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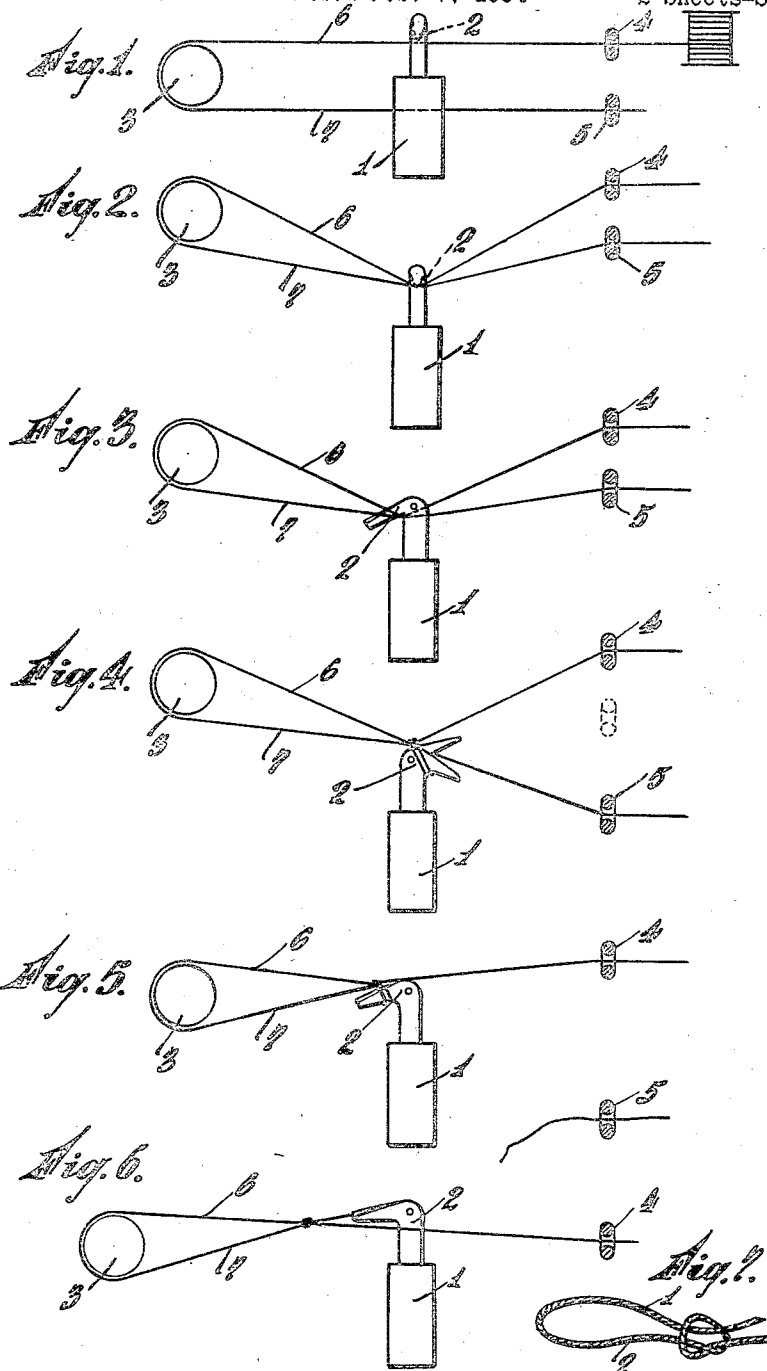
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MACHINE FOR LAYING A KNOT

Filed Feb. 7, 1934

2 Sheets-Sheet 1



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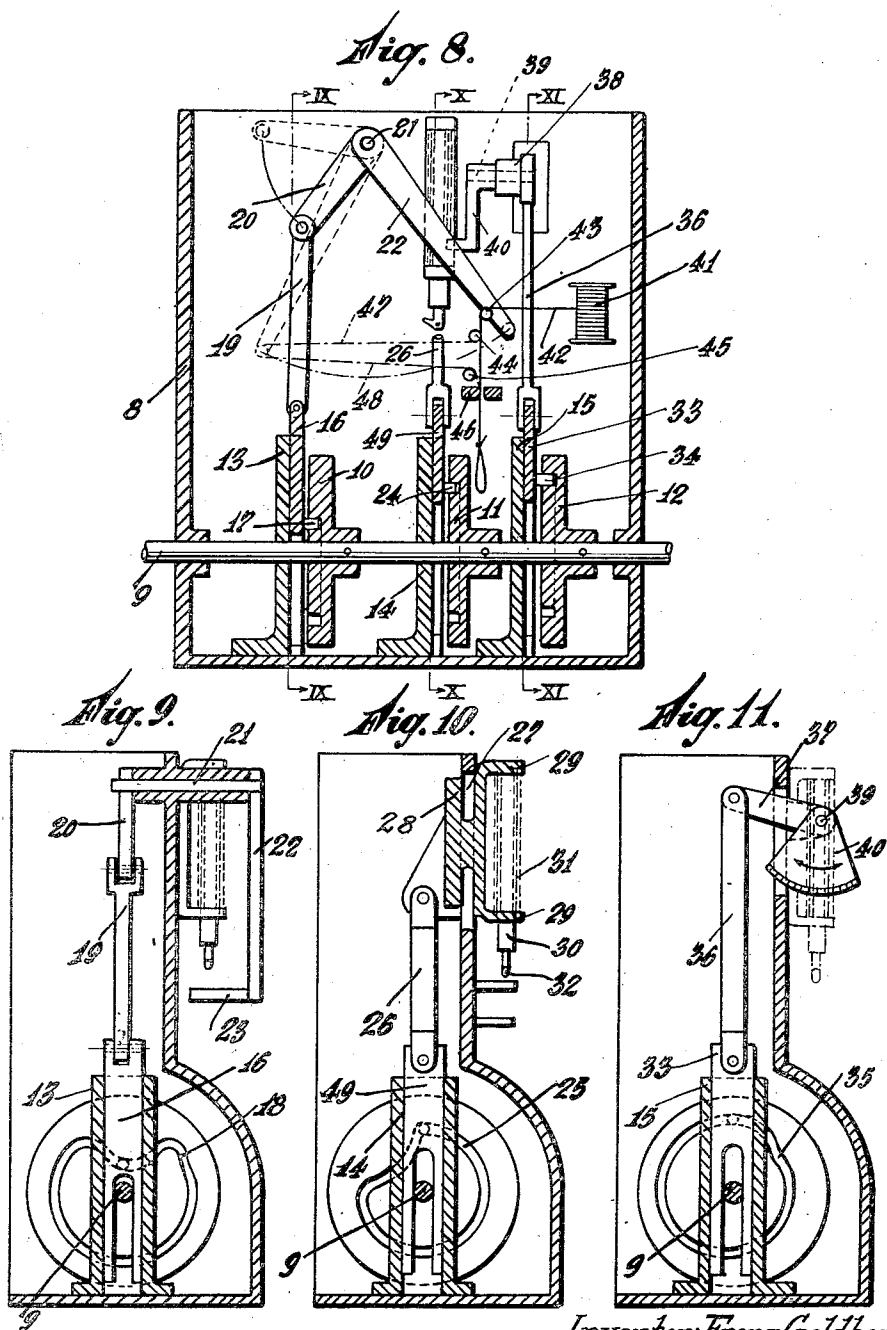
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UNITED STATES PATENT OFFICE

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MACHINE FOR LAYING A KNOT

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Application February 7, 1934, Serial No. 710,190

1 Claim. (Cl. 289—2)

It is already known to mechanically knot to-
gether two or more strings by means of a knotting
beak. In the prior machines a knot is made
occupying a fixed position relatively to the
strings.

In contra-distinction herewith the invention
has for its object to mechanically lay a knot in
the one string of two strings of a doubled-over
string, which knot is slidable over the other
string, whereby the manual laying of such a so-
called sliding knot, which up to the present was
necessary, is avoided.

A knot of this kind whereby a sliding sling is
formed is very useful in various applications
amongst which as examples may be mentioned
the mechanical provision of a sliding sling in
marking—or pricecards adapted to be attached
to articles, e. g. in the art of ready made clothes,
the rapidly tying up of uniform small packages,
the tying up of individual bags of tea, etc. In
all these examples the hitherto known mechan-
ically made but non-slidable knot cannot be used.

The machine for mechanically making a slid-
ing knot according to the invention comprises a
rotatable and axially movable knotting beak de-
vice at the one side of which a holder is located
for holding the merging ends of the strings of a
doubled-over string while at the other side of the
knotting beak device two string guides are ar-
ranged so as to keep at this point the strings at
such distance from each other, that after the
pulling of the strings towards one another by an
axial movement of the knotting beak device
during the subsequent rotation of this device one
of the strings only can be gripped by the latter.

The invention will be more fully described with
reference to the accompanying drawings illustrat-
ing the various phases of operation of the ma-
chine as well as one embodiment thereof.

Figs. 1-6 are schematical views of six successive
operations performed by the machine.

Fig. 7 illustrates a knot made by the machine.

Fig. 8 is a front elevation, partly a section, of
an embodiment of the machine.

Fig. 9 is a section on the line IX—IX in Fig. 8.

Fig. 10 is a section on the line X—X in Fig. 8.

Fig. 11 is a section on the line XI—XI in Fig. 8.

In Fig. 1 the knotting beak device 1 is shown
in the position in which the beak 2 is directed
rearwardly. At the left of the knotting beak de-
vice 1 a holder 3 is located over which a string
is passed which is further guided by two string
guides 4 and 5, mounted at the right of the knot-
ting beak device, so that a doubled-over string is
obtained, consisting of the strings 6 and 7. In

the initial position of the machine the beak 2 is
located above the strings 6 and 7 disposed above
each other.

Now, the knotting beak device 1 is lowered,
whereby the strings 6 and 7 are pulled down-
wardly by the beak 2 so that the position accord-
ing to Fig. 2 is obtained. Thereupon the knot-
ting beak device 1 is turned through 90° (Fig. 3)
and thereafter is turned through 180° (Fig. 4) in
the same direction. During the latter rotation
the beak 2 is opened and the string guide 5 is
lowered so that on a further rotation of the
knotting beak device 1 in the same direction
through 180° the string 7 only is engaged by the
beak 2 and is cut through during the subsequent
closing of the beak, the end of the cut string in
which the knot is to be laid being held fast by
the meanwhile closed beak 2.

Finally, after the knotting beak device 1 has
reached the position of Fig. 5, the string loop
around the beak 2 is withdrawn from the beak due
to the displacement of the holder 3 (Fig. 6) to
the left, the string end held by the beak 2 being
then pulled through the loop so that finally a knot
according to Fig. 7 is obtained.

Figs. 8-11 schematically illustrate an embodi-
ment of the machine adapted to perform the
above described operations.

In the box shaped machine frame 8 the main
driving shaft 9 is rotatably supported. To the
shaft 9 grooved pulleys 10, 11 and 12 are secured
which serve to actuate the movable parts of the
mechanism. Adjacent the grooved pulleys the
guides 13, 14 and 15 respectively are mounted,
which guides are rigidly attached to the machine
frame 8.

The guide 13 serves to guide the slide 16 dur-
ing rectilinear vertically reciprocating movement,
said slide carrying a projection 17 engaging a
groove 18 in the pulley 10.

The upper end of the slide 16 is connected to
the arm 20 by a connecting link 19, said arm 20
being attached to the one end of the shaft 21,
rotatably supported by the machine frame 8, to
the other end of which shaft the arm 22 is at-
tached, which at its free end is provided with
a finger 23. The groove 18 in the pulley 10 has
such a shape that the arm 22 together with the
finger 23 is movable between the positions indi-
cated in Fig. 1 in full and in dotted lines.

The guide 14 serves to guide the slide 49, dur-
ing its vertically reciprocating movement, which
slide carries a projection 24 that is in engage-
ment with the groove 25 in the pulley 11. The upper
end of the slide 49 is connected to the slide 28

by means of a connecting link 26, the latter slide 28 being guided in a slot 27 in the machine frame 8 and provided with two forwardly projecting arms 29 between which the knotting beak device 30 is mounted for rotation. The outer shell of the knotting beak device located between said arms 29 is at the exterior provided with a toothed rim 31 extending throughout the entire length of the shell. The purpose of said rim will be explained hereinafter. Within the shell, provided with said exterior toothed rim 31, the actuating means (not shown and described for instance in the German Patent No. 132,181 to Howard Darling Colman) for the opening and closing of the jaws of the beak 32 are arranged. The groove 25 in the pulley 11 has such a shape that at a full revolution of the pulley 11 the knotting beak device 30 performs the reciprocating movement required for the laying of a knot and the subsequent returning to its initial position.

The guide 15 serves to guide the slide 33 during its rectilinear vertically reciprocating movement, which slide carries a projection 34 that is in engagement with the groove 35 in the pulley 12.

The upper end of the slide 33 is connected by the connecting link 36 to an arm 37 which is attached to the one end of a shaft 39 supported by a bearing 38 on the machine frame 8; to the other end of said shaft a gear sector 40 is secured. The teeth of the gear sector 40 are in engagement with the toothed rim 31 on the outer shell of the knotting beak device 30. The groove 35 in the pulley 12 has such a shape that at a full revolution of the pulley 12 the knotting beak device performs the rotation required for the laying of a knot and the subsequent returning to its initial position.

The machine is further provided with a bobbin holder (not shown) supporting the string bobbin 41, from which the string 42 is guided over the string guides 43, 44, 45, a gripping mechanism 46 serving to hold the string end.

When moving the arm 22 from the full line position to the dotted position the finger 23 will come into contact with the string portion between the string guides 44 and 45 and will unwind such

a length of string from the bobbin 41 that when the arm 22 has reached the dotted position the string occupies the position shown in dotted lines. In the string tensioned in this manner a sliding knot is laid in the string portion denoted by 48 and over the string portion denoted by 47 in the manner described above with reference to Figs. 1-6. To this end the knotting beak device 30 is first lowered, then turned a quarter of a revolution and thereupon moved upwardly to such an extent that the string 48 with the portion bearing on the beak 32 is aligned with the string 47. Thereupon in the further rotation of the knotting beak device the string 48 is gripped between the opened beak 32, cut through and the knot is made which is then withdrawn from the meanwhile closed beak 32 due to the continued movement to the left of the arm 22.

The sliding sling thus formed is now pushed off the finger 23 whereafter the arm 22 is returned to the full line position and the string 42 is further unwound from the bobbin and clamped thereafter by the gripping mechanism 46 which has first been opened and then closed. In this condition the machine is ready for making the next knot.

It will be clear from the foregoing that the machine according to the embodiment shown delivers repeatedly a length of string having a sliding sling at one end.

I claim:

A machine for laying a knot in one of the strings of a doubled-over string said knot being slidable over the other string, comprising a rotatable and axially movable knotting beak device at the one side of which a holder is located for holding the merging string ends of the doubled-over strings, while at the other side of the knotting beak device two string guides are arranged adapted to keep at this point the strings at such a distance from each other that after the pulling of the strings towards one another by an axial movement of the knotting beak device one of the strings only can be gripped by the knotting beak during the subsequent rotation thereof.

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