

Feb. 10, 1959

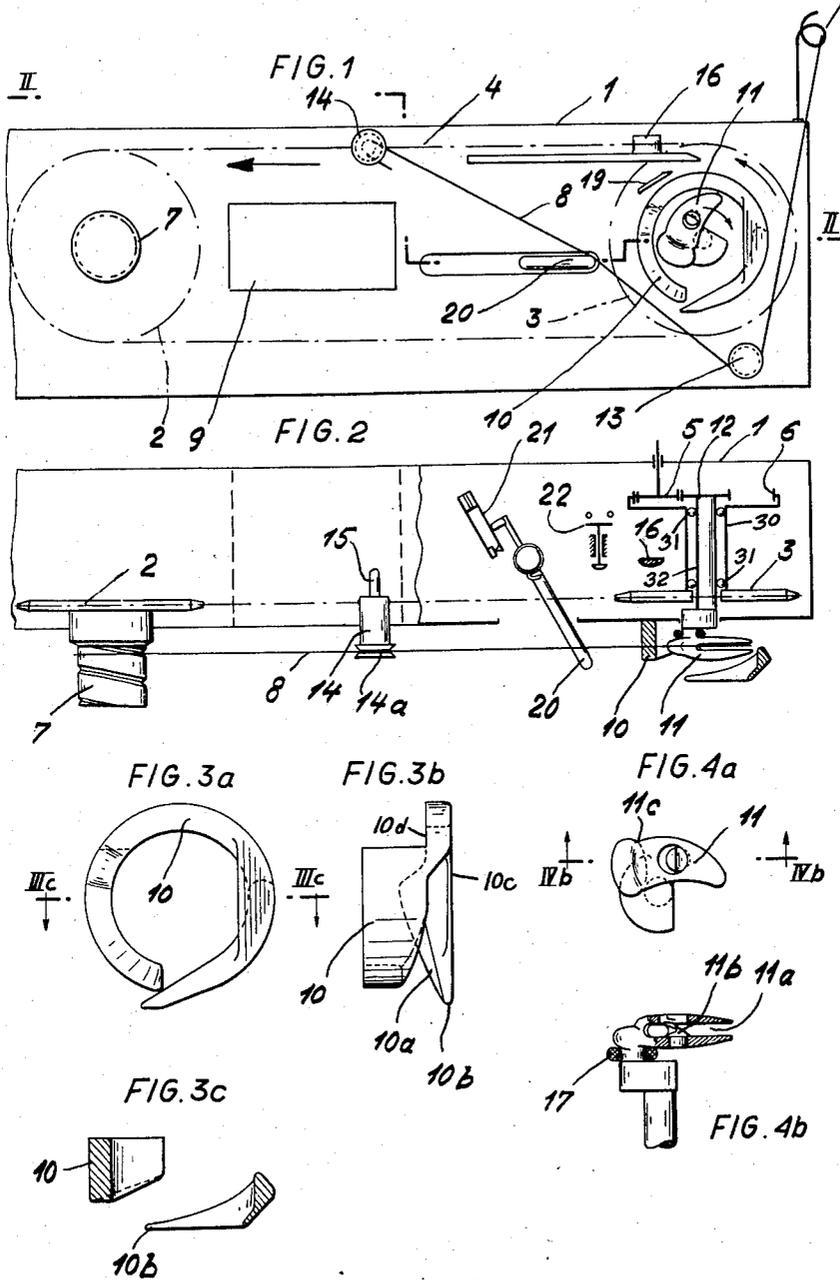
F. WIESER

2,873,133

DEVICE FOR TYING A THREAD ROUND AN OBJECT AND FOR KNOTTING THE THREAD ENDS

Filed Aug. 2, 1956

3 Sheets-Sheet 1



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3 Sheets-Sheet 2

FIG. 5a

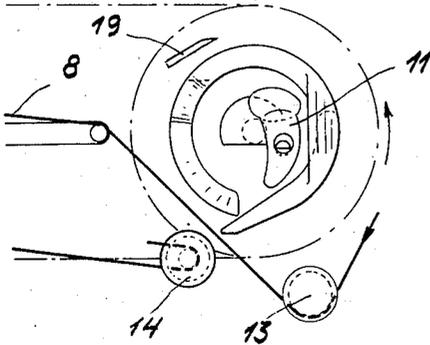


FIG. 5b

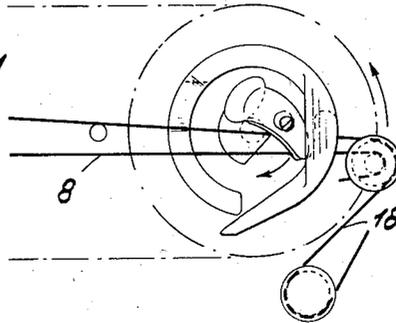


FIG. 5c

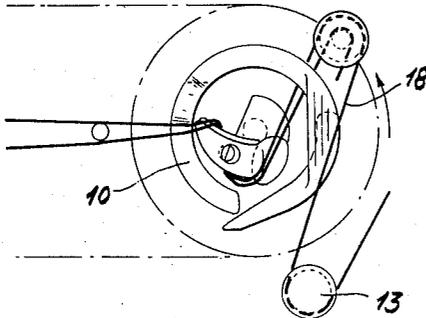


FIG. 5d

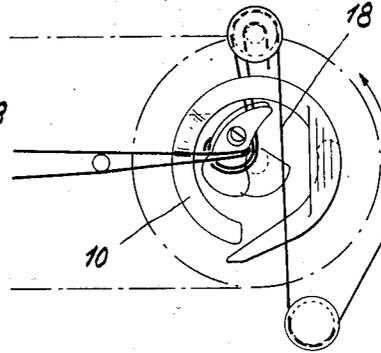


FIG. 5e

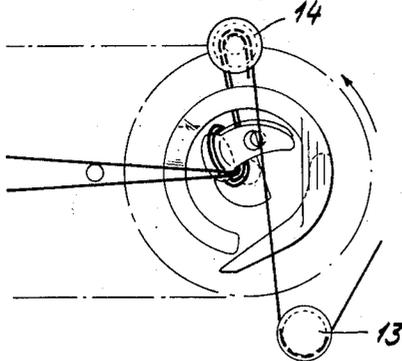
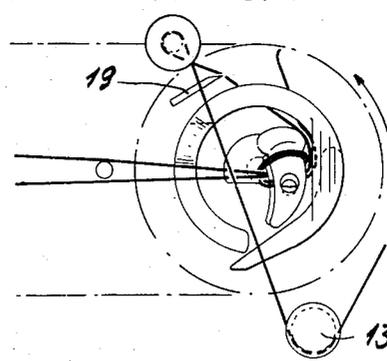


FIG. 5f



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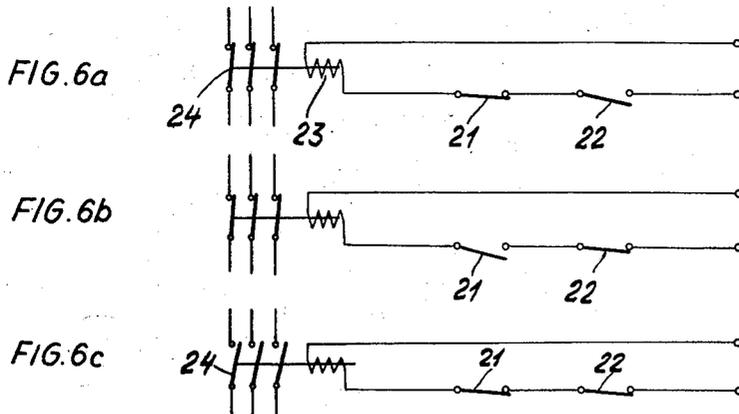
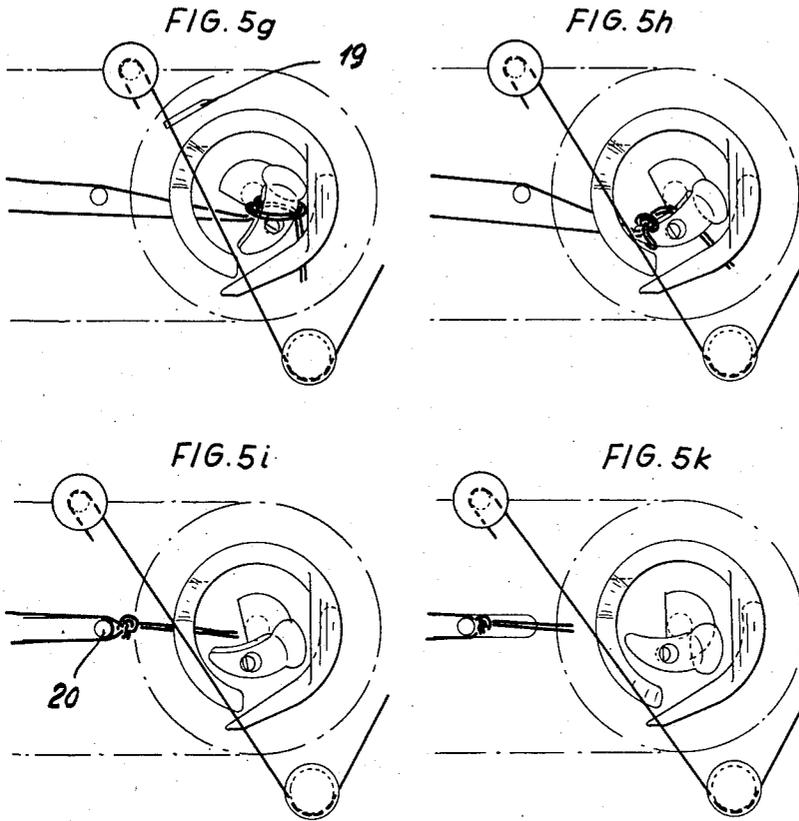
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3 Sheets-Sheet 3



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1

2,873,133

DEVICE FOR TYING A THREAD ROUND AN OBJECT AND FOR KNOTTING THE THREAD ENDS

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11 Claims. (Cl. 289—5)

The present invention relates to a device for tying a thread around an object and for knotting the thread ends. Such a device can be used, for instance, to wrap a thread around a wadding fleece or the like and to knot said thread, a plug then being formed of the wadding fleece. Devices of this sort are known, but they are very complicated in construction and take up a great deal of space. In particular, the devices known hitherto require an extensive control of the various means.

It is, therefore, the aim of the present invention to do away with the aforesaid complicated controls for various means, heretofore employed in wrapping and tying an object, thereby resulting in considerable savings in the cost of the machine and space.

It is another object of the present invention to provide means ensuring efficacious and relatively simple operation of a wrapping and tying machine.

It is a further object of the present invention to provide means affording positive control of the tying of the object so that, if the machine fails to perform any predetermined operational step, the same will become automatically disconnected from the drive, and the operation of the machine will be stopped.

It is still another object of the present invention to provide means facilitating an efficacious structure for tying the ends of a thread or like material, which structure is relatively simple, has only a few moving parts, and is extremely accurate in its operation, without necessitating the use of expensive and complicated control means as heretofore employed in known tying machines.

In order to obtain a comparatively simple device, it is suggested according to the present invention that a circulating or driven member, e. g. a chain or the like, be arranged around the object together with a mushroom-type thread drawer which is controlled when the thread is changed and which draws the thread over a stationary guide cam and a contrarotating knot hook. The individual parts can revolve constantly, only the mushroom-type thread drawer has to be controlled. The movement of the thread draw being timed in relation to the rotating knotter hook. The construction of the device is very simple and the driving means required are also of simple design.

In the practical embodiment of the invention the rotating knotting hook can be provided with a step to retain the loops and with a slot in which a braking pin resembling a non-return valve is located. The knot in the process of formation will be held firm thereby and will be pulled off only under a certain tension. A thread clamp, consisting of a rubber collar or the like and holding the thread end firm in the simplest manner possible, can be arranged behind the hook head. The thread guide cam arranged around the knotting hook is designed as an open lug, one part of it tapering to a point so as to control the thread sections in such a way that the new thread passes its front side 10c and the old one its rear side 10d. The thread is severed by a stationary thread cutter, against which the thread is drawn.

2

It is advantageous to arrange a control pin next to the knotter, which pin is shifted by the knotted thread. If a knot is not produced, the control pin will not be moved and the device will be stopped.

5 These and other objects of the invention will become further apparent from the following detailed description, reference being made to the accompanying drawings, showing preferred embodiments of the invention.

10 An embodiment of the device according to the invention is illustrated by way of example in the attached drawing in which:

Fig. 1 is a front view of the device;

Fig. 2 is a section along the line II—II in Fig. 1;

15 Figs. 3a, 3b and 3c shows the thread guide cam in elevation and in section;

Figs. 4a and 4b show the knotting hook;

Figs. 5a to 5k show the various positions of the knotting hook during the formation of a knot, and

20 Figs. 6a to 6c show the circuit diagram for the switch actuated by the control pin.

Mounted in a support or housing 1 are two chain wheels 2 and 3, over which a driven member or chain 4 runs. The chain wheel 3, shown on the right in Figs. 1 and 2, is driven via, for instance, a gear wheel 5 which engages an internal gear wheel 6 connected to the chain wheel 3. The left-hand chain wheel 2 is provided with a puller worm 7, over which the twine or thread 8 is laid. The worm ensures that after the chain wheel 2 has performed the corresponding number of revolutions, the thread laid over the worm in the form of a loop will slip off the said worm. The drive would of course also be taken from the shaft of the gear wheel 2.

30 A channel 9 or the like runs through the housing 1, and the object round which a thread is to be laid is passed through this channel. By way of example, a wadding fleece, around which the thread 8 is to be tied, can be passed through said channel 9.

40 Arranged in front of the right-hand chain wheel 3 is a thread guide cam 10 which is shown in elevation and in section along the line IIIc—IIIc in Figs. 3a, 3b and 3c. In the middle of this thread guide cam there is a knotting hook 11 which is illustrated separately in Figs. 4a and 4b. This knotting hook is mounted inside the chain wheel 3 through a hollow rotatable shaft 30 mounted in bearing 31 and is driven by a gear wheel 12 mounted on a shaft 32 located within said hollow shaft 30, at a speed which is, for instance, three times faster than that of the chain wheel 3. Beneath the thread guide cam there is, on the housing, a stationary thread brake 13 round which the thread is laid when it is drawn off from a delivery spool (not illustrated).

55 The chain 4 carries a mushroom-type thread drawer 14, the outer disk 14a of which (Fig. 2) can be controlled by a pin 15. Above the thread guide cam 10 there is a fixed stop 16 which acts on the pin 15 so as to open the mushroom-type thread drawer 14.

60 The lug-shaped thread guide cam 10 is open at its lower end and secured to the housing 1 only by its left part. The lower right part is provided at the rear with an oblique edge 10a which acts as a thread guide. This part tapers to a point lobe 10b which serves as a thread divider.

65 The bifurcated knotting hook according to Figs. 4a and 4b is provided with a slot 11a and carries in this slot a small pin 11b which acts as a thread brake in the manner of a valve. Arranged beneath the hook head is a rubber collar 17, which serves as a thread clamp.

70 The mode of operation of the knotter can be seen from Figs. 5a to 5k.

The initial position is shown in Fig. 5a. The revolving mushroom-type thread drawer 14 has laid the thread 8 around the puller worm 7 during its rotation and is now

3

approaching the stationary thread brake 13. The mushroom-type thread drawer 14 now grips the end of this thread 8, which end also forms at the same time the beginning of the new thread. It carries this thread along with it, the old thread 8 and the new thread 18 being so controlled by the thread guide cam that the contrarotating knotting hook 11 engages both threads (Fig. 5b). When the hook rotates further, its points pass under the two threads and thus form a loop as shown in Fig. 5c. Then, as the hook continues to turn, the thread ends are threaded into the hook slot 11a and at the same time the new thread 18 is passed in front of the thread guide cam 10 (Fig. 5d) by the point 10b which acts as a thread divider (Fig. 3b). Further movement of the hook causes the two thread ends to be drawn through the valve-type thread brake with the pin 11b (Fig. 5c). At the same time, the old thread is released and the new one clamped by the mushroom-type thread drawer 14 controlled by the stop 16.

A short distance further on only one end of the new thread is severed by a stationary cutter 19, as the second end is in front of the thread guide cam (Fig. 5f). The flexible or rubber collar 17 on the neck of the knotting hook 11 takes over the clamping of the severed thread end, as otherwise the loop would immediately slip off the hook and no knot would be formed.

The continued rotation of the knotting hook has caused the knot to be further formed and the loop slides off the step 11c of the hook head. The knot is then slowly drawn off the hook (Figs. 5g and 5h).

This action of the knotter is based on the fact that the loop is first prevented from slipping off by the step 11c (Fig. 4a), and does not slide over said step until the direction of drawing has been altered by the rotation of the hook; then, however, the loop is no longer prevented from sliding over the hook ends, while the two thread ends have to overcome such resistance at the braking pin 11b, as they slip through intertwined, that the loop first passes the hook ends. Thus the pulled through knot is produced without any controlled members being required.

After the knot has slipped off the hook, it comes against a control pin 20 and actuates same (Figs. 5i and 5k). This control pin 20 is mounted inside the housing 1 and acts on a switch 21 (Fig. 2). The arrangement of this supervisory device can be seen from Figs. 6a to 6c. Connected in series with the supervisory switch 21 is a switch 22 which, as shown in Fig. 2 for instance, can be controlled by the mushroom-type thread drawer 14. The control circuit acts on a magnet 23 of the main switch 24. As shown in Fig. 6a, the supervisory switch 21 is closed when the machine is running normally, while the control switch 22 is open. The main switch 24 is closed in this case. If, as shown in Fig. 6b, the supervisory switch is working, i. e. if a thread loop is being drawn off, the supervisory switch 21 is open, while the control switch 22 is briefly closed. The main switch 24 thus also remains closed. If, finally, a loop is not formed, the supervisory switch 21 will not be actuated (cf. Fig. 6c), i. e. it remains closed. The control switch 22 is then also briefly closed, and the main switch 24 is open and the device's driving motor stopped.

The invention is of course not confined to the embodiment illustrated. It is possible, for instance, to use instead of the revolving chain 4 a circulating member or the like which draws the thread round the object. Said object may also be an endless band or the like.

Various changes and modifications may be made without departing from the spirit and scope of the present invention and it is intended that such obvious changes and modifications be embraced by the annexed claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent, is:

1. A device for wrapping and knotting a thread to be delivered from a supply source; comprising a housing,

4

first rotatable wheel means, second rotatable wheel means, both said wheel means being supported by said housing for rotation relative to the latter, said first and second rotatable wheel means being spaced in tandem relation with respect to each other, means for transmitting rotation to said wheel means, a driven member movable in a predetermined path and operatively associated with said first and second wheel means, movable thread drawer means secured to said driven member for movement therewith along said predetermined path, a rotatable knotter hook provided with a slot, a stationary thread guide cam operatively associated with said movable drawer means and encompassing said rotatable knotter hook, said knotter hook being bifurcated and including a step member adjacent said slot, whereby the movable thread drawer pulls said thread from said supply source over the thread guide cam onto said knotter hook during rotation thereof, thereby forming a knot in the thread on said knotter hook and for release from the latter when the same assumes a predetermined position with respect to the direction of pull on the knotted thread.

2. A device according to claim 1, including control means provided with a movable element disposed contiguous said knotter hook and in the path of movement of the thread, whereby upon omission of said knotter hook to form a knot in the thread, the movement of the latter fails to displace said movable element thereby discontinuing movement of said driven member.

3. A device according to claim 1, including a hollow rotatable shaft located between said means and said one wheel and connected to the latter, and another rotatable shaft located within said hollow shaft and connected to said knotter hook, whereby said means drives both the knotter hook and said one wheel.

4. A device according to claim 1, including stationary stop means connected to said housing and cooperable with said movable thread drawer, thereby releasing said thread from said thread drawer upon movement of the latter past said stop means.

5. A device according to claim 1, said thread guide cam being provided with an opening permitting passage of said thread through said opening, thereby facilitating access of the thread to said knotter hook during rotation of the latter.

6. A device according to claim 1, including puller means connected to the wheel remote from said one wheel adjacent said knotter hook for rotation therewith.

7. A device according to claim 1, said slot carrying a member constructed to first serve as a brake for the thread when received in said slot and to release the thread thereafter at a predetermined period of rotation of said knotter hook.

8. A device for wrapping and knotting a thread to be delivered from a supply source; comprising a housing, channel means in said housing adapted to receive an object to be wrapped, first rotatable wheel means, second rotatable wheel means, both said wheel means being supported by said housing for rotation relative to the latter, said first and second rotatable wheel means being spaced in tandem relation with respect to each other, means for transmitting rotation to said wheels, a driven member movable in a predetermined path and operatively associated with said first and second wheel means, movable thread drawer means secured to said driven member for movement therewith along said predetermined path, a rotatable knotter hook disposed adjacent one of said rotatable wheel means and provided with a slot, a stationary thread guide cam encompassing said rotatable knotter hook, said thread guide cam being provided with an opening, said knotter hook being bifurcated and including a step member adjacent said slot, whereby the movable thread drawer pulls said thread from said supply source over the thread guide cam through said opening onto said knotter hook during rotation thereof, thereby forming a knot in the thread on said knotter

5

hook and for release from the latter when the same assumes a predetermined position with respect to the direction of pull on the knotted thread.

9. A device according to claim 8, said thread guide cam being provided with a tapered edge adjacent said opening, which edge serves as a thread divider for deviating said thread when forming the knot from another position of said thread delivered from said supply source.

10. A device for wrapping and knotting a thread to be delivered from a supply source; comprising a housing, channel means in said housing adapted to receive an object to be wrapped, first rotatable wheel means, second rotatable wheel means, both said wheel means being supported by said housing for rotation relative to the latter, said first and second rotatable wheel means being spaced in tandem relation with respect to each other, means for transmitting rotation to said wheels, a driven member movable in a predetermined path and operatively associated with said first and second wheel means, movable thread drawer means secured to said driven member for movement therewith along said predetermined path, a rotatable knotter hook disposed adjacent one of said rotatable wheel means, a stationary thread guide cam encompassing said rotatable knotter hook, said knotter hook being bifurcated and including a step member adjacent said slot, a neck portion depending from said knotter

6

hook, a flexible collar located on said neck portion, stationary cutter means adjacent said thread guide cam to sever said thread upon movement of said thread drawer past said stationary cutter means, said flexible collar engaging the severed thread, whereby the movable thread drawer pulls said thread from said supply source over the thread guide cam onto said knotter hook during rotation thereof, thereby forming a knot in the thread on said knotter hook and for release from the latter and the flexible collar when the knotter hook assumes a predetermined position with respect to the direction of pull on the knotted thread.

11. A device for wrapping and knotting a thread to be delivered from a supply source; comprising a support, spaced wheel means on said support, a driven member operatively associated with said wheel means, a thread drawer on said driven member, a rotatable knotter hook located adjacent said driven member, and a stationary thread guide cam operatively associated with said driven member and encompassing said knotter hook.

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