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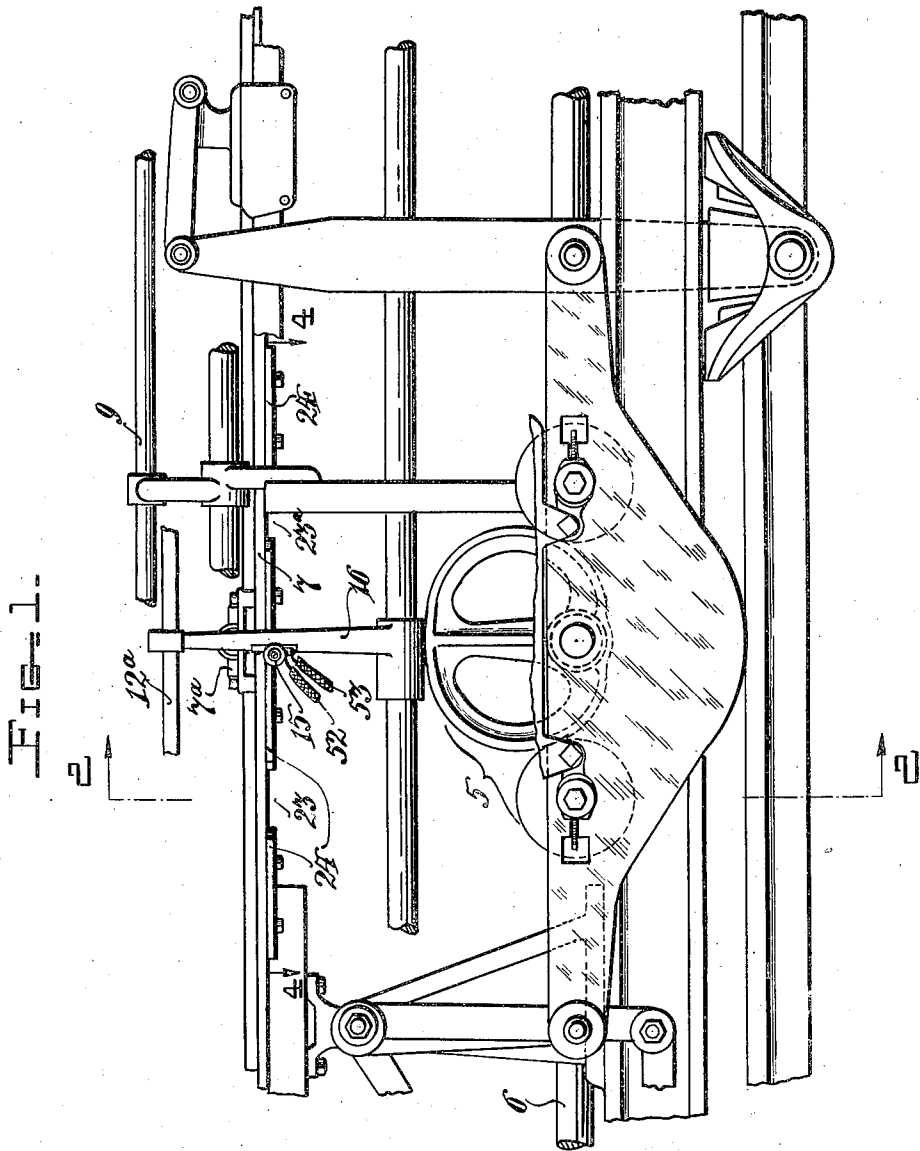
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SAFETY STOP MECHANISM FOR KNITTING MACHINES

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3 Sheets-Sheet 1



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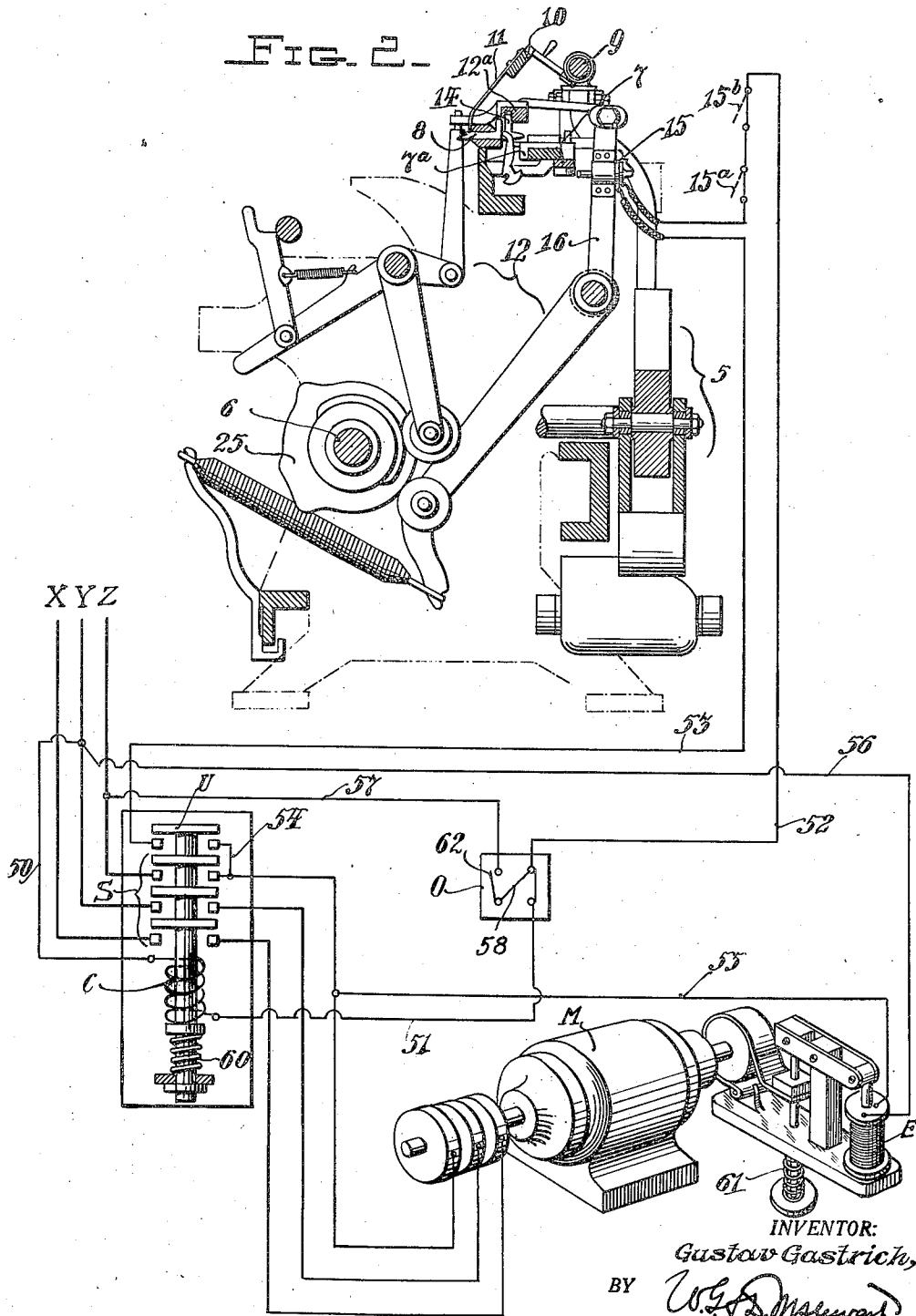
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Fig. 3.

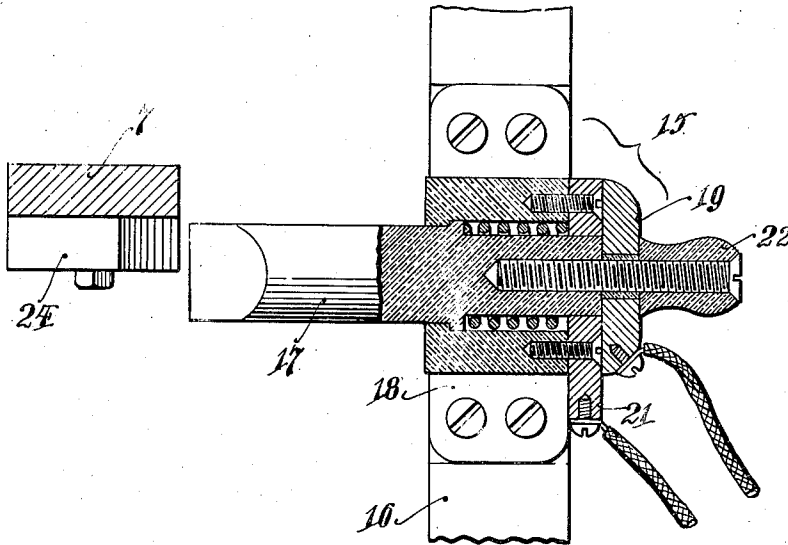
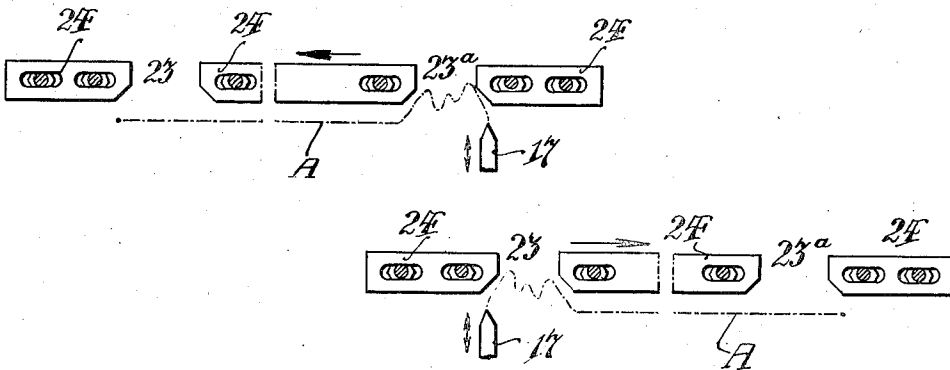


Fig. 4.



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SAFETY STOP MECHANISM FOR KNITTING MACHINES

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This invention relates to safety stop means for knitting machines; an object being to provide for automatically stopping the machine if certain machine elements or mechanisms which normally move in timed relationship get out of step with each other, thereby to prevent the usually resulting damage and loss of time for repairs.

The accompanying drawings illustrate a practical embodiment of the invention as applied to a full fashioned hosiery knitting machine, in such manner as to stop the same when the coulier and catch bar mechanisms get out of step with each other; thereby to avert damage to the sinkers and dividers by the thread carriers.

With these and other objects in view, the invention consists in certain novel elements, features of construction and arrangement of parts in cooperative relationship as will be more fully herein disclosed by reference to the illustrated embodiment thereof; its scope being more particularly indicated in the appended claims.

In the drawings:

Fig. 1 is a fragmentary rear elevational view of a full fashioned knitting machine, having my invention applied thereto.

Fig. 2 is a cross-sectional view taken substantially as indicated by the arrows 2—2 on Fig. 1, and having the wiring diagram of the machine drive motor and motor brake shown in connection therewith.

Fig. 3 is an enlarged sectional view of a switch device forming part of my invention, and

Fig. 4 shows two similar fragmentary plan sectional views, each taken substantially as indicated by the arrows 4—4 on Fig. 1, which more or less diagrammatically illustrate various positions of certain parts of my invention during one cycle of operation.

The invention is applicable wherever two knitting machine elements or mechanisms move in timed relation to one another, and can be applied in various ways and at different points, singly or in multiple, depending on the arrangement selected for controlling the stopping of the machine.

As is well known, the coulier mechanism of a full fashioned knitting machine, generally indicated at 5 in the drawings, is provided for transforming the rotary motion of the drive or cam shaft 6 into the reciprocatory motion necessary for the operation of such parts as the slur-cock bar 7, on which the slur-cocks 7a are mounted for actuation of the sinkers 8; and the friction rod 9 which in turn operates the thread carrier

rods 10 to which the thread carriers 11 are secured.

The catch bar mechanism of such a machine, generally indicated at 12 is provided to impart the proper movement to the catch bar 12a which periodically controls the sinkers 8 and dividers 14.

In operation, it is essential that the movements of the sinkers 8 and dividers 14 be correctly timed relatively to the thread carrier 11. When these parts accidentally get out of step with each other the lower ends of the thread carriers 11 will engage the upper parts of the sinkers 8, and, during continued operation of the machine, break or bend the latter; thereby similarly affecting the intermediately positioned dividers 14. This usually happens when the coulier mechanism 5 gets out of synchronism with the catch bar mechanism 12. In order to stop the machine when this takes place, I have provided a suitable motor control switch device 15, and conveniently 20 mounted the same on a catch bar operating member or arm 16, directly adjacent to the slur-cock bar 7, for the purpose of coacting therewith, as described later.

The switch 15 comprises a spring pressed plunger 17 that is adapted for reciprocation in a mounting 18, of insulating material, and provided with a metallic disk 19, which forms one terminal of the switch, normally held in contact with a second metallic terminal disk 21 fixed to the mounting 18, as shown. A finger knob 22 is secured to the rear end of the plunger 17 to permit of manual operation, if desired. The front end of the plunger 17 is V-shaped and adapted to be ordinarily reciprocatively moved by the arm 16 into and out of relatively spaced recesses 23 and 23a, provided between adjustably mounted bars 24, secured to the underside of the slur-cock bar 7.

The united movements of the member 16, and switch 15, are effected by a cam 25, on cam shaft 6. In Fig. 4, the dot-and-dash lines A indicate diagrammatically the positions of the point of the plunger 17 relative to the recesses 23, 23a, and bars 24, during one cycle of operation of the slur-cock bar 7. When the slur-cock bar is moved to the left the plunger 17 will enter the recess 23a, and remain stationary in withdrawn position during the rest of the movement, and when the slur-cock bar moves to the right, plunger 17 will be moved into recess 23, and will remain stationary in withdrawn position, during the remainder of the slur-cock bar movement.

If the coulier mechanism accidentally gets out of step with the cooperatively timed catch bar 55

mechanism, by reason of breakage or loosening of any of the involved machine parts, the timing of the movements of the plunger 17 with respect to the recesses 23, 23a and the bars 24 will be changed, and consequently instead of entering the recess 23 or 23a, the plunger 17 will contact at some point along the edge of the bars 24 and will thereby be moved rearwardly so that its disk 19 will be disengaged from contact with the disk 21, and effect opening of the circuit in which the switch 15 is connected.

It will be readily apparent from the foregoing, that additional switches can be similarly mounted for cooperation with other relatively timed elements or mechanisms of the machine, and for exactly the same purpose; and that such additional switches can be connected in series with the switch 15, as indicated at 15a and 15b. When such an arrangement is provided, the stopping of the machine will be effected when the elements of any one of the selected cooperating element or mechanism combinations get out of step with each other.

Referring to the wiring diagram of the motor and motor brake circuits, shown in Fig. 2, the mains X, Y and Z of a three phase A. C. circuit are connected through an electro-magnetically controlled switch S to the slip rings of a motor M. The switches 15, 15a, 15b, are connected in series with the coil C of the electro-magnet controlling the main switch S, a manually operable switch O, and an automatic switch U across the mains Y and Z.

The circuit may be traced from its connection at the main Y, through conductor 50, coil C, conductor 51, normally operable switch O, conductor 52, switches 15b, 15a, 15, conductor 53, automatic switch U, conductor 54, through switch S to the main Z. The motor brake magnet E is directly connected across the mains Y and Z through switch S, and conductors 55 and 56. Control switch S connects the three-phase main circuit X Y Z with the motor, while unitary switch U provides an auxiliary circuit with switches 15, 15a, 15b across the mains Y and Z.

If any of the switches 15, 15a, 15b is opened, as described, the current through the electric-magnet coil C of the motor switch S will be interrupted and the switch opened by a compression spring 60. Simultaneously therewith the motor brake circuit will be opened by reason of the opening of the switch S, and the brake B applied by a compression spring 61, as shown.

When the defective timing which opened the switch 15, 15a or 15b, has been corrected, and the switch remains in opened position, the main switch S can be closed and the coil C energized by closing the switch arm 62 of the manually controlled switch O. When this is done, the coil C is directly connected across the mains Y and Z through conductor 57, switch O, conductors 58, 51, coil C, and conductor 50. After normal conditions have been established and the respective machine operated switch is again closed, switch arm 62 of the switch O is manually opened for normal operation of the machine.

The usual auxiliary control apparatus and equipment has been omitted from the circuit to facilitate the understanding thereof.

While I have specifically described one form of my safety stop means for knitting machines, it is to be understood that the same can be changed and modified in various ways without departing from the invention herein disclosed and hereinafter claimed.

I claim:

1. In a straight knitting machine comprising cooperatively reciprocative slur-cock and catch bars, separate cam mechanisms for operating said bars in determinedly timed relation, and a machine drive motor; a motor control switch mechanism arranged to be automatically actuated by accidental changing of the determinedly timed movement of said bars so as to stop the motor.

2. In a straight knitting machine comprising cooperatively reciprocative slur-cock and catch bars, separate cam mechanisms for operating said bars in determinedly timed relation, and a machine drive motor; a motor control electric circuit comprising a switch movable with one of said bars and arranged to be automatically operated by accidental changing of the determinedly timed movement of said bars so as to stop the motor.

3. In a straight knitting machine comprising cooperatively reciprocative slur-cock and catch bars, separate operating members for said bars, and a machine drive motor; a motor control electric circuit comprising a switch mounted upon one of said operating members, and arranged to be automatically actuated by a change in the timed cooperative movement of said bars so as to stop the motor.

4. In a straight knitting machine comprising cooperatively reciprocative slur-cock and catch bars, separate cam mechanism for operating said bars in determinedly timed relation, and a machine drive motor; a motor control electric circuit comprising a switch movable with one of said bars, and switch contacting means movable with the other of said bars and adapted to automatically actuate said switch when the determinedly timed cooperative movement of said bars is changed.

5. In a straight knitting machine having slur-cock and catch bar operating mechanisms, driving means for operating said mechanisms in synchronism with each other, and control means for said driving means including an electric switch element moving in correspondence with one of said mechanisms and automatically operated when said mechanisms get out of step with each other for stopping said driving means.

6. In a straight knitting machine having slur-cock and catch bar operating mechanisms, driving means for operating said mechanisms in synchronism with each other, and control means for said driving means including an electric switch element carried by and moving with one of said mechanisms and automatically coacting with means carried by and moving with the other of said mechanisms when the mechanisms get out of step with each other for stopping said driving means.

7. In a straight knitting machine having slur-cock and catch bar operating mechanisms, driving means for operating said mechanisms in synchronism with each other, and control means for said driving means including an electric switch element mounted on and moving with the catch bar operating mechanism and automatically coacting with means carried by the slur-cock operating mechanism when said mechanisms get out of step with each other for stopping said driving means.

8. In a straight knitting machine, the combination with a cam shaft, a catch bar, a slur-cock bar, a cam-follower lever pivotally movable laterally to the slur-cock bar and actuated by a cam

on the cam shaft for moving the catch bar, and a coulier-movement mechanism operated by the cam shaft for reciprocally moving the slur-cock bar, of an electric motor for driving the cam shaft, a brake for the motor including spring setting and electro-responsive releasing means, a switch for controlling the circuits of the motor and the electro-responsive switch-release means, spring-closing and electro-responsive releasing means for said switch, a plunger switch spring biased to closed position in the circuit of said electro-responsive switch and carried by said lever, and adjustable elements carried by the slur-cock bar for cooperation with the plunger of the plunger switch, the plunger normally operating synchronously with said elements to avoid contact therewith by moving into and out of the path of movement thereof and responsive to asynchronous movement between the catch bar and the slur-cock bar for engaging one of the elements to open the plunger switch.

9. The combination with a rotatable shaft, a bar parallel to the shaft movable transversely thereto, a second bar positioned, and reciprocally movable, parallel to the shaft, and means for effecting each of said bar movements from the shaft, of means for driving the shaft, a brake for the driving means biased to braking position, electro-responsive means operative when energized to maintain the driving means in operation and the brake released, a circuit-control device biased to circuit-closing position in the circuit of said electro-responsive means and movable with said first bar, an element carried by said second bar for cooperation with said device, the device normally operating synchronously with said element to avoid being affected thereby by moving into and out of the path of movement thereof and responsive to asynchronous movement between said bars to be affected by said element to open the circuit.

10. The combination with driving means, a member reciprocally driven thereby, a second member reciprocally driven by said means transversely to the path of movement of said first member, electro-responsive means operative when energized to maintain the driving means in operation, a circuit control device in the circuit of said responsive means and carried by one of said members, and an element carried by the other of said members for cooperation with said device, the device normally operating synchronously with said element to avoid influence thereby by moving into and out of the path of movement thereof, and responsive to asynchronous movement between said members to be affected by said element to open the circuit.

11. A knitting machine comprising cooperative reciprocative members, a machine drive motor operatively connected to said members to drive the same in predetermined time relation, an electro-responsive switch for controlling the motor, means including a second switch electrically connected in circuit with said electro-responsive

switch for controlling the same, said second switch being movable with one of said reciprocative members and automatically responsive to variation of said predetermined time relation of the reciprocative members for operating said electro-responsive switch to stop the motor.

12. A knitting machine comprising cooperative reciprocative members, a machine drive motor operatively connected to said members to drive the same in predetermined time relation, an electro-responsive solenoid switch for controlling the motor, a second switch electrically connected in circuit with said solenoid switch for controlling the same, said second switch being movable with one of said reciprocative members, and switch operating means movable with another of said reciprocative members for actuating said second switch to operate the solenoid switch for stopping the motor in response to variation in said predetermined time relation of the reciprocative members.

13. A knitting machine comprising actuating means, a member reciprocally driven thereby, a second member reciprocally driven by said actuating means transversely to the path of movement of said first member, electro-responsive means operative when energized to maintain the actuating means in operation, means including a device for controlling the circuit of said electro-responsive means and carried by one of said members, and an element carried by the other of said members for cooperation with said device, the device normally operating synchronously with said element to avoid influence thereby by moving to and from a given position relative to the path of movement thereof, and responsive to asynchronous movement of said members to be affected by said element while in said position to open the circuit.

14. A knitting machine comprising actuating means, a plurality of members normally actuated by said means in synchronism with each other but capable of asynchronous movement, electro-responsive means for controlling the operation of said members, and means including elements carried by said members, respectively, for controlling the circuit of said electro-responsive means, said elements normally, under said synchronous actuation of said members, avoiding influence on each other affecting the synchronous actuation of the members, and cooperating in response to asynchronous actuation of the members to control said circuit.

15. A knitting machine comprising actuating means, a plurality of members normally actuated by said means in given time relation to each other, electro-responsive means for controlling the operation of said members, and means including elements carried by said members, respectively, and responsive to variation of said time relation for controlling the circuit of the electro-responsive means in response to variation in the time-related actuation of said members.

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