside of arm 10 is integral with a laterally projecting lug or boss 18 drilled with a ceive a stub shaft 20 on which is mounted a freely rotatable roll 22 formed with two V-shaped peripheral grooves *b* and *d* (Fig. 2), in approximate alignment with the grooves of roll 15, as shown in Figs. 2 and 3. Secured to the side face of the arm 10 is a finger 24 the outer end of which is drilled to receive a die 25 of porcelain or other suitable wear-resistant material. The receiving end of the die is formed with a funnel-like mouth (Fig. 4) and the delivery end is in substantial alignment with the groove *a* of the roll 15, as shown in Fig. 2.

Where, as is usually preferred, the strip material to be treated is given a coating of a treating liquid, such as an aqueous solution of glue, dextrin or the like, preparatory to crushing, a

trough 28 and associated applicator roll 30 may be supported on the frame F in any suitable manner. Mounted on the side of the arm 10 is an adjustable strip guide which comprises an inverted generally Y-shaped member, the upwardly extending leg of 32 of which is provided with an elongate slot 33 and the depending arms of which carry laterally projecting guide pins 34 and 35 disposed on opposite sides of the crest of the roll of 30, as shown in Figs. 1 and 2. A screw 36 passes through the slot 33 into the arm 10 and holds the guide in a selected position of adjustment.

An upwardly and outwardly projecting bracket 40, mounted on the frame F above the yarn guide G, rotatably supports a line drive shaft 42 and also a second line shaft 44 positioned inwardly of the shaft 42. The drive 42 carries a driving drum or friction wheel 45 for each drum 16 and this shaft is driven at the proper operating speed by any suitable means (not shown). Mounted on the shaft 44 is a rocker 48 for each arm 10, the rocker 48 having a depending leg providing an operating handle 50 which extends downwardly beyond the upper edge of the frame F and an upwardly inclined arm 52 which carries a roller 54 engageable with the underside of the arm 10. The construction and arrangement of the parts, as shown in Fig. 1, are such that the driving drums or rolls 16 and 45 are normally in operating engagement and in order to disengage these parts it is merely necessary to press the handle 50 inwardly, thereby swinging the arm 10 upwardly and lifting the roll 16 from the roll 45. When the pressure on the handle 50 is released the parts drop back under the influence of gravity and are thus restored to their normal operation position.

The operation of the machine is as follows:

A supply roll 55 (Fig. 1) of suitable strip material S, such for example as 20# kraft approximately ½ inch wide, is suitably mounted above the frame F for each spindle and the strip material S passes about the guide pins 35 and 34 which hold it against the applicator roll 30 for a predetermined interval at a given speed and thus receives a coating of adhesive or other treating material. The coated strip then passes through the die 25 which crumples or crushes it longitudinally in an irregular manner, as illustrated in Fig. 5, and then passes to the grooved roll 15. Since the delivery end of the die 25 is aligned with groove *a*, as shown in Fig. 2, the strip S passes from groove *a* of roll 15 to groove *b* of roll 22, then to groove *c* of roll 15, to groove *d* of roll 22, finally to groove *e* of roll 15 and thence to the yarn guide G.

The passing back and forth from the grooves of one roll to those of the other not only flexes the coated and crushed strip material, but also rolls it and thus conditions the strip for the final spinning operation which takes place in the usual way.

Although the roll 15 is driven by the shaft 42, the rotation of this roll in and of itself is insufficient to feed the strip material to the yarn guide G, but when combined with a pull exerted by bobbin B, the roll 15 is effective to feed the strip material. This is of considerable importance because if the strip S should break between the bobbin B and roll 15, enough slack will immediately develop to prevent further feeding of the strip material, thus providing an automatic stop motion.

Another advantageous feature of this particular embodiment is that each of the feeding and treating units may be put into or taken out of operation without affecting other units in the same frame.

The embodiment shown in Figs. 6 and 7 is in all major particulars substantially the same as the previously described embodiment and the same or similar reference characters are applied to the same or corresponding parts. This embodiment is designed for use in conjunction with another commercial type of twisting frame, and the arm 10^a, carried by a shaft 11^a suitably mounted on the frame F, supports the strip guide 32—35, die holder 24 and die 25. The free end of the arm 10^a rests on the upper end of a bracket 40^a so as to hold the delivery end of the die 25 in substantial alignment with the groove *a* of roll 15, as shown more clearly in Fig. 7. The grooved roll 15 is fixed to a line drive shaft 42 which is rotatably mounted in bearing carried by the bracket 40^a supported on the frame F. The grooved roll 22 is freely rotatable on a line shaft 43 supported by a depending lug integral with the bracket 40^a, the grooves of both rolls being in approximate alignment as in the previously described embodiment.

In operation the strip material is drawn from the supply roll 55, about the guide pins 35 and 34 to contact the applicator roll 30, thereby receiving a coating of binder or other liquid, through the die 25 where it is irregularly crushed, then back and forth from the grooves of roll 15 to those of roll 22, and thence to the yarn guide G. Although the roll 15 is continuously driven, this roll alone is incapable of continuously feeding the strip material and hence operates in conjunction with the pull of bobbin B. Accordingly, a break in the strip S between the bobbin and roll 15 arrest the feeding action, as in the previously described embodiment.

While I have shown and described one desirable embodiment of the invention it is to be understood that this disclosure is for the purpose of illustration and that various modifications and changes may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

I claim:

1. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm mounted on said frame, a die carried by said arm through which the strip material is drawn and crushed, a driven roll having a plurality of peripheral grooves, and a freely rotatable roll having a plurality of peripheral grooves in approximate alignment with those of said driven roll, one of the rolls being so positioned with respect to the delivery end of said die and the other of said rolls so that crushed strip material received from said die passes back and forth from the groove of one roll to that of the other roll and thence to the yarn guide.

2. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm pivotally mounted on said frame, a die through which strip material is drawn and crushed, a first roll mounted on the end of said arm and having a plurality of peripheral grooves, said roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted in spaced relation to the first roll and having a plurality of peripheral grooves in approximate alignment with those of the first

roll so that crushed strip material may pass back and forth from the grooves of one roll to those of the other and thence to the yarn guide, and means for driving one of said rolls.

3. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm pivotally mounted on said frame, a die through which strip material is drawn and crushed, a first roll mounted on the end of said arm and having a plurality of peripheral grooves, said roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted in spaced relation to the first roll and having a plurality of peripheral grooves in approximate alignment with those of the first roll so that crushed strip material may pass back and forth from the grooves of one roll to those of the other roll and thence to the yarn guide, and means for driving said first roll.

4. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm pivotally mounted on said frame, a die carried by said arm through which the strip material is drawn and crushed, a first roll mounted on the end of said arm and having a plurality of peripheral grooves, said roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted in spaced relation to the first roll and having a plurality of peripheral grooves in approximate alignment with those of the first roll so that crushed strip material may pass back and forth from the grooves of one roll to those of the other roll and thence to the yarn guide, one of said rolls having a driving drum, a driving means mounted on said frame and engageable with said driving drum, and means for raising and lowering said arm so as to engage and disengage said driving means and driving drum.

5. In a machine for forming a twisted cord from a continuous length of strip material including a twisting frame having a yarn guide and spindle, feeding and treating mechanism comprising an arm pivotally mounted on said frame, a die carried by said arm through which the strip material is drawn and crushed, a first roll mounted on the end of said arm and having a plurality of peripheral grooves, said roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted in spaced relation to the first roll and having a plurality of peripheral grooves in approximate alignment with those of the first roll so that crushed strip material may pass back and forth from the grooves of one roll to those of the other and thence to the yarn guide, driving means mounted on said frame and operatively connected with said first roll when said arm is in lowered position, and means for raising said arm so as to disengage said driving means and first roll.

6. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm pivotally mounted on said frame, a die mounted on said arm between its pivotal connection and free end through which the strip material is drawn and crushed, a first roll mounted on the end of said arm and having a plurality of peripheral grooves, said first roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted on said arm in spaced relation to said first roll, said

second roll having at least one peripheral groove in approximate alignment with the grooves of said first roll so that crushed strip material may pass from the peripheral groove of said first roll to that of the second roll, back to the second groove of the first roll and thereafter to said yarn guide, and means for driving one of said rolls.

7. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm pivotally mounted on said frame, a die mounted on said arm between its pivotal connection and free end through which the strip material is drawn and crushed, a first roll mounted on the free end of said arm and having a plurality of V-shaped peripheral grooves, said first roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted on said arm inwardly of and in spaced relation to said first roll, said second roll having a plurality of V-shaped peripheral grooves in approximate alignment with the grooves of said first roll so that crushed strip material may pass back and forth from the grooves of one roll to those of the other roll and thence to said yarn guide, and means for driving one of said rolls.

8. In a machine for forming a twisted cord from a continuous length of strip material including a twisting frame having a yarn guide and spindle, feeding and treating mechanism comprising an arm pivotally mounted on said frame, a die mounted on said arm between its pivotal connection and free end through which the strip material is drawn and crushed, a first roll mounted on said arm and having a plurality of peripheral grooves, said first roll being arranged to receive crushed strip material from the delivery end of said die, a second roll mounted on said arm in spaced relation to said first roll, said second roll having at least one peripheral groove in approximate alignment with the grooves of said first roll so that crushed strip material may pass from the peripheral groove of said first roll to that of the second roll, back to the second groove of the first roll and thereafter to said yarn guide, and means for driving one of said rolls.

9. A machine for forming a twisted cord from a continuous length of strip material comprising a twisting frame having a yarn guide and spindle, an arm mounted on said frame, a die carried by said arm through which the strip material is drawn and crushed, a bracket mounted on said frame above said yarn guide, a driven roll mounted on said bracket and having a plurality of peripheral grooves, said driven roll being positioned to receive crushed strip material from the delivery end of said die, and a freely rotatable roll mounted on said bracket inwardly of said driven roll and having a plurality of peripheral grooves in approximate alignment with those of said driven roll so that the crushed strip material may pass back and forth between the grooves and thence to said yarn guide.

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