May 14, 1935. F. KLEIN 2,001,064

CONTROL MECHANISM FOR WARPING MACHINES AND THE LIKE

Filed March 22, 1934 2 Sheets-Sheet 1

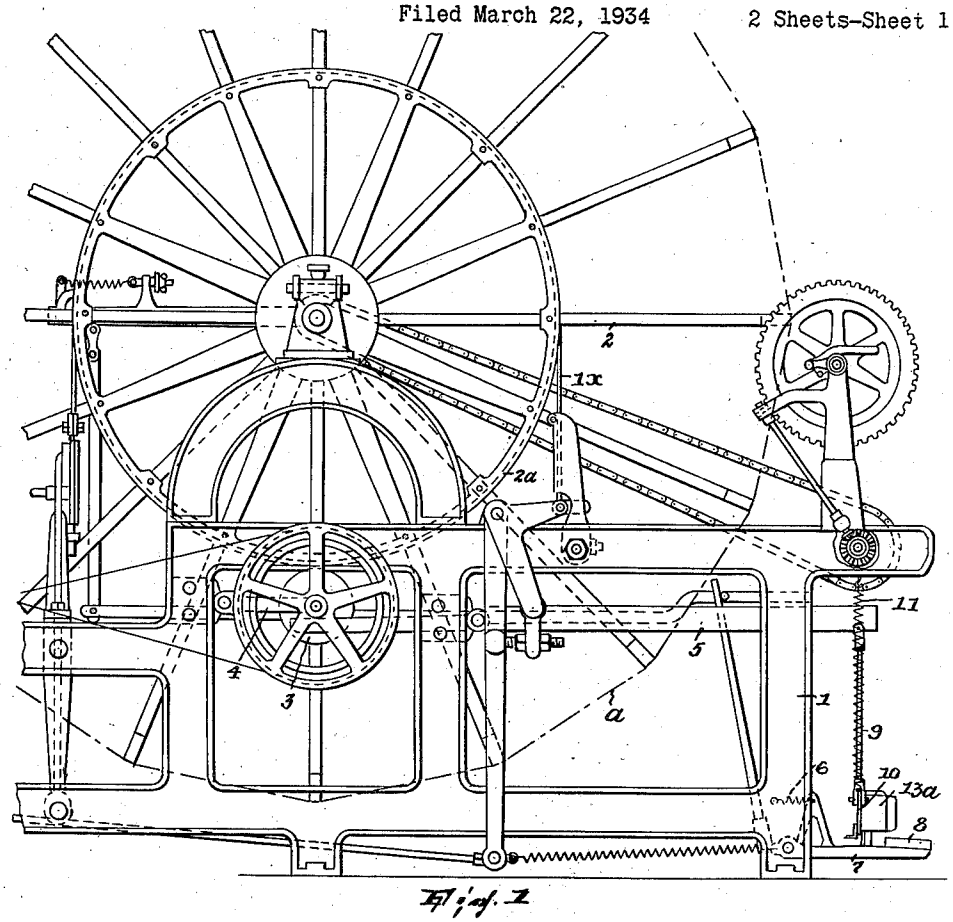


Fig. 1

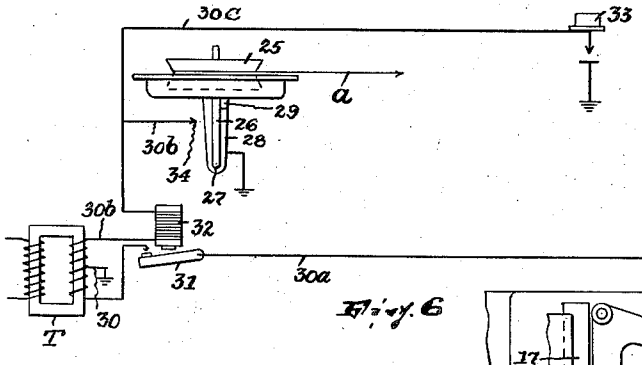
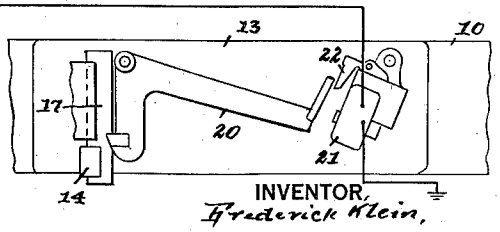


Fig. 6



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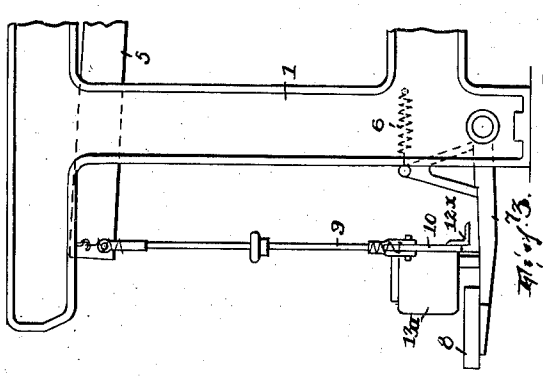

Fig. 3.

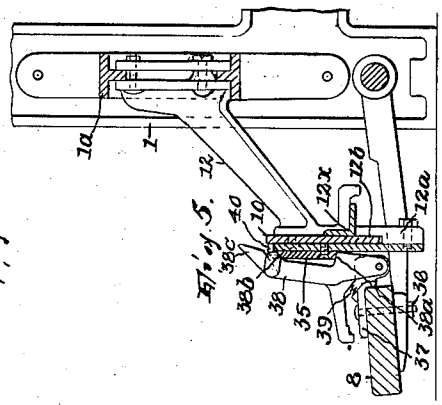

Fig. 5.

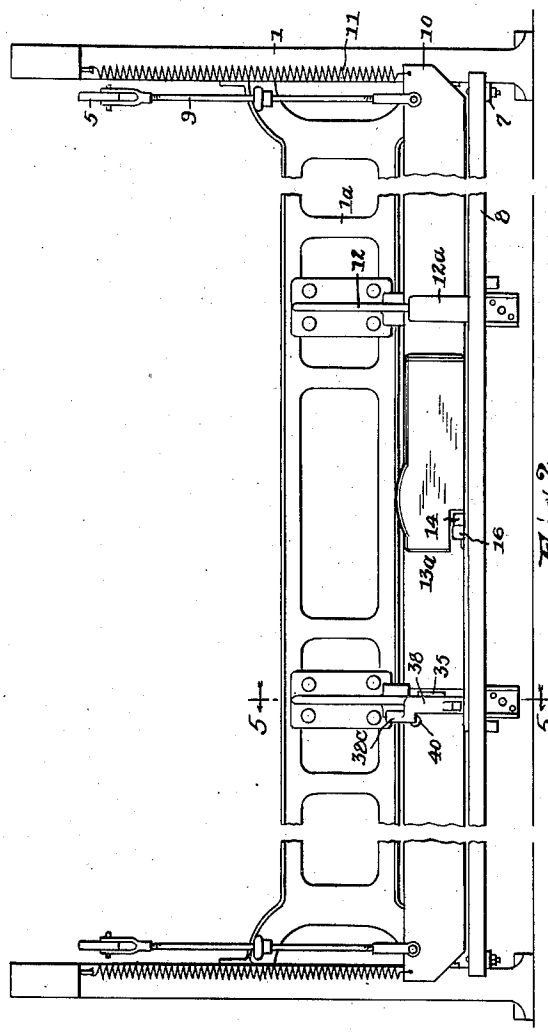

Fig. 2.

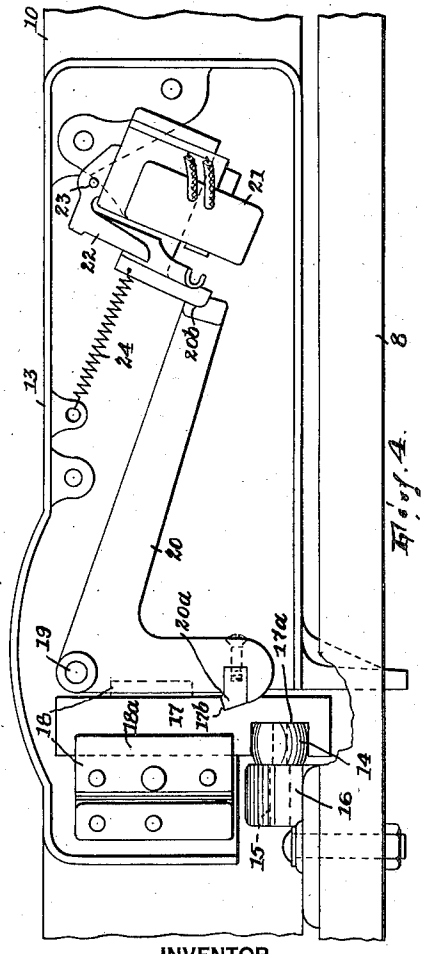

Fig. 4.

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Patented May 14, 1935 2,001,064

UNITED STATES PATENT OFFICE

2,001,064

CONTROL MECHANISM FOR WARPING MACHINES AND THE LIKE

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Application March 22, 1934, Serial No. 716,794

11 Claims. (Cl. 28—51)

This invention relates to machines in which there are a rotary element to be driven and a system, including a rotary driver for said element, which is movable to bring the driver against said element, and particularly to machines of this class in which, as in a warping machine, lengthy material is to be wound on said element, as the reel of such warping machine.

According to this invention said system comprises an actuating means, an actuated means including the driver to bear against said element, and disconnective coupling means to couple together the actuating and actuated means for movement together. More specifically, to wit, when lengthy material is being wound on said element, said coupling means is controlled from the material so that, for instance, in a warping machine, if a thread of the warp breaks the coupling may be rendered unstable or impotent to transmit movement from the actuating to the actuated means or, if they stand moved to the position in which said element is being driven, to maintain the actuated means in that position.

The invention further contemplates novel means for locking said system in the position in which the driver is held against the element to be rotated.

In the drawings,

Fig. 1 is a side elevation of a warping machine embodying the invention;

Fig. 2 is a front elevation of the principal parts of the invention which are directly associated with the machine;

Fig. 3 is a side elevation of what is shown in Fig. 2 with a certain cover 13*a* in place;

Fig. 4 is a front elevation on a larger scale of a portion of what is shown in Fig. 2; with said cover removed;

Fig. 5 is a section on line 5—5, Fig. 2; and

Fig. 6 is a diagram of the electric circuit.

The frame 1; the reel 2 journaled therein; the suitably driven rotary drivers 3 journaled in arms 4 pivoted to the frame; the levers 5 fulcrumed in the frame and by which the drivers are moved into peripheral contact with the rims 2*a* of the reel to drive the latter or to fall away from said rims when the rotation of the reel is to cease; the treadle normally held elevated by springs 6 and comprising the levers 7 fulcrumed in the frame and the treadle-board 8; the links 9 depending from the free ends of the levers; and the braking means at 1*x*, are or may be all according to the known construction (see, for example, the Sipp Patent No. 1,878,298) excepting that, instead of connecting the links permanently with the treadle, according to this invention they are attached to a horizontal bar 10 arranged above the treadle and subject to the tension of springs 11 connecting the bar with the frame and, as will appear, the treadle and bar are provided with means for disconnectively connecting them together. The bar is guided vertically in slots 12*b* of the slotted terminals 12*a* of arms 12 clamped to a cross-rail 1*a* of the frame and connected by a brace 12*x*; and midway its length the bar has a housing 13 having a cover 13*a* and containing the mentioned coupling means. The treadle has a roller 14 journaled on a stud 15 of an attachment 16 bolted to the treadle-board midway its length and on this roller is a bolt 17 (receiving in its recess 17*a* the roller) which in effect forms an upstanding projection of the treadle and has a notch 17*b*. The bolt is kept in upstanding position at all times by and is slidable vertically between guides 18 at the back of the housing, one of which has a retaining flange 18*a* lapping the bolt.

Treating the treadle and its bolt 17 as the mentioned actuating means and the parts 10, 9 and 5 as the mentioned actuated means including a driver (as 3) for the reel, the mentioned disconnective coupling means to couple them together is as follows:

Pivoted at 19 to the back of the housing is a coupling 20 to dog the bolt by engaging with its nose 20*a* in the notch 17*b* of the bolt, such coupling being here a bell-crank lever whose shorter arm depends and has said nose and whose longer arm extends laterally and tends by its weight to hold the nose against the bolt. The coupling in itself affords an unstable engagement with the bolt, tending to slip out of such engagement when the treadle is depressed because its pivot is in a vertical line offset from that of the contact of its nose with the bolt and/or because the engaging surfaces of the nose and bolt are sloped as in Fig. 4, wherefore there is also a detent 22 which is here an armature pivoted at 23 to the back of the housing and normally held by spring 24 in position to engage in a notch 20*b* of the coupling when the latter's nose engages the notch 17*b* of the bolt, thus to stabilize or render positive the mentioned engagement.

21 is an electro-magnet secured to the back of the housing of which detent 22 is the armature.

The magnet is energized subject to the control of any of the threads going to make up the warp

or section of the warp being wound on the reel and which, it will be understood, come from a number of spools or other supplies on a creel as in my Patents Nos. 1,885,114 and 1,942,511. Each thread, in passing from its spool to the reel, extends around a pulley 25 (Fig. 6) journaled on an upstanding (metal) support 26 pivoted at 27 in a (metal) bracket 28, the pull on the warp by the reel normally acting through the pulley to hold the support 26 against some suitable stop, as 29, the support being however adapted to fall by gravity from the stop if the thread breaks or slackens appreciably. As will appear, the device 26—28 forms a circuit closer. Fig. 6 shows a transformer T the primary of which may be connected to any available supply line. Leading from ground is a conductor 30 which has a grounded branch 30*a* including a part of the secondary of the transformer, a circuit-closer 31 and the magnet 21. Another branch 30*b* of the conductor 30 includes the remainder of the secondary, a relay magnet 32 (of which the circuit-closer 31 is the armature) and the automatic circuit-closer 26—28 and is grounded. In the branch 30*b* there may be a terminal stop 34 against which the support 26 falls when it is allowed by the thread to move from stop 29. The part of the branch-conductor 30*b* which leads from the magnet 32 to ground and includes the circuit-closer 26—28 is of course in the present instance only one of a number like it, one for each thread of the warp. At 30*c* is shown a branch which may extend from the branch-conductor 30*b* to ground and includes a push-button or other manual circuit-closer 33.

Assume each thread of the warp to be intact and not unduly slack; the corresponding automatic circuit-closer 26—28 will then be in open position (Fig. 6) and magnet 32 de-energized, as also magnet 21, wherefore, the treadle and bar being up, the coupling 20 is held engaged with bolt 17 by armature detent 22. If any thread should be broken or unduly slack when the treadle and the bar coupled therewith undergo depressing action or while they are being held down in any way the automatic circuit-closer will close the circuit of magnet 32 which will in turn close the circuit of magnet 21 and, the coupling being consequently released, the bar 10 will fail to descend and the reel not be started or the (depressed) bar will rise and the reel cease to rotate, as the case may be. (The attendant can bring about the same result at any time manually by pressing the push-button 33.) Further, the reel cannot again be started by depressing the treadle until the defect in the thread has been corrected. Of course, as soon thereupon as the magnet 21 is again de-energized the detent 22 becomes free to interlock with the coupling when the treadle rises and its bolt brings its notch 17*b* into registry with the nose of the coupling.

The controlling structure formed by the treadle may be locked down while the attendant is engaged in duties remote from the treadle as shown in Figs. 2 and 5 thus: On the terminal 12*a* of the left-hand arm 12 is a projection 35 affording upper and lower abutments. On the treadle-board is secured by a bolt 36 a bracket 37 in which is fulcrumed on an axis parallel with the treadle-board an upstanding pawl 38 normally urged toward said terminal portion by spring 39. The pawl has a back recess forming a lower locking shoulder 38*a* to engage the lower abutment and an upper camming shoulder 38*b* to engage the upper abutment. When the treadle is depressed to reel-driving position it will be locked down by the engagement of its locking shoulder with the lower abutment; but the operator may release the treadle by depressing the treadle beyond its locked position, or so that the camming shoulder 38*b* engages the upper abutment and cams back the pawl, and then allowing the treadle to rise before the pawl can again assume locking position.

In the above it is assumed that the member 10 is coupled with the treadle and moves down with it. In case the coupling is disestablished either in the act of depressing the treadle or while it and the member 10 stand depressed the pawl is prevented from assuming locked position or is moved out of such position, as the case may be, by a stud 40 projecting from said member in vertical alinement with the laterally offset camming upper end 38*c* of the pawl; in short, if the member 10 is up and not coupled with the treadle when the latter undergoes depression or if said member is uncoupled from the treadle while the latter stands locked down by the pawl the latter is by said member rendered ineffective to lock or to continue to lock down the treadle.

Having thus fully described my invention what I claim is:

1. Mechanism for controlling the rotation of a rotary element of a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, and a coupling movable on one of said means into position for engagement with the other means and thereupon adapted to transmit motion to the actuated means on movement of the actuating means.

2. Mechanism for controlling the rotation of a rotary element on which to wind lengthy material in a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, a coupling movable on one of said means into position for engagement with the other means and thereupon adapted to transmit motion to the actuated means on movement of the actuating means, and means, controlled from the material, for controlling the movement of the coupling.

3. Mechanism for controlling the rotation of a rotary element of a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, a coupling on one of said means having coupling engagement, but movable out of such engagement, with the other of them, and a detent to hold the coupling in such engagement and movable to free the coupling, said coupling forming an unstable connection between the actuating and actuated means when the coupling is freed by the detent.

4. Mechanism for controlling the rotation of a rotary element on which to wind lengthy material in a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, a coupling on one of said means having coupling engagement, but movable out of such engagement, with the other of them, a detent holding the coupling in such engagement and movable to free the coupling,

said coupling forming an unstable connection between the actuating and actuated means when the coupling is freed by the detent, and means, controlled from the material, to move the detent.

5. Mechanism for controlling the rotation of a rotary element of a machine of the class described comprising actuating means movable in a given direction and reversely, actuated means movable in said direction to one position and reversely to another position and normally urged to the second position and including a rotary driver to engage said element, and means to couple the actuating and actuated means together for movement together in the first direction when the actuating means has moved reversely and the actuated means is in the second position.

6. Mechanism for controlling the rotation of a rotary element on which to wind lengthy material in a machine of the class described comprising actuating means movable in a given direction and reversely, actuated means movable in said direction to one position and reversely to another position and normally urged to the second position and including a rotary driver to be thereupon moved against said element, means to couple the actuating and actuated means together for movement together in the first direction when the actuating means has moved reversely and the actuated means is in the second position, and means, controlled from the material, for controlling the coupling means.

7. Mechanism for controlling the rotation of a rotary element of a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, a coupling connecting said means and movable clear of one of them, and means, including an electro-magnet, to control said movement of the coupling.

8. Mechanism for controlling the rotation of a rotary element on which to wind lengthy material in a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, a coupling connecting said means and movable clear of one of them, and means, controlled from the material and including an electro-magnet, to control said movement of the coupling.

9. Controlling mechanism for a machine of the class described comprising, with fixed structure, a controlling structure movable in the fixed structure in one direction and normally urged in the opposite direction, one structure having an abutment facing in the first direction, and a pawl on the other structure normally urged toward the structure having the abutment and having a shoulder facing in the second direction and adapted to abut said abutment to lock the controlling structure against return when moved in the first direction, said pawl having means engageable with the structure having the abutment to cam the pawl clear of said abutment when, upon the controlling structure being so locked against return, said controlling structure is moved in the first direction.

10. Controlling mechanism for a machine of the class described comprising, with fixed structure, a controlling structure movable in the fixed structure in one direction and normally urged in the opposite direction, a member to be moved with said controlling structure in the first direction but normally urged in the opposite direction, a coupling connecting said member and controlling structure but movable to disconnect them, the fixed structure having an abutment facing in the first direction, and a pawl on the controlling structure normally urged toward the fixed structure and having a shoulder facing in the second direction and adapted to abut said abutment to lock the controlling structure against return when moved in the first direction, said member having means to displace the pawl shoulder from engagement with said abutment when said coupling disconnects said member and controlling structure.

11. Mechanism for controlling the rotation of a rotary element of a machine of the class described comprising actuating means, actuated means including a rotary driver to be moved against said element on movement imparted to the actuated means from the actuating means, and a coupling movable on one of said means into and out of and normally urged into coupling engagement with the other means.

FREDERICK KLEIN.