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G. WIGGERMANN
WARPING MACHINE
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3 Sheets-Sheet 1

Fig. 1.

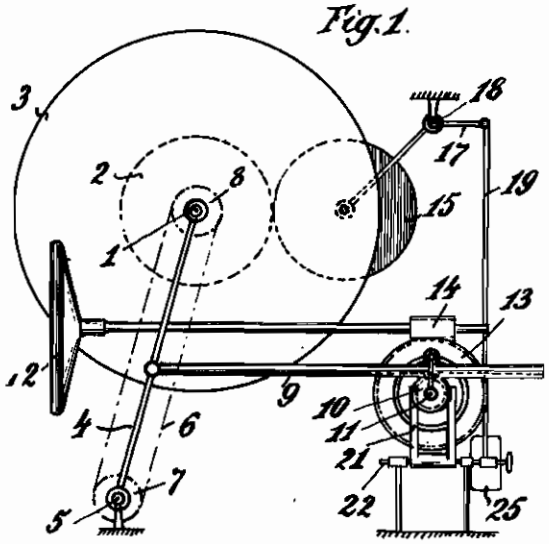

Fig. 2.

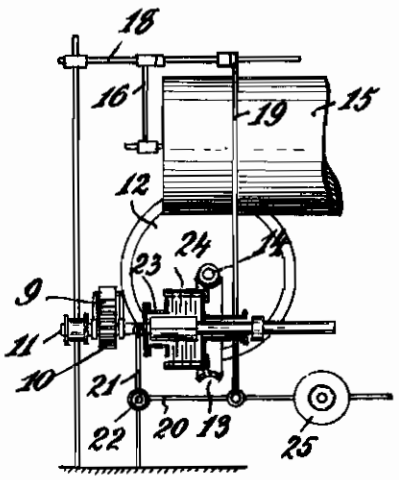

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Fig. 3.

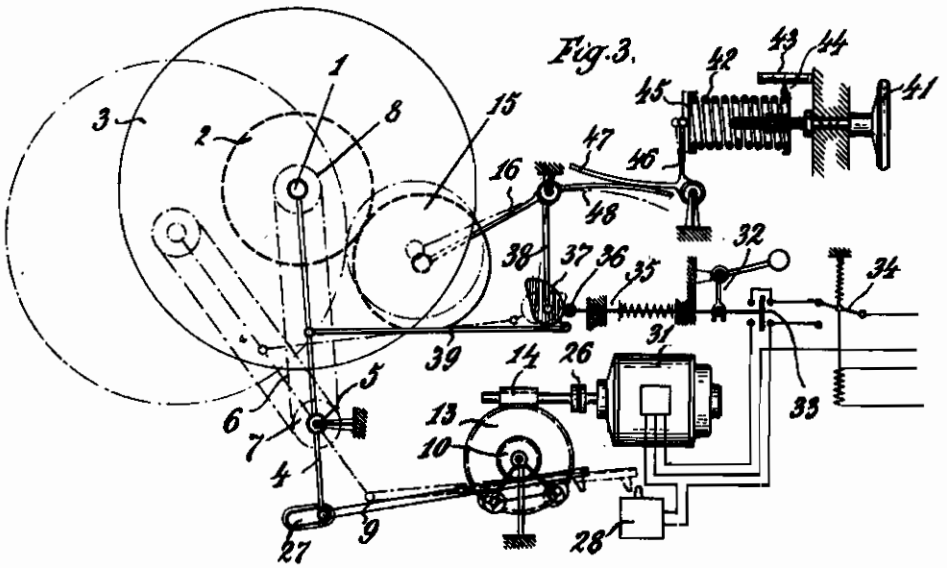

Fig. 4

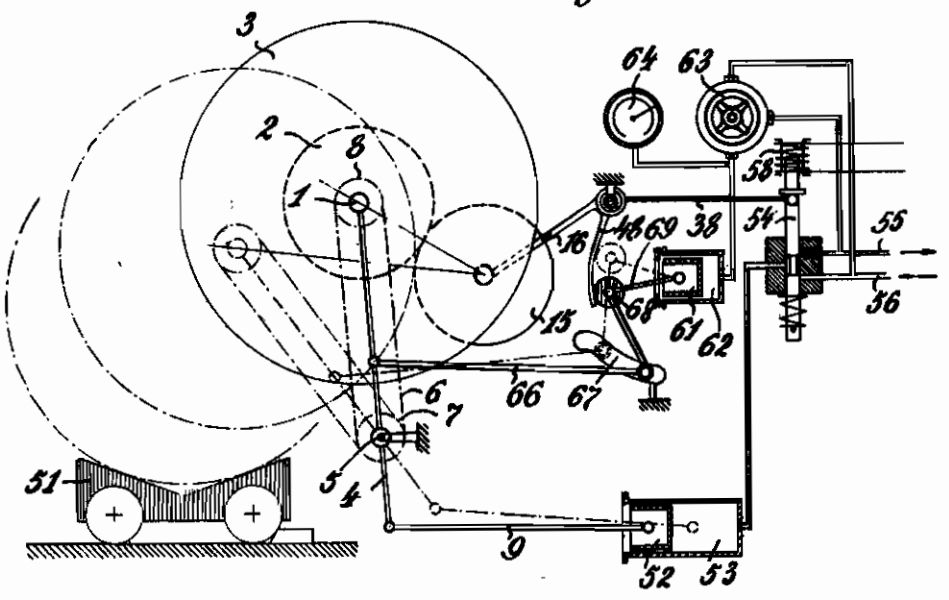

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Fig. 5.

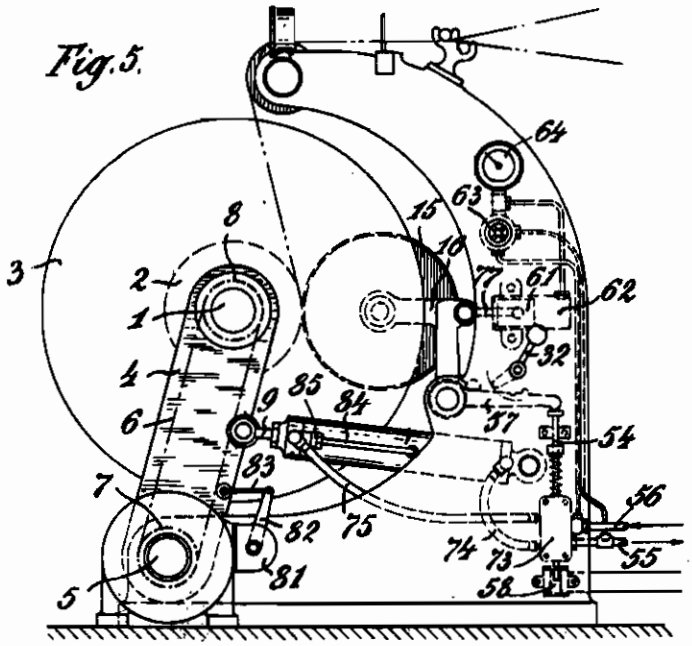


Fig. 6.

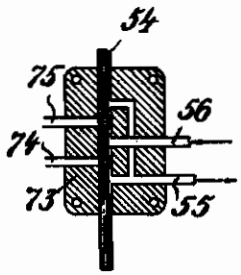
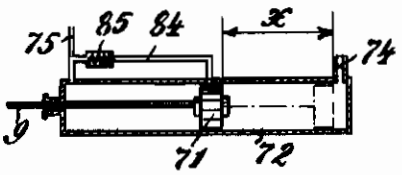


Fig. 7.



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ALIEN PROPERTY CUSTODIAN

WARPING MACHINE

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Application filed March 6, 1941

The invention relates to such warping machines, in which either the beam or the pressure roller are driven. In machines of this type the warping beam is usually journalled stationarily, whereas the pressure roller which is positively driven rests movably either in swinging arms or on a slide path. A resistance to friction adapted to be regulated is then inserted in the path of the pressure roller. The arrangement in swinging arms is as such a simpler solution of the problem but possesses certain inconveniences in so far as, owing to alteration of the turning moment of the swinging arms, the pressing-on pressure occurring in the joint between beam and pressure roller alters. This alteration of the pressing-on pressure becomes apparent especially strongly if the driving motor for the pressure roller is oscillated at the same time, that is the turning moment of the swinging arms is still further increased.

The object of the invention is, to produce a warping machine, in which, notwithstanding the journalling of the pressure roller in the swinging arms, the pressing-on pressure in the joint between beam and pressure roller remains always invariable. This is effected chiefly thereby that the warping beam as well as the pressure roller are mounted in swinging arms and both pressed together by means of a regulatable resistance to friction in such a manner that any alteration of position of the axle of the beam or of the roller can take place only in overcoming the resistance to friction. This arrangement makes it further possible to connect one half of the resistance to friction with a worm drive, so that by turning the resistance to friction the beam can be run in and out by means of racks hingedly mounted in known manner on its swing arms, whereas in the usual forms of construction the resistance to friction had first to be lifted off with this object in view. A single actuation is therefore sufficient for running-in the beam, the winding of the beam being then effected under any desired, previously adjusted pressure. The advantage is, however, further obtained, that the motor is no longer to be mounted on the swing arm itself but in the oscillating point and the force is transmitted from thence upon the shaft of the beam or of the roller.

A solution of this problem according to the invention can be at first enlarged in the direction that the running in and out of the beam can take place automatically. As, namely, owing to the pressing-on pressure remaining uniform, an accurate laying-on of the running-in beam is no longer necessary, and as on the other hand the total turning resistance as such can be turned without alteration of the resistance to friction, the coordination of a motor is sufficient, in order to accordingly move the beam through the same, by means of hand switch or press-knob control respectively from the stopping arrangement, whereby these operations are considerably simplified. The motor may further serve to oscillate off the beam when the diameter increases. According to the invention this movement is controlled from the pressure-roller in that the moving away of this roller by the running-on thread warp is transmitted upon the switch of the motor, so that owing to the swinging-off of the beam the pressure-roller always returns again in permanent movement into its initial position.

With this mechanisation of the chief moving proceeding at the beam movement, according to the invention, it is no longer necessary to take into consideration the easy accessibility of the running-on point of the thread-warp; nor are additional auxiliary elements required, to bring the beam into a position favorable for the re-knotting of threads. Consequently the movement of the beam, in further development of the invention, can be restricted to the second quadrant and therewith the total building-up of machine can be simplified. The movement of the axles of the beam and of the pressure roller connected herewith, the one relative to the other and in the space, would result in the most known machines in especially unfavorable conditions for the pressing-on pressure remaining uniform. According to the invention compared herewith not only the pressing-on pressure is kept uniform even if beam and pressure roller are in the most unfavorable mutual position, but it is also possible to adjust this pressing-on pressure in very wide limits. At this occasion for instance the loading of the pressure roller is effected by means of rolling levers, so that alterations of the pressure in the joint between beam and pressure roller at alteration of position of the axles by shifting of the contact points of the roller levers are equalized.

If the movements take place under employment of flowing pressure media by means of corresponding control cylinders, the medium is, according to the invention, employed at the same time for the production of the pressing-on pressure between beam and pressure roller and the cylinder acting for instance upon the swing arms of the pressure roller is connected to an automatic regulating valve, so that the pressure existing in

the loading cylinder remains always uniform independently on the positions of the piston. The desired winding pressure at the warping can therefore be adjusted and surveyed according to the indication of a pressure gauge.

In order to obtain any additional pressure at the running out of the beam owing to the depassing of the normal end position, the cylinder acting upon the swing arms is preferably equipped, when flowing pressure media are employed, with a pressure equalizing conduit short-circuiting the cylinder sides. In similar manner the production of an undesired pressure between warping beam and its depositing point may be prevented when the movement of the beam is mechanically controlled in that the connection between the beam journalling and the drive of the same controlling its oscillation is in closed circuit only in one direction. The part of the drive which then continues to freely move can be arranged so, that it automatically disengages the drive.

Finally the swinging-movement, in regulating gears built-in according to the invention, is utilized for the adjusting of the gear and thereby the circumferential speed of the beam is maintained uniform in known manner notwithstanding the increasing diameter.

Several embodiments of the invention are illustrated by way of example in the accompanying drawings, in which

Fig. 1 shows the warping machine in side elevation,

Fig. 2 a corresponding part view of Fig. 1 seen from the rear,

Fig. 3 illustrates the swinging of the beam by means of a control motor influenced by the pressure roller,

Fig. 4 a construction with employment of flowing media for the swinging and the production of the predetermined loading,

Fig. 5 another construction with employment of flowing media, and

Figs. 6 and 7 details of the construction shown in Fig. 5.

Elements with similar operation are designated by similar reference characters. As can be seen from the drawings, the control impulses are derived, in the forms of construction shown, from the pressure roller and transmitted onto the beam; it is, however, clear for anyone skilled in the art that the operation may be carried out inversely. It is also evidently clear, that all control proceedings may be derived from one or both swing arms of the pressure roller and transmitted upon one or both swing arms of the beam, or inversely.

The warp beam may be equipped with continuous shaft or clamping hubs, which admit of centering it on the axle 1 of the beam. By a tube, which if desired may have perforations, the discs 3 of the beam are connected the one with the other. In the form of construction shown, the beam is journalled in swing arms 4, which form a fork together with the strong shaft 5 connecting them. The beam is driven by a sprocket wheel 7 revolving on shaft 5 by means of a chain 6, which drives a sprocket wheel 8 coupled with the hub of the beam. The chain drive is enclosed in tubes.

By a bar 9 having teeth in its lower side at its free end any swinging movement of the beam is transmitted in known manner upon a pinion 10 fixed on a shaft 11, this shaft being adapted to be turned by means of a hand wheel 12 through the intermediary of a worm wheel 13 and a worm 14.

The pressure roller 15 is also movable and mounted in the form of construction illustrated in swing arms 16 rigidly connected by a shaft 19. By means of a lever system 17, 19, 20 every swing movement of the pressure roller 15 is transmitted upon a fork 21, which, revolvable on a shaft 22, is connected on the one hand with a lever arm 20 and on the other hand with a pressure ring 23 of a multi-disc clutch 24. The toothed discs of the clutch 24 engage in a bush connected with the worm wheel 13. The coupling pressure is regulated by a weight 25 shiftable on the lever arm 20.

Instead of as shown and described the pressure roller may be driven from a motor arranged in alignment with its swing axle. The fundamental speed is adjusted in any case preferably by means of regulating gear, which is connected with one of the swing arms or serves itself as swing arm.

The pressure in the joint between beam and pressure roller, which at the warping is produced owing to the pushing asunder of beam and roller by the running-on warp, owing to the connection of both through the friction clutch, corresponds always to the frictional pressure adjusted by the weight 25. Without the necessity to anyhow alter this pressure, the beam may, on the other hand, be run out by hand by means of the worm gear 13, 14, whereas a turning of the outer clutch bush fixed on the worm wheel 13 from the shaft 11 is prevented owing to the self checking of the worm gear.

When running-in the beam no pressure increase in the joint can occur by the running-on of the pressure roller, as a swinging off of the pressure roller is possible only when the frictional pressure of the clutch has been overcome, the clutch lamellas slipping, however, the one along the other at the overcoming of this pressure.

In the examples shown in Figs. 3 and 4 the swinging point of the arms 4 of the beam is arranged above the point at which the control rods 3 act. All movements of the beam take place exclusively in the second quadrant, which means in the space between the perpendicular and the swung off position of the swing arms.

Fig. 3 illustrates firstly the employment of a control motor 31 for the movements of the beam, which motor acts through a friction clutch 26 upon the worm gear 13, 14 and moves the arms 4 by turning of the whole turning resistance through the spur wheel 10 and the rack 9. The laying of the motor 31 on the net in the one or other sense of rotation is effected through one of the switches 33, 34, either by means of the hand switch 32 or by the swing arm 16 of the pressure roller 15, through intermediate elements 35, 36, 37, 38 or from the cutting off switch respectively from press-knob controls on warping machine and bobbin frame.

As shown in Fig. 3 the roller 38 of the intermediate elements bears, owing to spring pressure, against the cam disc 37. By means of a rod 39 hingedly connected with the swing arm 4 of the beam the cam disc 37 is turned, when the position of the power station is altered, from the axis of the beam and pressure roller.

The loading of the pressure roller is effected in the construction shown in Fig. 3 by a spring 42 adjustable by means of a hand wheel 41. The adjusted pressure can be read on a scale 43 according to the position of a hand 44.

From a swinging of the pressure roller 15 re-

sults, that the common contact point of the friction levers 47, 48 is accordingly displaced.

The connection of the swing arm 4 with the rack 9 is effected by a slot 27 at the left hand end of the rack 9 so that the connection between the journalling of the beam and the drive controlling its swinging movement is in closed circuit only in one direction. As soon therefore as the beam during its swinging movement strikes against the depositing point on the floor or on the conveying means, the closed circuit is cut out. The rack 9 continuing to move actuates the switch 28 and therefore completely cuts out the drive.

The operation of the construction shown in Fig. 3 is in detail as follows:

After the beam 3 has been mounted between the swing arms 4, as shown in Fig. 4, and the yarn warp has been fixed on the beam, the motor 31 is laid on through the intermediary of the push knob control or the lever 32, whereby the beam is run in against the pressure roller 15. In the joint between beam and pressure roller exists then the adjusted pressure indicated by hand 44 and corresponding to the actually desired winding tightness. Owing to the automatic checking of the worm gear 13, 14, the movement of the arms 4 is blocked. The yarn warp running on at the warping therefore pushes off the pressure roller 15 and the control roller 36 towards the right, as shown in Fig. 3, closes the contact 33 and effects, through the motor 31, worm gear 13, 14, toothed wheel 10 and rack 9, a movement of the beam, in the form of construction shown towards the left. Consequently, the control roller 36, or the pressure roller 15, returns again into the normal position, the switch 33 opens and the movement of the beam is interrupted again. As the beam diameter has further increased in the meantime, this operation repeats itself and continues until the desired circumference or the desired warp length has been attained. Such control impulses become effective, as is known, in the course of time so that they practically take place steadily.

Owing to the alteration of position of the central between axis of beam and axis of pressure roller, which may occur as result of the mutual position of beam and pressure roller selected in the embodiment shown by way of example, the pressure in the joint between the two would alter also. As however, at a rotation of a cam disc 37 the distance between the fulcrum of the same and the roller 36 alters, current is supplied to the motor 31 for a longer time, and the beam is therefore swung farther to the left, so that the pressure roller can follows the beam and ascend accordingly in the embodiment shown. At this swinging movement of the pressure roller or of the pressing-on roller 15 the contact point of the shiftable levers 47, 48 is shifted, so that the pressure indicated by the hand 44 is maintained in the joint between beam and warp.

When a thread breaks, the switch 34 is closed by the current of the stop motion through the intermediary of a time-switch up to the moment when the beam has moved away from the pressure roller 15 so far as is necessary for the re-knotting work. In similar manner the beam is automatically swung outwards up to depositing on the carriage 51 as shown in Fig. 4 when the warp thread length has been attained, by the stopping arrangement of the machine.

The hand switch 32 makes it possible for the attendant at any time to sensitively move in the one or other direction the beam through the intermediary of the motor or to stop it.

The embodiments according to Figs. 4 and 5 show how the same proceedings can be controlled for instance hydraulically by employment of flowing media.

In the embodiment shown in Fig. 4 the control rod 9 of the swing arm 4 is connected with a piston 52 guided in a cylinder 53. A slide 54 connects the cylinder with the admission- or discharge-conduit 55, 56. The controlling of the slide is effected, in the embodiment illustrated, again from the pressure roller 15 by means of an arm 36 connected with the swing arm 16 of the roller, or from a control relay 58 influenced by the push knob switch, stop motion or cutting out switch of the machine.

The loading of the pressure roller 15 is effected by a pressure piston 61 in accordance with the pressure in the cylinder 62. A regulating valve 63 maintains this pressure in the cylinder 62 independently on the position of the piston 61, in that it connects the cylinder 62 with one of the conduits 55, 56 when the pressure actually adjusted on the pressure gauge 64 is exceeded or not attained.

The piston 61 is connected, in the embodiment illustrated, with the pressing-on roller 68 by a rod 69 and guided with the swing arm 4 of the beam by rods 65, 66 guided in a slot 67. The pressure roller 15 returns always into its initial position, after it has effected by arms 38 and slide 54 on oscillating off of the swing arms 4 of the beam corresponding to the increasing diameter of the warp of the beam according to above explained movements. The shape of the lever 48 is selected so that the roller 69, independently on its actual position, has no possibility to additionally load the rods 65, 66. As the central between beam axle and pressure roller axle has altered owing to the oscillating off of the beam, and as on the other hand the pressure in the cylinder 62 remains constant, the loading of the pressure roller 15 must also be altered according to the alteration of position of the power station. This is attained by the shifting of the pressing-on roller 68 on the arm 48 owing to the shape of slot 67.

Figs. 5, 6, 7 illustrate an embodiment of the invention, in which the warp beam is moved through the first and second quadrant in the manner much used up to the present, whereas the embodiments shown in Figs. 3 and 4 may be employed with advantage also for movement in the other quadrants, for instance suspended mounting of the beam.

The control rod 9 is in this instance hinged above the axle 5 on the swing arm 4 and connected with a piston 71 guided in a cylinder 72. The movement of the piston is controlled by the slide 54. This slide can connect, according to its position in a slide box 73, as shown in Fig. 6, the conduits 55, 56 with conduits 74, 75 leading to the cylinder 72, as soon as the control slide 54 has been actuated from the pressure roller 15 through the intermediate elements 16, 57 or by the hand switch 32, respectively by the control relay 58. In the mutual position shown in Fig. 5 a comparatively little oscillation of the power station from the axles of beam and pressure roller occurs.

In order to prevent at the running out a soft laying down of the beam and the production of an additional pressure, the cylinder 72 is equipped with an equalizing conduit 64, as shown in Fig. 7,

which short-circuits both cylinder sides outside the possible winding diameter or the corresponding piston travel x. At the running-in of the beam a check valve 85 effects, that the overflow conduit remains out of action in this direction of movement.

Finally it is shown in Fig. 5 how the swinging movement of the arms 4 of the beam can be utilized, to maintain equal the circumferential speed of the beam, especially if the regulating gear is arranged on the swing arm 4. With this object in view, for instance the adjuster of the regulating gear, a regulating motor 81 or the like, may be hingedly connected by rods 82, 83 with the swing arm 4, so that according to the alteration of angular position of arm 4 the ratio of transmission is automatically altered.

It is evidently also possible to proceed so that when the pressure roller 18 is driven the adjuster of the regulating gear is influenced for this driving from the swinging movement of the arms.

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