S. T. WALKUP.

CONTROLLER FOR POWER OPERATED MECHANISM.

APPLICATION FILED NOV. 29, 1911.

1,270,994.

Patented July 2, 1918.

3 SHEETS—SHEET 1.

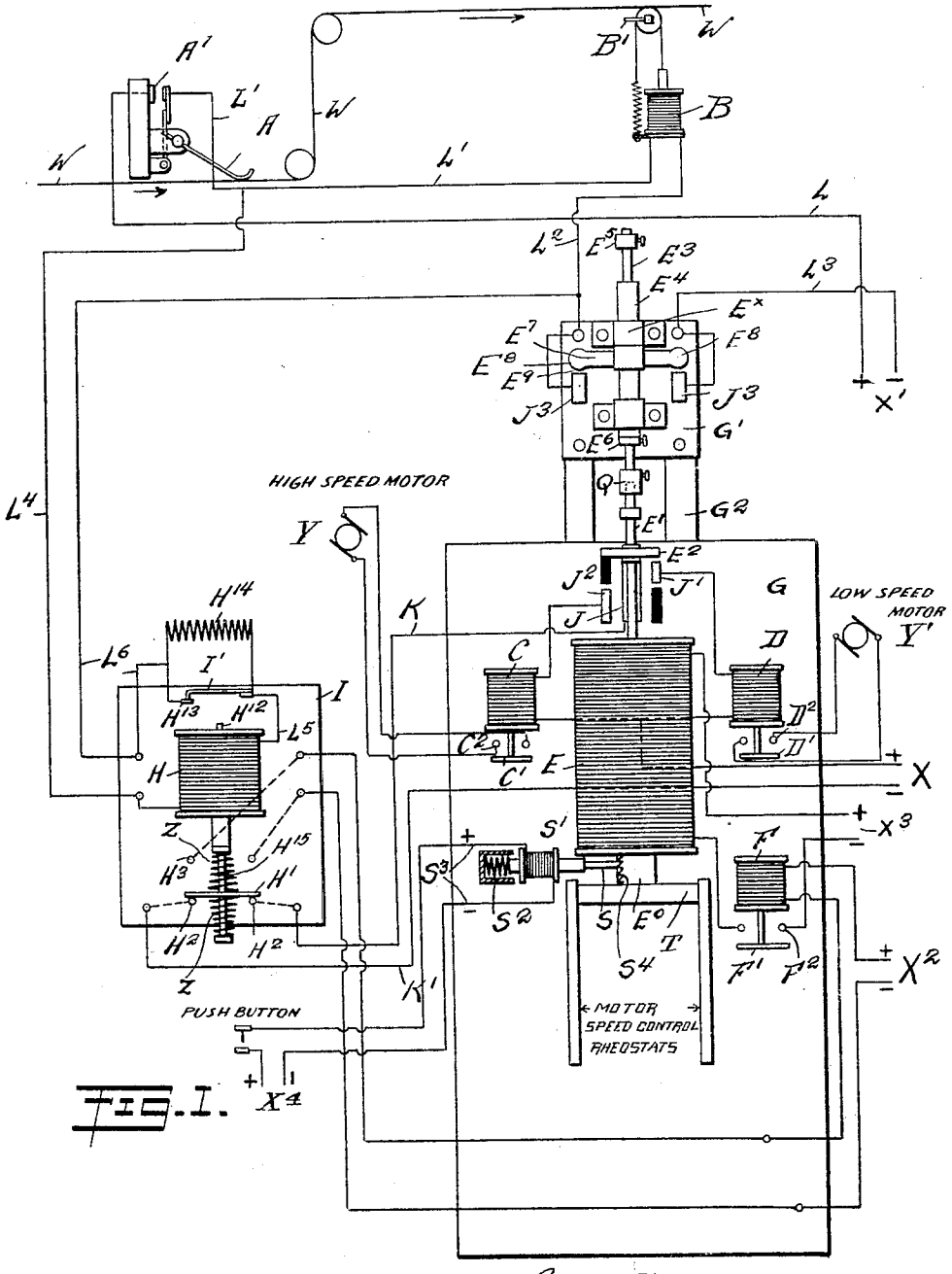


FIG. I.

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3 SHEETS—SHEET 2.

FIG. 2.

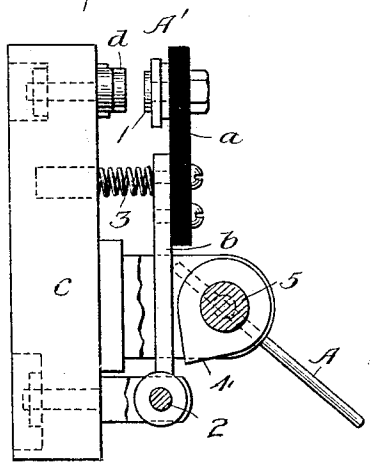
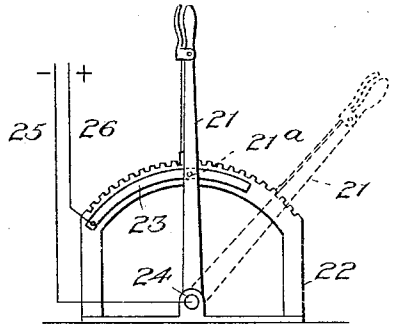


FIG. 7.



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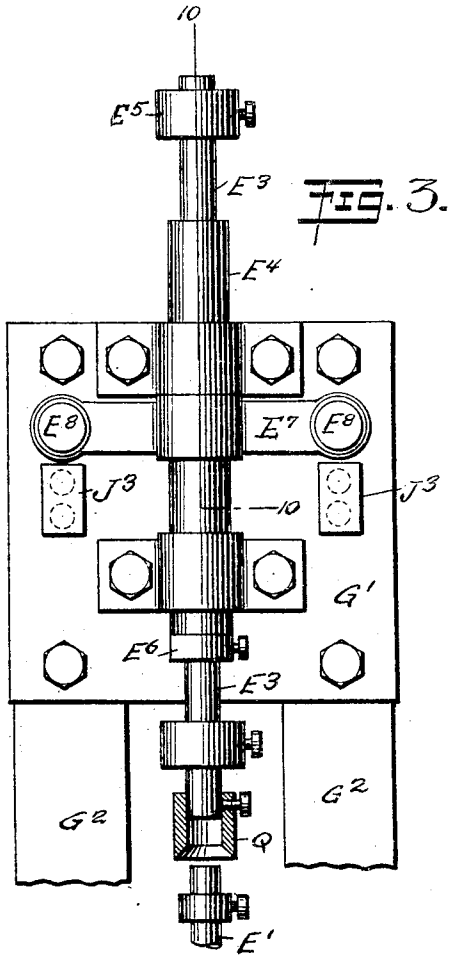


Fig. 3.

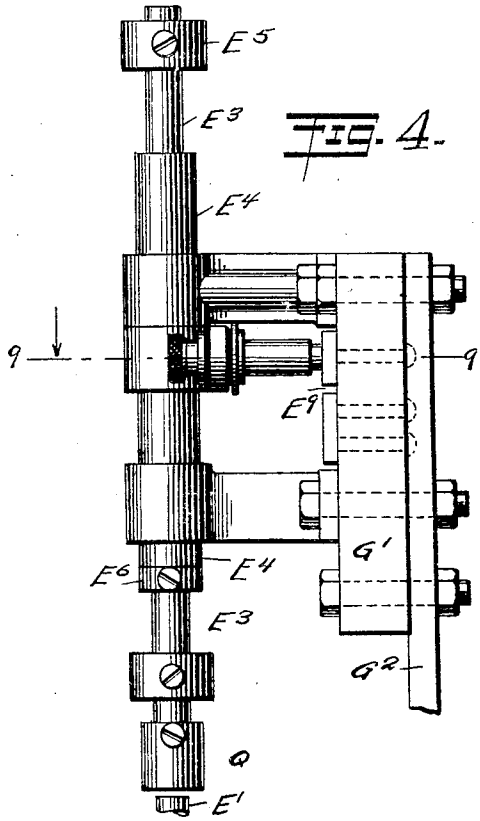


Fig. 4.

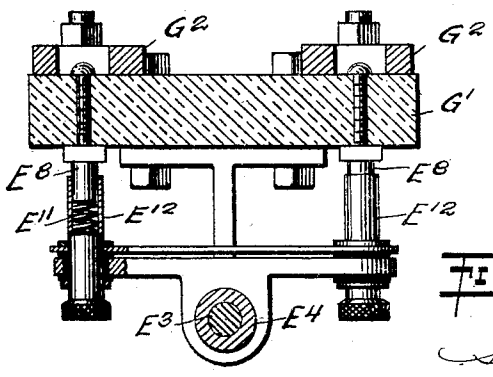


Fig. 5.

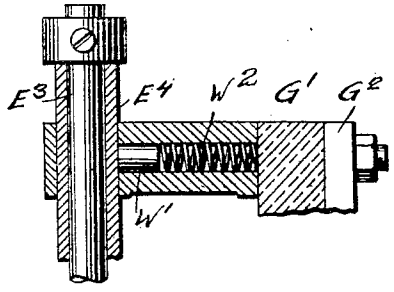


Fig. 6.

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CONTROLLER FOR POWER-OPERATED MECHANISM.

1,270,994. Specification of Letters Patent. Patented July 2, 1918.

Application filed November 29, 1911. Serial No. 663,150.

To all whom it may concern:

Be it known that I, SAMUEL THOMAS WALKUP, a citizen of the United States, and a resident of the city, county, and State of New York, have invented certain new and useful Improvements in Controllers for Power-Operated Mechanism, of which the following is a specification.

This invention relates to controllers for power operated machines and is particularly useful in connection with power operated printing presses or similar devices adapted to feed webs of paper or other material.

In the operation of printing presses and other machines adapted to feed runs or webs of paper or other material breakage of the run or web is apt to cause injury to the machinery, due to the web being wound upon the feeding or operating rolls or guides, and waste of material before manual control can be depended upon to stop the feed.

One of the objects of this invention is to provide improved mechanism whereby the condition of the web operated upon controls the feed and supply thereof.

Another object is to provide an improved web operated controller for controlling electro-magnetically governed multiple speed web-feeding machines.

Other objects and advantages will appear from the following specification and claims.

In the drawings:

Figure 1 is a diagrammatic illustration of the circuit connections and apparatus.

Fig. 2 is a side view partly in section of the web controlled detector.

Figs. 3 and 4 are front and side elevations respectively of one of the switch members.

Fig. 5 is a top view partly in section of this switch.

Fig. 6 is a view of some of its details, and

Fig. 7 is a manually controlled switch which may be used.

In the preferred embodiment two separate means are provided for running the press, one at relatively slow speeds, which may be designated the threading speeds and one at relatively high speeds, which may be designated the operating speeds. These means are controlled by an electro-magnetically actuated master controller. When breakage, interruption or slackening of the web occurs while the machine is running at operating speeds the web is cut and the machine is stopped although breakage at threading speeds does not effect these results. The machine may be run at threading speeds, and threading speeds only, after such stoppage or at any time even though the web be broken in order to provide for rethreading or "replating" the web.

The web of paper or other material upon which the machine is adapted to operate passes in the direction of the arrow beneath a pivoted arm A. This arm or break detector may be located at any desired position, the customary place in printing presses being between the printing and folding mechanism. If desired several detectors may be employed, located in various positions where breakage is most apt to occur. The arm A normally rests upon the web W and coöperates with a switch A′ which is open when the web is under tension but is adapted to be closed when the web sags. The arm and switch thus provide a web controlled detector governed by the condition of the web.

B′ is a paper cutter or severing device operated by a solenoid B or other electro-magnet whenever the circuit is completed at A′ and said magnet is energized. C (Fig. 1) is a solenoid or other electro-magnet for controlling the motor Y that operates the press at operating speeds. D is a solenoid or other electro-magnet for controlling a motor Y′ for operating the press at slower or threading speeds, when for example, it is desired to "plate" and "thread" the press. A master solenoid E is arranged to control the speed of operation of the machine and the effect of the web detector as will be hereinafter described. Such a master controller for regulating the speed of the machine is well known in the art being illustrated for example in C. A. Dresser patent, No. 744,178, issued November 17th, 1903. F is a solenoid or other electro-magnet which controls the current to the solenoid E, and is itself controlled, indirectly, by the movements of the arm A, and other devices hereinafter described. All the electro-magnets C, D, E and F, as well as certain contact devices above the same, are supported upon an insulating board or plate G at any convenient point. H is an

electro-magnet mounted upon an insulating board 1.

The upper extension E′ of the core E⁰ of solenoid E supports a contact bar E² arranged to connect a stationary contact member J with stationary contact members J′ or J² according to its position. Above and alining with the extension E′ is a rod E³, which passes loosely through a sleeve E⁴, said sleeve being mounted to slide in bearings E× secured to an insulating plate G′ supported by bars G² extending from the plate G. This rod E³ supports on its upper end an adjustable collar E⁵, and below the sleeve E⁴ a like collar E⁶, which two collars force the sleeve to move downward or upward according to the direction of the movement of the rod E³, which, as hereinafter explained, is at times forced upward by the extension E′ the end of which enters a socket of a block Q secured to the rod E³. The sleeve E⁴ carries a conducting cross bar E⁷ having at its ends contact points E⁸ in position to slide upon the contacts J³ and complete a circuit through them, all for purposes that will presently appear.

The core of the solenoid C supports a bar C′, which when the solenoid is energized, connects contacts C², C² and completes a circuit to a motor Y for running the press at operating speeds. Similarly upon the energizing of the solenoid D a bar D′ connects the contacts D², D² and completes a circuit to motor Y′ adapted to run the press at threading speeds. In like manner, the bar F′ when the solenoid F is energized, connects the contacts F², F² and completes a circuit for the master solenoid E.

Normally, while the press is at operating speeds, the contacts J³ (see Figs. 1, 3, 4, 5) are interconnected by the bar E⁷, the contacts J, J² are connected by the bar E² (Fig. 1) and a circuit is completed from the generator X through the coil C, contact J², bar E², contact J, wire K, one contact H², bar H′ (upon the core of the relay solenoid H), the other contact H², and wire K′ back to generator X, while circuits through solenoids D, F, and E are broken. The solenoids B and H are in different circuits, from a common generator X′, both of said circuits being normally broken at A′ and when the machine is running at threading speeds, at E⁹ between the contacts J³ and E⁷. If the circuit at A′ and E⁹ be closed, current will pass from generator X′ through wire L, contacts A′, wire L′, solenoid B, wire L², contacts J³, bar E⁷, and wire L³, back to generator X′. At the same time current passes through wire L, contacts A′, wires L′, L⁴, relay H, wire L⁵, movable conducting arm I′, contact H¹³, wire L⁶, contacts J³ and E⁷, wire L³ and generator X′. These circuits are completed only when there is an undue slack in the web W supporting the arm A, which slack is usually caused by a "choke" in the folder of a press, or by a break of the web. The slack or break of the web W will permit the arm A to fall, and by means hereinafter to be described, cause the two contacts at A′ to meet, and thus complete the circuits just traced. When the above mentioned circuits are completed, the consequent energization of solenoid H lifts its core, and downward extension H¹⁵ and bar or disk H′ from the contacts H² and the circuit through solenoids C will be broken and solenoid C will be de-energized. The contacts H³, however, are now connected, thus completing the circuit from the generator X² through the solenoid F, which causes the bar F′ to rise, and completes a circuit from the generator X³ through the master solenoid E and energizes it. This raises the core E⁰ and all its attachments, including the contact bars E² and E⁷, thereby breaking all the circuits except that through solenoid E, bar E² being carried above J′ and J², and E⁷ above J³, J³ as shown in Fig. 1. The parts will then all again be in initial position ready for starting the press.

The contact at A′ is shown in enlarged detail in Fig. 2, wherein 1 is a movable contact member mounted on an insulating plate *a*, itself carried by an arm *b* rocking about the axis of a shaft 2 supported by an insulated plate *c* to the upper part of which is secured a contact *d* to co-act with the contact 1. 3 is a light spring interposed between the plates *c* and *b*, and normally keeping the contacts 1 and *d* apart. The arms A, normally rest upon and are supported by the web of paper W as it passes through the press. When the web W sags materially or breaks, the arms A fall by gravity and cause cam or arm 4 to move the arm *b* so that the contact 1 will meet the contact *d*, against the tension of the spring 3, and the circuit be completed at A′.

The arms A are small rods of suitable construction adjustably fixed to a rock shaft 5 upon which is fixed a cam 4 adapted to act against the arm *b*.

Figs. 3, 4, 5, 6, show details of certain of the devices illustrated in Fig. 1. The sliding sleeve E⁴ forms a guide and bearing for the rod E³, and the adjustable collars E⁵, E⁶ upon said rod push the sleeve upward and downward when the rod slides beyond certain limits. A friction member W′ pressed against the sleeve E⁴ by a spring W² (Fig. 6), serves to support said sleeve and its contact arm E⁷ when the sleeve is not acted upon by either collar E⁵ or E⁶. The contacts E⁸ carried by the bar E⁷ are preferably spring contacts, springs E¹¹ inclosed in tubes E¹², causing tension of the same upon the plate G′ and fixed contacts J³.

The contact plate H′ supported by the core of the solenoid H, is insulated from the core, and held between two springs Z carried by an extension of the core, to secure cushioning and automatic adustment of said plate.

The core H^{15} is also provided with an upward extension H^{12}, and if the current through this solenoid should be excessive, this extension H^{12} breaks the circuit at H^{13} by raising the arm I′ and causes the current to pass through the resistance coil at H^{14} (Fig. 1).

The core E^0 of the master solenoid E is provided near its lower end with a rack S^4 with which is adapted to engage the beveled end of a rod S (Fig. 1) extending from the core of a solenoid S′, said rod being kept in engagement with said rack by a tension spring S^2. Initially, this rod S holds the core, its extension E′ and the rod E^3 in raised position so that all circuits are broken. This master controller, besides controlling the completion of circuits through solenoids C and D, as hereinbefore explained, may also control the speed of the motors for operating the press as explained in the above mentioned patent to Dresser. Since the operation of the master controller, in varying the speeds of the motor, is well known the resistances, contacts, etc., are not shown in detail.

If, now, it be desired to operate the press, the circuit S^3 through the solenoid S′ is closed, momentarily, as by a push button or similar circuit breaker. This will cause the pawl S to retract, and allows the parts supported thereby to descend, the pawl reëngaging the rack and stopping the bar E^2 in position to complete the circuit through solenoid D and contacts J, J′, thus causing the press to operate at slow or threading speed as hereinbefore described. The descent, however, is not great enough to bring the collar E^5 against the sleeve E^4. and hence the two circuits from generator X′ remain broken at E^9, and the solenoids B and H are not energized, and cannot be energized by any chance closing of the break at A′ in threading the press. Even if the circuits from generator X^3 were completed, the only effect would be to energize the solenoid E and restore all parts to initial position where all circuits are broken.

The press being threaded and with a web W passing under and holding up the arms A and the press otherwise ready for use, a second closing of the circuit through the solenoid S′ again retracts the rod S, and the arm E^2 falls, thus causing the bar E^2 to drop to J^2 and close the circuit through the solenoid C, which instantly raises the bar C′ completing the circuit broken at C^2, C^2 and thus putting the press into operation at the higher speed. The circuit for solenoid D is broken and the threading speed motor Y′ is stopped. The same descent of the core E^0 allows the rod E^3 and its collar E^5 to fall, and carry the sleeve E^4 and bar E^7 downward, closing the break at E^9 from the generator X′. The press will then run indefinitely so long as the web remains taut. But if at any time there is an undue deflection or sagging of the web W that will permit the contact arms A to drop, both the circuits from X′ will be closed, and the entering web will be instantly severed by the cutter B′, the solenoid H is energized, breaking the high speed circuit as above described through the solenoid C, and completing the circuit through the solenoids F and E, thus energizing the same. The energizing of solenoid E will draw up the core E^0, and its connected parts, so that they will assume their initial positions, as shown in Fig. 1, with all circuits broken, and the apparatus ready for again threading and operating. Thus the slackening of the web and the consequent operation of the web detector will or will not effect automatic stoppage of the press depending upon the condition of the master controller. The severing of the web is also dependent upon the condition of the master controller. If the plunger of the solenoid E is lowered sufficiently to interconnect contacts J and J^2 the press is running at operating speeds and contacts E^7 and J^3 are also closed. The slackening of the web W to allow the closure of contact A′ then causes the operation of cutter B′ and solenoids H, C, F and E, the press is stopped and the parts are restored to normal non-running position. The supply of the web is also interrupted by the severing thereof by cutter B′. If, on the other hand, the plunger of solenoid E is lowered only to the extent that contacts J and J^2 are not interconnected and contacts J and J′ are interconnected the press will be running at threading speeds because only motor solenoid D can be energized. Under such condition the slackening of the web and closure of contact A′ can cause no current to flow either through the cutter solenoid B or the solenoid H. The condition of the web can therefore exert no influence upon the running of the press and the machine can be run at threading speeds to rethread the web. If, however, an attempt is made to accelerate the press beyond threading speeds before the web is rethreaded and the contacts A′ are open, circuit is immediately completed through cutter solenoid B and solenoid A as soon as the plunger of solenoid E causes the interconnection of contacts J^3. Thereupon the press will be stopped and the web again severed. Thus the press can be operated at threading speeds regardless of the condition of the web, is automatically stopped and the web severed when slackening of the web oc-

curs while the press is running at operating speeds, and any inadvertent acceleration of the press beyond a certain point while the web is being rethreaded is prevented.

It is sometimes desirable to be able to break the web cutter circuit, the press stop circuit and the controlling circuit for the slow-motion operating devices, independently of the devices herein before described, and hence I provide at any convenient point a manually operating controller (Fig. 7) consisting of a lever 21 for riding over a quadrant 22 which is provided with a contact segment 23 having the lever pivot 24 as a fulcrum. The lever 21 is provided with the usual contact projection 21^a, which moves along this segment 23 and leaves it, breaking contact, when the lever is swung to the position shown in dotted lines. The contact point on the lever is electrically connected with one branch 25 of a conductor forming part of each of the controlling circuits having the generator X', while the segment 23 is similarly connected to the other branch 26 of that conductor. It follows that all the controller circuits may be opened at this point.

From the above it will be evident that by the use of my invention, a printing press can be run at any desired speed and with perfect safety and with as little delay as possible when the web is severed, and without danger of the web bunching or snowing up.

It will also be evident that my invention is not limited to the precise construction described and shown, as many changes and variations may be made therein without departing therefrom.

What I claim as new and desire to secure by Letters Patent is:

1. In a control for a power operated machine through which a web passes of the class wherein an electromagnetically actuated master controller regulates the speeds at which the machine is driven, the combination of means dependent upon the condition of the web and coöperating with said master controller when the speed of the machine is above a predetermined value to control the operation of the machine.

2. In a control for a web feeding machine of the class wherein an electromagnetically actuated master controller regulates the speeds of the machine, the combination with a web detector coöperating with said master controller for stopping the machine when a break in the web occurs while the machine is operating above a predetermined speed.

3. In a control for a web feeding machine of the class wherein an electromagnetically actuated master controller regulates the speeds of the machine, the combination with a web tension detector coöperating with said master controller to stop the machine when the tension of the web decreases while the machine is operating above a predetermined speed, and means for allowing the machine to be driven below, but not above, a predetermined speed until the tension of the web is restored.

4. In combination with a machine through which a web passes, means adapted to drive said machine, an electromagnetically operated master controller for controlling said means to drive said machine at different speeds, and means dependent upon the condition of the web for controlling said master controller.

5. The combination of means adapted to drive at different speeds, a web feeding machine adapted to be driven by said means, a web actuated circuit controller, and an electromagnetically actuated controller for controlling said means to drive the machine at different speeds and rendering said circuit controller effective.

6. The combination with a machine through which a web passes, and means for severing the web, of driving means adapted to drive the machine at different speeds, an electromagnetically actuated controller for regulating the speeds of said driving means, and means dependent upon the condition of the web for controlling said controller and said web severing means.

7. The combination of a web feeding machine, a source of power for driving said machine at threading speed and operating speed, an electromagnetically actuated device for determining the speeds at which said machine shall be driven and means automatically acting to stop the machine upon breakage of the web when the machine is running at operating speed but not when it is running at threading speed.

8. In combination with a printing press of driving means therefor, a threading speed controller for said means, an operating speed controller for said means, a master switch for controlling the operation of both said controllers, and a web controlled switch for controlling said master switch.

9. The combination of a master relay, a threading speed control relay, an operating speed control relay, driving means controlled by said relays, a web feeding machine adapted to be driven by said means at different speeds, and means controlled by the breakage of the web for causing said master relay to affect the other relays to stop the machine.

10. A controller for power operated web feeding machines, comprising a threading speed motor, an operating speed motor, a relay for controlling said threading speed motor, a relay for controlling said operating speed motor, a master relay, circuit connections affected by said master relay for controlling a circuit for either of the other relays dependent upon the condition of said

master relay, and means affected by breakage of the web for stopping the machine.

11. A controller for power operated machines adapted to be driven at different speeds and operate upon a web, which has a pair of relays each controlling the operation of the machine at a certain speed, a web condition detector, and a master relay controlling the operation of the other two relays and rendering said detector effective or ineffective to stop the machine.

12. For a machine adapted to be driven at threading and at operating speeds and feed a web of material, a controller having a detector affected by the condition of web, and a master relay controlling the threading and operating speed conditions of the machine and rendering said detector effective to stop the press at operating speeds but not at threading speeds.

13. In a control system for a machine adapted to be driven at threading and operating speeds and feed a web of material, a web severing device, a web condition detector, and a master relay controlling the threading and operating speed conditions of the machine and rendering said detector effective to cause the operation of said severing device to cut the web and to stop the machine.

14. For a machine adapted to be driven at threading and at operating speeds and to operate upon a web of material passing therethrough, a controller having a web condition detector, and a relay controlling the threading and operating speed conditions of the machine and rendering said detector effective to control the operation of the machine at operating speeds but not at threading speeds.

15. A control system for a machine adapted to operate upon a web of material and to be run at threading and at operating speeds, having a relay for controlling both speed conditions, a web condition detector, and means affected by said relay when said relay is in position to affect operating speed but not when it is in position to affect threading speed to render said detector effective to stop the machine.

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."