

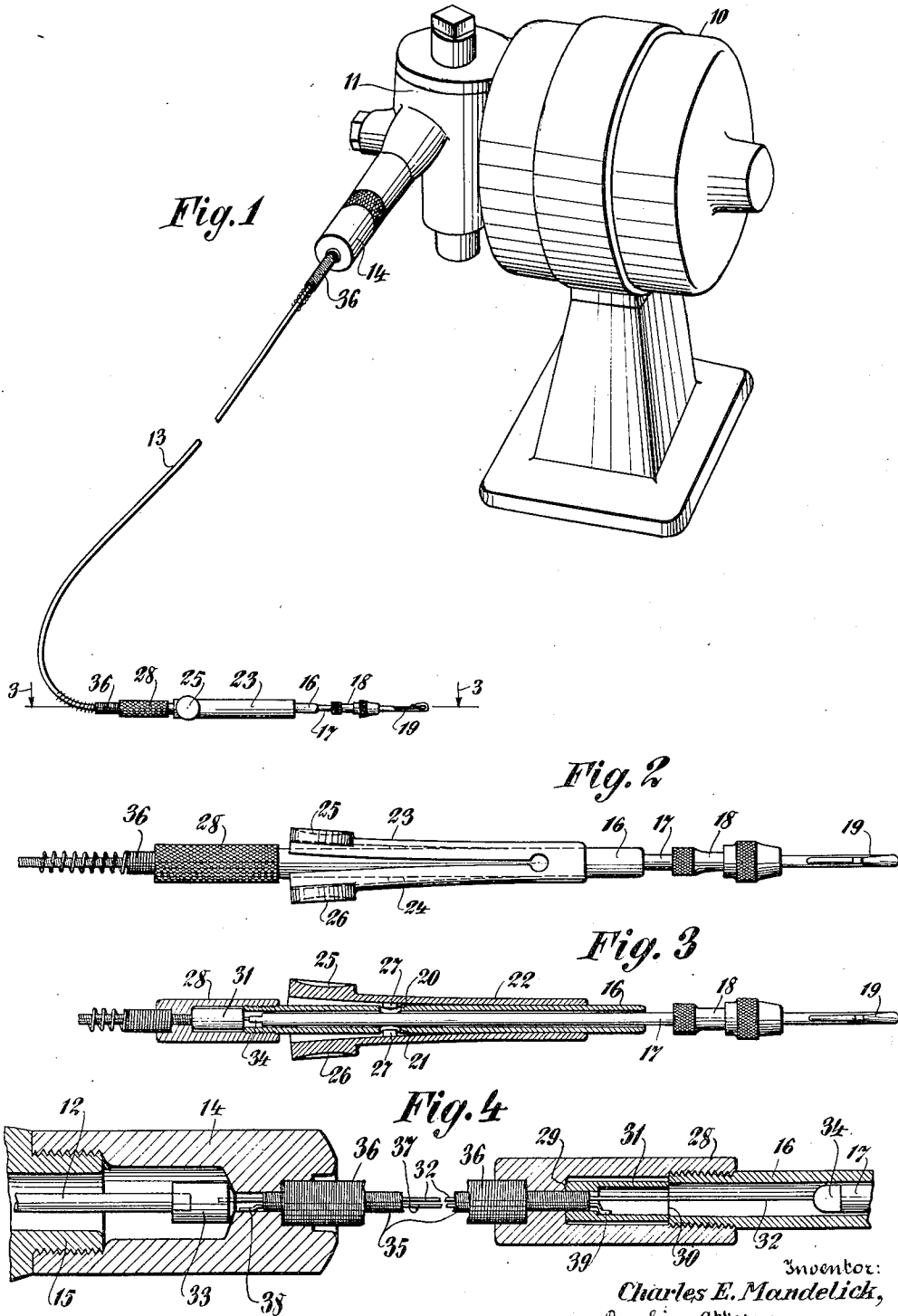
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MACHINE FOR RELOOPING THE RUNS IN STOCKINGS AND OTHER KNITTED FABRICS

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# UNITED STATES PATENT OFFICE

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## MACHINE FOR RELOOPING THE RUNS IN STOCKINGS AND OTHER KNITTED FABRICS

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The invention relates in general to a machine for re-looping the runs in stockings and other knitted fabrics, and the invention particularly relates to the flexible driving connection between the motor, or other source of reciprocating power, and the re-looping needle or other tool employed for re-looping and otherwise repairing the runs in hosiery. The present invention constitutes an improvement in the Bowden wire form of flexible connection disclosed in Patent No. 1,745,462 to William D. Van Dyke, issued February 4, 1930.

In the above identified patent there is disclosed a manually actuated handle slidably mounted in which is a rod constituting a tool carrier, at one end of which is a tool chuck in which a re-looping needle is demountably positioned and the opposite end of which carrier is connected by means of a Bowden wire with mechanism for translating the rotary movement of an electric motor into reciprocatory movement of the impulse member mounted in the Bowden wire. The Bowden wire includes the conventional form of spirally wound cable or shield, one end of which is secured to the frame of the motor and the other end of which is secured to the rear end of the handle.

It is understood that in actual practice the looping needle is reciprocated at high speed and that it is required in the most perfected operation of machines of this character that the handle be held loosely so as to permit the needle to feed itself automatically along the run. When such machines are so lightly held and driven at high speed there develops a tendency to set up a vibratory movement in the handle which at times becomes unmanageable and jerks the needle out of its operative position in the run. This vibratory movement of the handle became extremely annoying to the operator as she was not sure when the needle would jump into the knit portion of the stocking, starting another run, and further this vibration of the handle became extremely wearing, tiring and otherwise detrimental to the comfort and efficiency of the operator.

Another disadvantage inherent in the con-

ventional Bowden wire drive in such machines is that an operator was very apt to stretch or elongate the spiral cable either by pulling on the handle or by bending the flexible cable, and it was noticed that even the stretching of the cable due to the friction between the contained reciprocating impulse member and the enclosing spiral cable had the effect of elongating the latter. Any elongation of the flexible spiral cable caused the handle to approach the tool clutch, even to the extent of touching it. This variation in the length of the enclosing spiral wire cable resulted in a variation in needle stroke and sometimes even in a stoppage of the needle while engaged in re-looping the ladder forming the run. This variation in position of the handle relative to the mean or average position of the handle had the effect, of course, of varying the stroke of the needle, with the result that it would skip a stitch and thus fail to function or would unduly pull the succeeding loops in varying amounts, resulting in an unsatisfactory appearance of the finished work.

Accordingly, the primary object of the invention is to provide a form of drive connection between the reciprocating source of power and the hand guided needle which will permit a freedom of movement of the needle such as characterizes Bowden wire driven connections now known, and at the same time which will minimize, if not entirely eliminate, any vibration at the handle.

Another object of the invention is to provide a form of driving connection in which the path of reciprocatory movement of the needle will be fixed relative to the handle and thus insure uniformity in the operative strokes of the needle.

Another object of the invention is to provide a simple driving connection of the type referred to, which is easily connected to or disconnected from the source of power and the repair needle, so that it may be readily removed or replaced without special knowledge or skill on the part of the operator.

Broadly these objects of the invention are attained by fixing the handle relative to the machine when considered longitudinally of

the length of the intermediate driving connection, or, differently expressed, to connect opposite ends of the spiral cable in such way that elongation or contraction of the cable is prevented while maintaining a freedom of movement of the handle end of the cable.

In mounting driving connections of the type herein discussed to the driving power mechanism at one end and to the handle at the opposite end extreme care must be exercised in preventing any twist or torsion in the reciprocating impulse member contained in the cable, and this is especially true in constructions such as is herein disclosed where it is necessary to maintain the hooked side of the needle facing away from the operator and in the direction of the run to be repaired.

Accordingly another object of the invention is to provide in connection with the modified Bowden wire construction herein featured, a simplified form of coupling connection therefor which will permit the screwing of the opposite end of the drive into position without rotating or otherwise distorting the contained impulse member.

Various other objects and advantages of the invention will be in part obvious from an inspection of the accompanying drawing, and in part will be more fully set forth in the following particular description of one form of mechanism embodying my invention, and the invention also consists in certain new and novel features of construction and combination of parts hereinafter set forth and claimed.

In the accompanying drawing:

Fig. 1 is a view in perspective of a mechanically actuated fabric run re-looping machine equipped with a driving connection constituting a preferred embodiment of the invention.

Fig. 2 is an enlarged view of the handle end of the connection shown in Fig. 1 with parts of the flexible cable broken away.

Fig. 3 is a view similar to Fig. 2 showing parts of the handle, clutch and coupling structure in axial section, and

Fig. 4 is an axial sectional view further enlarged showing the manner of connecting the flexible cable at opposite ends and with the intermediate part of the flexible connection broken away.

In the drawing, and referring first to Fig. 1, there is disclosed an electric motor 10 operatively connected to a motion translating device and slip clutch form of drive contained in the casing 11 for reciprocating power member 12, reference being had to the above identified Patent No. 1,745,462 for a detail of one form of slip clutch mechanism for reciprocating the member 12. At the motor end of the flexible connection 13 herein featured is a sleeve connector 14 threaded on to a stud 15 forming part of the mechanism containing casing 11. At the free end

of the flexible connection is a long pencil-like sleeve forming a handle 16 in which a tool carrier 17 is mounted for reciprocatory movement. The tool carrier projects beyond the free end of the handle and has secured thereto a tool chuck 18 in which is demountably positioned a looping needle 19 of the sliding latch type. The tool handle is provided intermediate its ends with a pair of diametrically opposing apertures 20 and 21, and positioned on the handle is a sleeve 22 secured thereto at its forward end and having its rearward end split to form bifurcated parts 23 and 24. The free ends of these parts are provided on their outer sides with concaved disks 25 and 26 forming finger cups for receiving the thumb and one of the fingers of the hand of the operator. Each of the parts 23 and 24 is provided with an inwardly extending clutching lug 27, which lugs project toward each other and act when the finger cups are pressed towards each other to clutch the tool carrier 17 and thus hold the needle from reciprocating, all as is more fully described in the pending application Serial No. 359,408, filed April 30, 1929 by George T. Walker. It is understood that when the needle carrier is thus held the motor continues to turn, the necessary slippage being provided by some form of slip clutch connection contained in the part of the drive within the casing 11.

The rear end of the handle is externally threaded and on to the threaded end is screwed a bushing 28; the bore of which is enlarged to form a stop shoulder 29. Between the shoulder 29 and the adjacent end 30 of the handle is positioned a coupling sleeve 31 held against relative endwise movement but free to rotate about its own axis. Extending between the tool carrier 17 at one end and the reciprocating power member 12 at the other end of the flexible connection is a thin flexible, reciprocating wire 32, hereinafter referred to as an impulse member, conventionally secured at opposite ends by means of connectors 33 and 34. This impulse member extends loosely through the usual spirally wound or housing cable 35 forming part of the flexible connection 13, one end of which is secured to the connector 14 and the other end of which is secured to the bushing 31 as particularly shown in Fig. 4. In order to minimize tendency of the flexible connection 13 to bend or kink at its connection with the connector 14 or with the bushing 28, it is suggested that an outer relatively short spirally wound shield 36 be disposed to encircle the connection and secured to the connector and bushing.

The disclosure particularly features the inclusion within the flexible connection of an additional flexible wire 37 preferably a thin flat rod, hereinafter referred to as an anchoring member, one end 38 of which is secured

as by welding to the connector 14 and the other end 39 is similarly secured to coupling sleeve 31.

In operation and assuming that the flexible connection as a whole is to be secured to the casing 11 the connector 14 is screwed on to the stud 15 while permitting the handle end of the connector to turn freely. The bushing 28 may then be screwed on to the handle 16 while maintaining the needle and its handle in its proper position in the plane intermediate the finger cups 25 and 26, as shown in Figs. 2 and 3. It will be noted that the bushing 28 can be turned freely about the coupling sleeve 31 without tendency to rotate or otherwise distort the impulse member 32.

It is noted that the anchoring member 37 provides a longitudinally rigid connection between the connector 14 and the sleeve 31 so that it is not possible to elongate the spirally wound cable 35, and at the same time this anchoring wire in no way interferes with the required flexibility of movement of the handle. With the machine in operation it is the usual practice for the operator to hold the handle by means of the thumb and first finger engaging the finger cups which permits the needle in the end of the handle to feed itself automatically along the run, and at the same time the operator simply by pinching the cups with two fingers towards each other can instantly stop the reciprocation of the needle regardless of motor operation.

By means of a device of the character described it has been possible to eliminate any material vibratory movement of the handle as a whole and possibility of the handle jumping out of the run has been largely eliminated. As the Bowden wire can be easily and quickly mounted in position without danger of kinking or otherwise distorting the impulse member, it has been found possible to utilize in a construction of the type under discussion a relatively light, frail form of Bowden wire drive with a resulting ease of operation and the providing of a more delicate control of the tool by the operator in the act of inserting the tool in place and in supporting the tool in its operative movements than has been possible with the old form of Bowden wire drive connection.

I claim:

1. In a flexible power transmission member, the combination of a tubular handle, an impulse member extending through said handle, a cable for protecting the portion of said impulse member leading to said handle and having an end intruded into the handle, an anchoring member extending through the cable and having an end projecting therefrom into the handle, and means secured to said ends of the cable and anchoring member for securing the cable and anchoring member while permitting the handle to rotate freely about the same.

2. In a device of the class described, the combination of a bushing provided with a bore enlarged at one end to form a shoulder, a handle forming sleeve threaded into the other end of the bore, a coupling sleeve mounted in the bushing bore between the shoulder and the handle forming sleeve and detached therefrom to permit free rotary movement between the coupling sleeve and the handle forming sleeve, a cable having an end intruded into the end of the bushing provided with the shoulder and secured inside the coupling sleeve, a thin flat rod constituting an anchoring member contained in the cable and having an end secured to the coupling sleeve, an impulse member extending freely through the bushing and coupling sleeve and into the handle forming sleeve, and a spirally wound shield encircling the portion of the cable which is intruded into the bushing.

3. In a device of the class described, the combination of a bushing provided with a bore enlarged at one end to form a shoulder, a handle forming sleeve threaded into the other end of the bore, a coupling sleeve mounted in the bushing bore between the shoulder and the handle forming sleeve and detached therefrom to permit free rotary movement between the coupling sleeve and the handle forming sleeve, a cable having an end intruded into the end of the bushing provided with the shoulder and secured inside the coupling sleeve, a thin flat rod constituting an anchoring member contained in the cable and having an end secured to the coupling sleeve, and an impulse member extending freely through the bushing and coupling sleeve and into the handle forming sleeve.

4. In a flexible power transmitting device, the combination of two tubular members one of which is movable relative to the other, a coupling sleeve mounted in one of said members, means restraining axial movement of the coupling sleeve while permitting it to rotate with respect to tubular member in which it is mounted, an impulse member extending freely through said tubular members and coupling sleeve, a spirally wound cable enclosing said impulse member, an anchoring member having its mid-portion contained in said cable and its ends projecting beyond the cable, said cable and anchoring means each having one end secured to the coupling sleeve in one of the tubular members thereby to turn freely with respect to said tubular member and having its other end secured to the other tubular member, the bore of one of said tubular members at the end thereof facing the other tubular member being enlarged, and a relatively short spirally wound shield encircling the cable, intruded into said enlarged portion of the bore, projecting therefrom and acting to

minimize sharp bends of the cable at its jointure with said tubular member.

5     5. In a flexible power transmitting device, the combination of two tubular members one of which is movable relative to the other, a coupling sleeve mounted in one of said mem-  
10     bers, means restraining axial movement of the coupling sleeve while permitting it to rotate with respect to the tubular member in which it is mounted, an impulse member  
15     extending freely through said tubular members and coupling sleeve, a spirally wound cable enclosing said impulse member, and an anchoring member having its mid-portion contained in said cable and its ends projecting beyond the cable, said cable and anchoring means each having one end secured  
20     to the coupling sleeve in one of the tubular members and having its other end secured to the other tubular member thereby to turn freely with the same.

Signed at New York in the county of New York and State of New York this 13th day of April, A. D. 1929.

25     CHARLES E. MANDELICK.

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