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GIMPING MACHINE

Filed Feb. 11, 1930

2 Sheets-Sheet 1

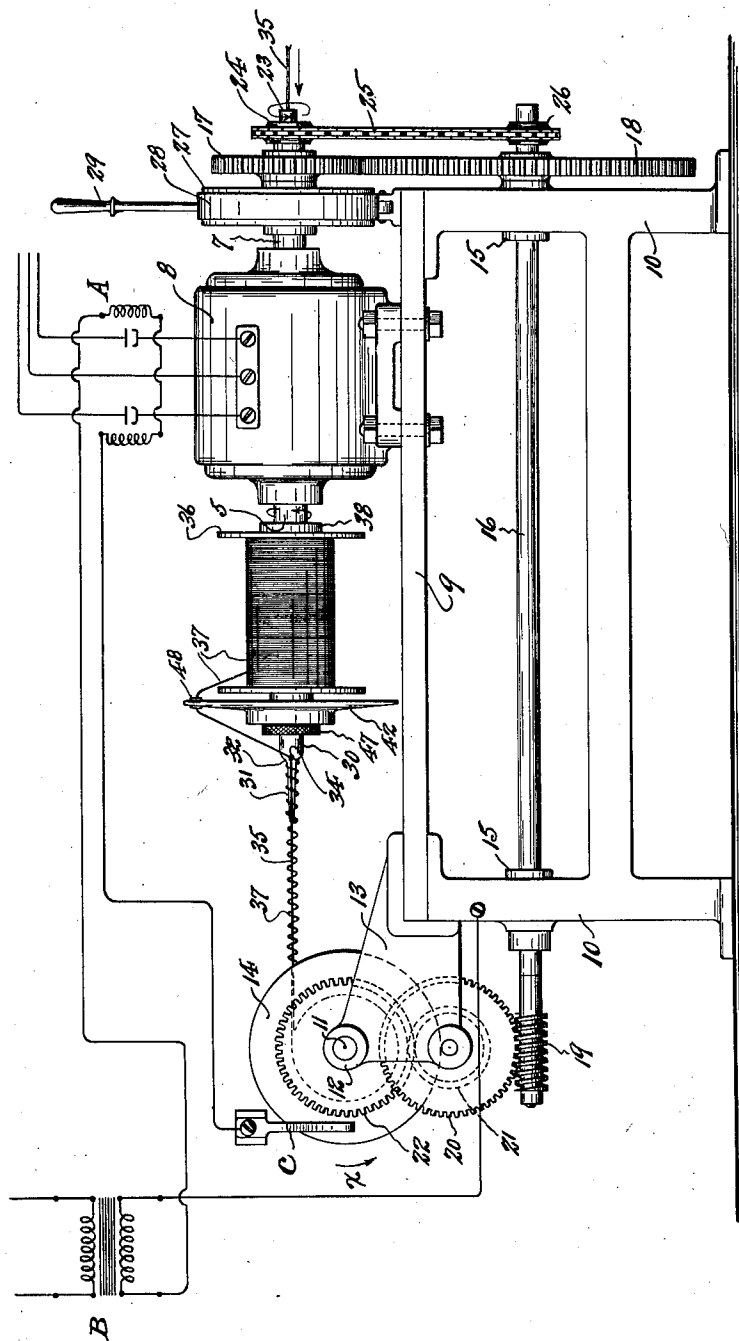


Fig. 1

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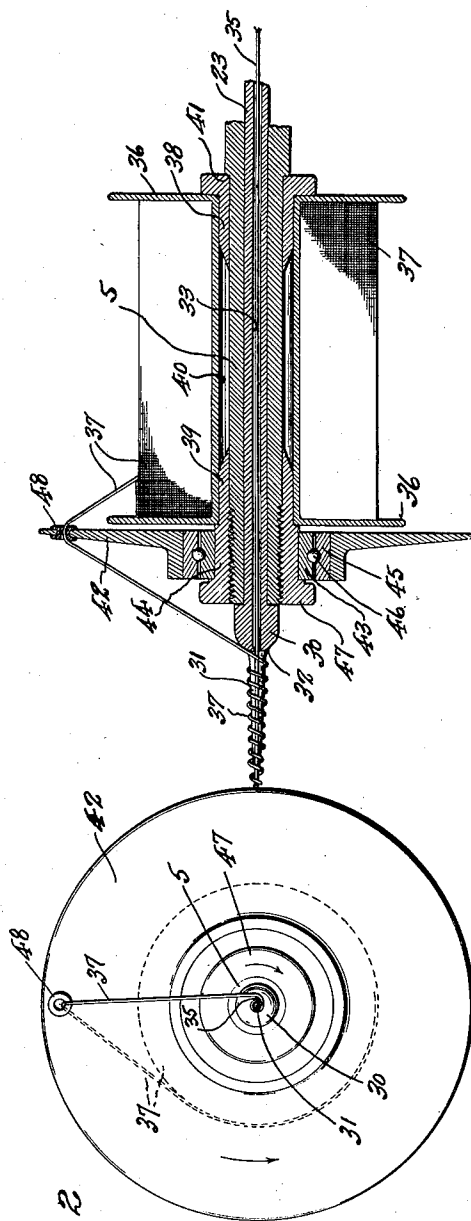


Fig. 3

Fig. 2

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GIMPING MACHINE

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This invention relates to improvements in gimping machines adapted to spirally convolute a strand of gimp material upon a carrier strand.

5 In old type gimping machines, as heretofore employed, it has been the practice to use a mechanically driven revolvable flier to draw off the gimp strand from a supply spool, the latter being mounted to freely turn under
10 the pull of the flier; the carrier strand being led along a stationary tapered, needle or mandrel, about which the flier is revolved so as to wind the gimp strand around the needle or mandrel and the carrier strand, as the latter
15 is drawn axially away from the needle or mandrel by the take-up mechanism of the machine. In the old type machines, so constructed and so operating, the flier can only be driven at a definite rate of speed bearing
20 a fixed ratio to the speed of the take-up mechanism which pulls the carrier strand through the machine. The disadvantages of these old type machines are that the size and weight of the gimp strand supply spool possible to be
25 used was, of necessity, governed by the tensile strength of the gimp strand operated on; and the speed of operation was also limited according to the tensile strength of the gimp strand. As a consequence of these limitations,
30 such old type machines were of low capacity as to amount of gimp strand possible to be used or consumed in a given single continuous run, for the reason that only comparatively small spools of gimp strand material could be satisfactorily employed; such
35 small spools requiring frequent stoppage of the machine for replacement thereof, with consequent loss of productive time in the machine operation. Furthermore, since the
40 speed of the machine was comparatively slow, its output in a given period of time was likewise relatively small.

It is the principal object of this invention to provide a novel construction of gimping machine, so constructed and possessing such
45 mode of operation, that the disadvantages above referred to are overcome, and whereby the machine may be operated at high speed with gimp strand supply spools of large capacity no matter what may be the particular

tensile strength of the gimp strand material operated on. To this end the machine is so constructed that the gimp supply spool is positively driven while the flier is freely rotatable, so that the flier will make one revolution to each revolution of the spool plus a distance substantially equal to the circumference of the needle or mandrel around which the gimp strand is turned; in other
55 words, the flier is free to turn ahead of the spool and consequently compensates the unwinding movement of the gimp strand without placing undue strain thereon, and no matter what the tensile strength of said gimp strand may be.

Another object of this invention is to provide in the novel machine of this invention an improved form of winding needle or mandrel, which is preferably rotated, and which
60 assures the formation of uniform convolutions of the gimp strand around the carrier strand.

Other objects of this invention, not at this time more particularly enumerated, will be clearly understood from the following detailed description of the same.

An illustrative embodiment of this invention is shown in the accompanying drawings, in which:—

Figure 1 is a side elevation of a gimping machine made according to this invention; Figure 2 is an end view, on an enlarged scale, of the gimp strand supply spool carrying and driving means, the associated freely rotatable flier, and the novel winding needle or mandrel cooperative therewith, and Figure 3 is a vertical longitudinal view of the parts shown in Figure 2.

Similar characters of reference are employed in the above described views, to indicate corresponding parts.

Referring to said drawings, the reference character 5 indicates a driven spindle on which the gimp strand supply spool 36 is carried. The spindle 5 may be driven by any suitable power transmitting means, although preferably, and as shown in the drawings, said spindle 5 is formed as a forward extension of the armature or rotor shaft 7 of an electric motor 8, the latter serving as a

power source for actuating all driven parts of the machine. Said motor 8 is mounted on a table, bench or other suitable support 9, preferably having a standard frame 10. Suitably fixed on a driven arbor 11, which is journaled in bearings 12 of a supporting frame-work 13 attached to the support 9, is a take-up reel 14. This take-up reel, in practice, is demountably arranged on said arbor 11 for ready detachment and replacement in any suitable or well known manner.

Power transmission means is provided intermediate said motor 8 and said arbor 11 for driving the take-up reel 14. Illustrative of one of various forms of such power transmission suitable for the purpose, the drawings show the following arrangement thereof. Journaled in bearing portions 15 connected with said standard frame 10 is a counter shaft 16. Fixed on the rear end of said motor armature or rotor shaft 7 is a drive gear 17 which meshes with and drives a gear wheel 18 fixed on said counter shaft 16. Connected with the forward end of said counter shaft 16 is a worm member 19. Rotatably mounted of in connection with said frame-work 13 is a worm gear 20, which meshes with and is driven by said worm member 19. Rotatable with said worm gear 20 is a spur gear 21 which meshes with and drives a spur gear 22, to in turn rotate said arbor 11 and the take-up reel 14 fixed thereon in the direction of the arrow *x* in Figure 1.

Said motor armature shaft 7 and the spindle extension 5 thereof is hollow or of tubular form, and extending axially therethrough is a needle or mandrel shaft 23. The rear end of said needle or mandrel shaft 23 projects beyond the rear end of the motor armature shaft 7, and fixed thereon is sprocket 24 over which runs a chain 25 which is driven by a sprocket 26 carried by said counter shaft 16. As will be evident from an inspection of Figure 1 the needle or mandrel shaft is driven in a direction opposite to that of the motor armature shaft 7 and spindle extension 5 thereof.

Said motor armature shaft 7 is provided with a brake-drum member 27, with which cooperates a brake-band 28 suitably mounted for actuation by the hand lever 29, when it is desired to quickly stop the machine after the motor circuit is interrupted.

Connected with the outer end of the needle or mandrel shaft 23 is a head portion 30 from which projects a reduced outwardly tapered winding needle or mandrel 31. The juncture of the needle or mandrel 31 with the head portion 30 is so formed as to provide a fillet 32 at the base of the shoulder formed between said needle or mandrel and head portion 30. The needle or mandrel shaft 23 and its head portion 30 is provided with a central longitudinal bore 33 terminating at the base of the needle or mandrel

31 in a discharge opening or outlet mouth 34. The carrier strand 35 is led from a source of supply through the bore 33 to emerge from the discharge opening or outlet mouth 34 for extension along the side of the needle or mandrel 31 to the take-up reel 14; the strand being secured to the latter so as to be continuously drawn away from the needle or mandrel as the gimping is formed on the carrier strand and wound up on the reel.

The reference character 36 indicates a spool on which is wound a supply of material to be used as the gimp strand. The gimp strand carried by such supply spool 36 is indicated by the reference character 37. Said supply spool 36 is fixed on said spindle 5, so as to be positively rotated thereby, by means of a rearward wedge sleeve 38 and a forward wedge sleeve 39, which are interposed between the bore 40 of the spool and the spindle 5, when the former is telescopically disposed over the latter, and whereby the spool is frictionally bound to the spindle. It will be understood that any suitable variations of the means for fastening the spool 36 to the spindle 5 may be employed within the spirit of this invention. When using the wedge sleeves 38 and 39, the sleeve 38 is backed against a shoulder 41 formed at the juncture of said spindle 5 and armature or rotor shaft 7, while the sleeve 39 is positively engaged with the end of the spindle 5, preferably by means of cooperating screw threads with which said parts are provided.

Freely rotatable, adjacent to the forward end of the supply spool 36, when the same is operatively fixed on the spindle 5, is a flier 42, the same preferably being in the form of a light weight aluminum disk. To thus mount the flier 42, a ball-bearing or other form of anti-friction means is provided; one or the inner race member 43 of which is carried by an exteriorly projecting and preferably diametrically enlarged extension 44 of the forward wedge sleeve 39, and the other or outer race member 45 of which is centrally secured to the flier 42; the intermediate anti-friction balls or the like 46 being interposed between said race members 43 and 45. Said forward wedge sleeve 39 is preferably provided, at its outer free end, with an enlarged head 47, which serves both as a finger piece for manipulating the same and as a stop to prevent outward displacement of the flier from its operative assembled relation to the gimp strand supply spool 36. Said flier disk 42 is provided adjacent to its outer periphery with an opening or eye, which may take the form of an eyelet member 48 of hard material, such as agate or the like, which is adapted to withstand the wear of the gimp strand 37 moving therethrough, while at the same time offering a minimum of frictional resistance to

the free movement of said gimp strand there-through.

When the machine is made ready for operation, the carrier strand 35 (which may be of any suitable material, such e. g. as a cord) is led through the bore 33 of the needle or mandrel shaft 23 to emerge from the opening or mouth 34 of the head portion 30, thence extending along the side of the tapered needle or mandrel 31 to the take-up reel 14 to which it is secured. The supply spool 36, which carries the gimp strand 37 (which may be of any suitable material, such e. g. as flat ribbon-like metallic wire) is fixed on the spindle 5, with the flier disk 42 rotatably mounted adjacent to its free end. The gimp strand is led from the supply spool 36 through the eyelet member 48 of the flier, and thence down to the needle or mandrel 31, so as to wind around the latter and the carrier strand 35 moving along the same. With the materials thus operatively related to the machine, the latter is operated under the power of the motor, whereby the take-up reel 14 is rotated to draw forward and reel up the product as the gimp strand is wound around the carrier strand. While the take-up mechanism is thus operated, the supply spool is positively rotated to unwind the gimp strand therefrom, the flier disk 42, moving in the direction of the spool rotation and under the pull of the gimp strand as it unwinds from the spool, serves to carry the gimp strand around the needle or mandrel 31 and carrier strand, thus forming running convolutions of the gimp strand around the carrier strand, which convolutions or gimps are drawn off the tapered needle or mandrel by the movement of the carrier strand toward the take-up reel 14. When the gimp strand supply spool 36 makes one revolution, the flier disk 42 also makes one revolution plus the distance around the needle or mandrel taken up by the winding of the gimp strand thereon. It will thus be seen, that the flier will move ahead of the spool, and will compensate the feeding movement of the gimp strand relative to the winding movement thereof, without imparting undue strain or stress upon the gimp strand in excess of its tensile strength, no matter what the latter may be. The spool being positively driven, the weight of the supply of gimp strand thereon does not have to be dragged around by the pull of the gimp strand, and consequently the supply spool may be made of comparatively large capacity, without risk of straining the gimp strand beyond its tensile strength, and without necessity for restricting the speed of operation. In fact the novel machine of this invention has been operated with a supply spool speed of 7,000 R. P. M., said spool and content having an initial weight in excess of six pounds, and the gimp strand carried thereby consisting in

thin copper ribbon measuring .002" by .018". Operation at such speed with such weight and kind of gimping material would be impossible of attainment were the pull of the gimp strand depended on to rotate the supply spool for feeding movement.

The novel machine of this invention can be operated in the manner above described, with the needle or mandrel 31 held stationary. It has been found very advantageous, however, to rotate the needle or mandrel, in the direction of winding the gimp strand therein, which is a direction opposite to the direction of rotation of the supply spool. Such rotation increases the speed of production, and assists in maintaining the gimp convolutions uniform. Another advantage in the use of the rotating needle or mandrel lies in the fact that, by varying the ratio of speed of rotation of the needle or mandrel relative to the speed of rotation of the supply spool, the degree of tightness of the gimp convolutions can be varied proportionally. Another advantage of the mode of operation of the machine of this invention, is that the gimped product is free from undue twist, that is, it is less likely to turn on itself under the tendency of the convolutions to unwind.

The special form of needle or mandrel structure also presents advantages over the old form of straight tapered needle. With the straight tapered needle or mandrel, when the flier revolves around the point of the needle, due to irregularities in the take up of the finished product or other causes, the gimp strand is likely to fluctuate or vary as to the position in which it meets the needle or mandrel as the winding is initiated. Sometimes it will wind near the point and sometimes near the base of the taper, resulting in a variation in the diameter of the gimp strand convolutions. In the machine of this invention, the tapered mandrel or needle 31 extends from the enlarged base head 30, with the intermediate curved fillet 32. The gimp strand 37 is led at such angle from the flier as to be guided by the head 30 and fillet 32 to the needle or mandrel 31, in such manner as to assure uniform gimp convolutions, the head 30 and its fillet 32 acting as a stop against rearward displacement of the gimp strand 37, and thus assuring that it meets the needle or mandrel at the same point in initiating each wound convolution thereof.

When the novel gimping mechanism is electrically driven by a motor, and the gimping material is metallic, it is of advantage to provide automatic means for interrupting the motor operating circuit to stop the motor, and consequently the machine, in event the gimp strand should break. To this end the motor circuit is provided with a relay controlled motor circuit interrupter A.

The relay circuit may be supplied by circuit of suitable voltage from any source, as,

for example, by a step down transformer B. One size of said transformer is connected to the machine as a ground, and the other side of the transformer B is connected through the relays of the relay controlled motor circuit interrupter to a contact brush C, which contacts with the metal take-up reel 14 (the latter being insulated from the ground formed by the machine in any suitable manner). The circuit is therefore completed through the metallic gimping material and thence through the ground formed by the machine. It will be obvious that, if the metallic gimping material breaks, the relay circuit will be broken so as to actuate motor circuit interrupter means, the latter being designed to remain in circuit closing condition only while current flows through said relay circuit.

As many changes could be made in the above described construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:—

1. In a machine of the kind described, a tapered mandrel having means to deliver a carrier strand to run axially parallel thereto, a take-up means for drawing said carrier strand along the mandrel, means concentric to the axis of said mandrel for positively rotating a gimp strand supply spool, a flier means freely rotatable about the axis of said mandrel, said flier means being located intermediate said supply spool and the tapered extremity of said mandrel, and means for rotating said mandrel in a direction opposite to the direction of rotation of said supply spool.

2. In a machine of the kind described, a hollow rotatably driven spindle, a mandrel shaft extending axially through said spindle, said mandrel shaft terminating in a tapered mandrel projecting exteriorly beyond the free end of said spindle, said mandrel shaft having a longitudinal passage terminating in a discharge mouth adjacent to the base of said tapered mandrel through which a carrier strand may be led to move longitudinally along the length of said mandrel, a gimp strand supply spool secured on said spindle for rotation therewith, a flier means having an opening through which is passed a gimp strand unreeled from said spool, and from which said gimp strand extends to said mandrel so as to be wound around the same and said carrier strand, said flier means being mounted for free rotation about the axis of said mandrel shaft and spindle, and means to rotate said mandrel in a direction opposite to the direction of rotation of said supply spool.

3. In a machine of the kind described, a hollow rotatably driven spindle, a mandrel shaft extending axially through said spindle, said mandrel shaft terminating in a tapered mandrel projecting exteriorly beyond the free end of said spindle, said mandrel shaft having a longitudinal passage terminating in a discharge mouth adjacent to the base of said tapered mandrel through which a carrier strand may be led to move longitudinally along the length of said mandrel, a gimp strand supply spool secured on said spindle for rotation therewith, a flier means having an opening through which is passed a gimp strand unreeled from said spool, and from which said gimp strand extends to said mandrel so as to be wound around the same and said carrier strand, said flier means being mounted for free rotation about the axis of said mandrel shaft and spindle, means to rotate said mandrel in a direction opposite to the direction of rotation of said supply spool, and driven means to draw off gimped material from said mandrel.

4. In a machine of the kind described, a rotatably driven spindle, a mandrel head axially aligned with and projecting beyond the free end of said spindle, said mandrel having a forwardly extending tapered mandrel of reduced cross section, a fillet shoulder at the juncture of said mandrel head and tapered mandrel, said mandrel head having a carrier strand passage provided with a discharge mouth adjacent to the fillet shoulder thereof whereby a carrier strand may be drawn longitudinally along the side of said tapered mandrel, a gimp strand supply spool secured on said spindle for rotation therewith, a flier means having an opening through which is passed a gimp strand unreeled from said spool, and from which said gimp strand extends to said mandrel so as to be wound around the same and said carrier strand, said fillet shoulder operating to hold said gimp strand against displacement from initial winding relation to said mandrel, said flier means being mounted for free rotation about the axis of said spindle and intermediate said mandrel and supply spool, and means to rotate said mandrel head and mandrel in a direction opposite to the direction of rotation of said supply spool.

5. In a machine of the kind described, a rotatably driven spindle, a mandrel head axially aligned with and projecting beyond the free end of said spindle, said mandrel head having a forwardly extending tapered mandrel of reduced cross section, a fillet shoulder at the juncture of said mandrel head and tapered mandrel, said mandrel head having a carrier strand passage provided with a discharge mouth adjacent to the fillet shoulder thereof whereby a carrier strand may be drawn longitudinally along the side of said tapered mandrel, a gimp strand supply spool

secured on said spindle for rotation therewith, a means having an opening through which is passed a gimp strand unreeled from said spool, and from which said gimp strand
5 extends to said mandrel so as to be wound around the same and said carrier strand, said fillet shoulder operating to hold said gimp strand against displacement from initial winding relation to said mandrel, said flier
10 means being mounted for free rotation about the axis of said spindle and intermediate said mandrel and supply spool, means to rotate said mandrel head and mandrel in a direction opposite to the direction of rotation of said
15 supply spool, and driven means to draw off gimped material from said mandrel.

6. In a machine of the kind described, a hollow rotatable spindle, an electric motor for driving said spindle, a mandrel having
20 a tapered portion in axial alignment with said spindle and having means to deliver a carrier strand for longitudinal movement adjacently parallel to said tapered portion, a spool to hold a supply of metallic gimp strand, said
25 spool being fixed on said spindle so as to be rotated thereby, a flier means freely rotatable about said spindle intermediate said tapered mandrel portion and spool, a relay controlled motor circuit interrupter, and a relay circuit
30 serving said interrupter arranged to include the metallic gimp strand.

7. In a machine of the kind described, a hollow rotatable spindle, an electric motor for driving said spindle, a mandrel having a
35 tapered portion in axial alignment with said spindle and having means to deliver a carrier strand for longitudinal movement adjacently parallel to said tapered portion, a spool to hold a supply of metallic gimp strand, said
40 spool being fixed on said spindle so as to be rotated thereby, a flier means freely rotatable about said spindle intermediate said tapered mandrel portion and spool, a take-up means to draw off gimped material from said
45 tapered mandrel portion, transmission means for actuating intermediate said motor and take-up means, a relay controlled motor circuit interrupter, and a relay circuit serving said interrupter arranged to include the metallic gimp strand.
50

In testimony, that I claim the invention set forth above I have hereunto set my hand this 6th day of February, 1930.

DANIEL J. MAYER.