This invention relates to printing machines and more particularly to a control device therefore, whereby the machine may be protected against possible damage and inconveniences due to folder or like chokes.

In printing machines and especially in those wherein the product requires folding, chokes occasionally occur at or adjacent to the folding means, which usually comprises a pair of cylinders having cooperating means thereon, thereby causing severe strains and possible damage to the adjacent machine parts, or at least considerable inconvenience, if not promptly attended to and which usually requires the stopping of the press before operations can be continued.

Before such chokes occur, or at least become sufficiently developed as to cause damage, several conditions become existent. For instance, if the product is beginning to accumulate, it is readily noticed due to the lack of a product being delivered, or by the presence of a product upon the folding cylinder at an improper time. Whenever products fail to appear, or do appear but at improper intervals, a choke may be in the process of development and immediate action must be taken to interrupt the same. Due to the rapidity with which chokes develop and become troublesome, and to the complicated nature of such printing machines, it is generally impossible to promptly note the indications of a choke and to avoid subsequent damage, by preventing continuance of the fault in time.

Automatically operable means, including both mechanically and electrically operated mechanisms, have been provided, most of which operate only after a choke has occurred, and by using the accumulated products to operate an actuating member to stop the printing machine. These devices require the occurrence of a choke to operate them, which in many instances is sufficient to impose severe strains upon the machine parts, or cause considerable inconvenience and loss of time while the choke is being cleared.

One of the principal objects of this invention is to provide a control device which is automatically operable to actuate controlling means for a printing machine in time to prevent damage and inconvenient chokes, especially at the folding mechanism of such machines.

Another object is to provide means in a printing machine to detect the presence of a product at a predetermined position at an improper time and to actuate control mechanism, when the product is so detected to avoid possible damage or further irregularities in machine operation.

Still another object is to provide a printing machine control mechanism which is automatically operable upon the absence or presence of a product in a position before the proper time therefore, to actuate suitable devices to stop further operation of the printing machine and to interrupt the feeding of products therethrough.

A further object is to provide light responsive electrical devices arranged to detect the absence or presence of a product at an improper interval in the operation of a printing machine and to actuate mechanism to stop the machine or interrupt the flow of products therethrough, or both.

It is also an object of the invention to provide a control device for printing machines, of generally improved construction, whereby the device will be simple, durable and inexpensive in construction, as well as convenient, practical, serviceable and efficient in its use.

With the foregoing and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts, and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

The preferred embodiment of the invention is illustrated more or less diagrammatically in the accompanying drawing, wherein is shown the folding and delivery mechanism of a printing machine having associated therewith an arrangement and combination of features and devices constituting the control mechanism embodying the feature of this invention.

It will be understood that the invention relates especially to printing machines wherein the products thereof are fed to folding and delivery mechanisms. Herein is shown a continuous web being fed between a pair of cylinders and having cooperating mechanism for severing the web as indicated at 14. The severed portion is carried by the cylinder into position to be acted upon by a folding blade which directs it between a pair of folding rollers and delivered therefrom onto a suitable receiving member (not shown). Suitable means, generally an electric motor, is provided to drive the operating parts of the printing machine and suitable interconnecting mechanism insures the proper timing of the various components of the
machine for operating on the web and delivering the products in proper timed relation.

The particular point at which most chokes occur, in printing or similarly operating machines, is after severing the web, and as the severed product is folded. The products at this position occasionally accumulate, choking the mechanisms, whereby considerable damage thereto may result. At such times, the product may not be carried beyond the rollers 17 and 18 (as shown at 21) into proper position to be acted upon by the blade 16. The product, under the above conditions, therefore, will not pass between the rollers 17 and 18. Such discrepancies or irregularities in operation, when they occur, are probable indication that a choke is being developed, and interruption of the machine operation as soon as possible, is desirable.

A mechanism for automatically detecting the above irregularities and to actuate devices to stop operation of the printing machine or portion thereof is herein illustrated and will be hereinafter described. This mechanism is operated by the absence of a product at the proper time below the rollers 17 and 18 or by its presence at an improper time upon the web shown at 21, but it is to be understood that it may be adjusted to operate, due to the presence of a product at the first position at an improper interval or the absence of a product at the second position at the proper interval of machine operation.

The mechanism contemplated, in one instance, the interruption of the operation of the printing machine, and, therefore, provision is made for interrupting an electric circuit 22 which may control the operation of the driving motor by opening the switch 23. It is also contemplated to interrupt the feeding of the web, and an electrically operated web severing means or knife 24 is provided for this purpose. The electrically operated actuating means for the knife 24 is under control of a solenoid switch 25. A solenoid 26 is arranged to operate both the switches 23 and 25 but it is obvious that one or the other may be omitted if it is not desired to both stop the machine and sever the web.

Energization of the solenoid 26 will operate the switch 23 to open the motor control circuit 22 whereby the printing machine will stop. Simultaneously, the switch 25 will close and energize the circuit 28 influencing a knife operating device 29, whereby the knife 24 will be swung downward to sever the web in advance of the cylinders 12 and 13, and direct the oncoming portion away from them. The solenoid 26 is energized to actuate the switches 23 and 25 whenever, as herein shown, a product is absent, at the proper time for the same, below the rollers 17 and 18, and also when a product is disposed of at an improper interval of time, although as stated above, their operations may be accomplished when a product is present or absent respectively from these positions at other times.

The means for controlling the energization of the solenoid 26 herein comprises a pair of devices, each consisting of a light responsive electrical device such as a photo electric cell 30, and a source of light 31, operatively disposed adjacent to the path of the product. The light responsive electrical devices 30, are each arranged to operate associated control means 32 to energize the solenoid 26 through circuits 33 whenever a beam of light strikes the light sensitive elements thereof in a well known manner. The source of light may be an electric light, the beam of which is focussed at a point to be reflected back to the light responsive device 30 whenever the light reflecting surface is presented at the proper position, so to do. The electric lights 31 are each arranged to be energized by being in a circuit 34 which at timed intervals is opened and closed by a timing switch 35. The timing switch 35, it is understood, is operated in any convenient manner in synchronism with the operation of the printing machine, and particularly with that of the folding mechanism, to which the control mechanism of this invention is applied.

The timing switches 35, in this instance, are shown arranged to energize the light sources 31 and thus a beam of light upon the points past which the web must pass. Should there be a product present at point 21 at an improper time or absent from point 35 at the proper time the light from this beam is reflected upon the sensitive element of the photo-electric cell 30 and the solenoid 26 is energized, whereby the printing machine will stop and if a severing knife 24 is provided the web 11 will be severed. In this case where the absence of a product is to be detected at a point 36, a light reflecting surface must be provided beneath the rollers 17 and 18 to reflect the beam from the source of light 31 adjacent the same, which may be, for instance, a mirror disposed at 37. If desired, however, the source of light 31 may be disposed in place of mirror 37 and its beam directed so as to shine directly across the path of the product and upon the sensitive element of the cell 30.

The timing switches 35 may be of the form illustrated, wherein a cam 38 rotates in synchronism with the operation of the printing machine and acts through the cam surface 39 upon an arm 41 to open and close the circuit 34 by means of cooperating contacts 42 and 43. As illustrated one of the switches 35 has its cam 38 arranged to actuate the arm 41 to close the circuit 34 and thereby tend to cause a beam of light from the light source to illuminate the reflector or mirror 37 during the interval a product is passing the point 36 from the rollers 17 and 18 at the fan wheel 16. The other switch has its cam arranged to cause illumination of a product, when the same has reflecting properties, during the interval it is not supposed to be present at the point 21 on the cylinder 12. In cases where the product does not have reflecting properties, it is readily made to provide a reflecting surface upon the cylinder at the proper position to cause reflection of the light beam 21 whereby the presence of a product thereat, at an improper time, will interrupt the beam of light and cause the control 32 to be actuated to energize the solenoid 26. This arrangement will merely require the reversal of the arrangement of the cam 38 controlling the source of light 38 directed toward point 31 to illuminate the same reversely to the previous arrangement. A reversal of the action of the control 32 adjacent point 21 will also be required, whereby it will act to close the circuits 33 and energize the solenoid 26 when the beam of light reflected back from the reflecting surface provided on the face of the cylinder 12 is interrupted by the presence of a product at 21. In respect to the ability to reverse the action of the controls 32, it will be understood that these may include a solenoid controlled switch which, as is well known, may be arranged to either open or close a circuit when the solenoid thereof is energized. In the arrangement first...
described, such a switch may be utilized, which is closed when the light responsive device 31 adjacent point 21 is actuated by a beam of light from the product, and in the arrangement wherever-in a reflecting surface is provided upon the cylinder, the switch is arranged to close when the respective light responsive device is not actuated, due to an interruption in the beam of light from the reflecting surface on the cylinder.

The mechanism, which is operable as described above in connection with the description of its features and parts, provides an efficient and substantially instantly acting protective device for a printing machine, to prevent severe strains and possibly expensive damage, with their attendant inconvenience and delay, due to chokes wherever such are liable to occur. The mechanism is not necessarily limited for use in association with the folding devices of a printing machine, as it is obviously adaptable for use in connection with other parts or mechanisms thereof, or of like machines, to detect the presence or absence of a product at improper intervals, at any position where chokes are liable to occur, during machine operation.

It will be understood that the invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and it is therefore desired that the present embodiment be considered in all respects as illustrative and not restrictive, reference being had to the claims rather than to the foregoing description to indicate the scope of the invention.

What I claim is:

1. In a control device for a printing machine having a rotary folding cylinder, a light responsive electrical device positioned and arranged to detect the presence of a product on the folding cylinder at an improper time, and control means actuated by said device, when this occurs, to stop the machine.

2. In a control device for a printing machine having a rotary folding cylinder and a delivery, a light responsive electrical device positioned and arranged to detect the absence of a product normally moving between the folding cylinder and the delivery, and control means actuated by said device, when such absence is detected, to stop the machine.

3. In a control device for a web printing machine having a rotary folding cylinder and a delivery, a web severing device adjacent the path of the web before it reaches the folding cylinder, a light responsive electrical device positioned and arranged to detect the absence of a product normally moving between the folding cylinder and the delivery, and control means actuated by said light responsive device, when such absence is detected, to operate said severing device.

4. In combination with a rotary folding cylinder for a web printing machine, a web severing device adjacent the path of the web before it reaches the cylinder, a light responsive electrical device positioned and arranged to detect the presence of a product on the folding cylinder at an improper time, and control means actuated by said light responsive device, when this occurs, to operate the severing device.

5. In a control device for a printing machine having folding means and delivery means between which the product normally passes at timed intervals, means including a light responsive device positioned and arranged to detect the absence of a product at an improper time between said folding and delivery means, and control means operated by said light responsive device to stop the machine when such absence is detected.

6. In a control device for a web printing machine having folding means and delivery means between which the product normally passes at timed intervals, means including a light responsive device positioned and arranged to detect the absence of a product at an improper time between said folding and delivery means, control means to stop the machine, means to sever the web before it reaches said folding means, and means to control said severing means, light responsive device being operable to actuate said machine stopping control means and said web severing control means, when such absence is detected.

7. In a control device for a printing machine having a cylinder upon which a product is disposed at time intervals, a machine stopping control, means to detect the presence of a product on said cylinder at an improper interval and to actuate said machine stopping control.

8. In a control device for a printing machine having a cylinder upon which a product is disposed at time intervals, means to prevent disposition of products on said cylinder and to direct them away therefrom, and means to detect the presence of a product on said cylinder at an improper interval and to actuate said first means to prevent further disposition of products on said cylinder and to direct them away therefrom.

9. In a control device for a printing machine having a pair of devices between which the material printed upon is passed from one to the other at regular intervals, a machine stopping control, means to detect the absence of the material between said devices at an improper interval and, upon doing so, to actuate said machine stopping control to stop the machine.

10. In a control device for a printing machine having a pair of devices between which the material printed upon is fed from one to the other at regular intervals, means to prevent the feeding of the material between said devices, control means for said feeding preventing means, and means to detect the absence of the material between said devices at an improper interval and, upon doing so, to actuate said control means to cause operation of said feeding preventing means to interrupt the material feeding operation thereof.

11. In a control device for a printing machine having a pair of devices between which the material printed upon is fed from one to the other at regular intervals, a machine stopping control, and means to detect the absence of the material between said devices when it normally should be present and, upon so doing, to actuate said control to stop the machine.

12. In a control device for a printing machine having a pair of devices between which the material printed upon is fed from one to the other at regular intervals, means to prevent the feeding of the material between said devices, control means for said feeding preventing means, and means to detect the absence of the material between said devices when it normally should be present and, upon so doing, to actuate said control means to cause operation of said feeding preventing means to interrupt the material feeding operation thereof.

13. A control device for a printing machine having a cylinder in its structure upon which a product is moved at regular intervals, a light responsive electrical device disposed to detect
the presence of a product on said cylinder at an improper interval by the reflection of light therefrom, a source of light directed at a product on said cylinder, and means operated by said device to stop said machine when the improper presence of a product is so detected.

14. A control device for a printing machine having mechanism in its structure adjacent which a product is moved at regular intervals, a light responsive electrical device disposed to detect the presence of a product in such position at an improper interval by the reflection of light therefrom, a source of light directed at such position, and means operated by said device to interrupt the movement of the product, when the presence thereof is so detected, and to deflect the product away from the said mechanism.

15. A control device for a printing machine having mechanism in its structure adjacent which a product is moved at regular intervals, a light responsive electrical device disposed to detect the presence of a product in such position at an improper interval by the reflection of light therefrom, a source of light directed at such position, timing means to energize said source of light at intervals when no product should be present at such position, and means operated by said device to prevent further moving of the product into such position when the presence thereof is so detected.

16. In a control device for a printing, or like machine, cooperating product folding rollers, a product delivery mechanism, means to pass a product past a given point between said rollers and said delivery mechanism at substantially regular intervals, means to interrupt the operation of said product passing means, and means to detect the absence of the product at one of such intervals and to cause actuation of said interrupting means to prevent further movement of the product past the given point.

17. In a control device for a printing, or like machine, means to dispose a product upon a part of said machine at a given point at substantially regular intervals, means to interrupt the disposition of the product on, and to direct it away from, the machine part, and means to detect the presence of the product at such point at an improper time and to cause actuation of said interrupting means to prevent further disposition of the product upon the machine part and to direct it away therefrom.

18. In a control device for a printing, or like machine, means to interrupt the operation of said product passing means, means to pass a product past a given point at substantially regular intervals, means to detect the absence of the product at one of such intervals and to cause actuation of said interrupting means to prevent further movement of the product past the given point, means to dispose a product upon a part of said machine at a given point at substantially regular intervals, means to interrupt the disposition of a product upon said machine part, and means to detect the presence of the product at such point at an improper time and to cause actuation of said second mentioned interrupting means to prevent further disposition of the product upon the machine part.

19. In a control device for a printing machine having a machine part in its structure upon which a product is moved at regular intervals, a light responsive electrical device disposed to detect the presence of a product on said machine part at an improper interval by reflection of light toward said device, a source of light directed toward said machine part, timing means to energize said source of light at intervals, and means operated by said device to stop the movement of the product upon said machine part when the improper presence of a product thereon is detected thereby.

20. In a control device for a web printing machine having a rotary folding cylinder and a delivery, means to substantially prevent the formation of chokes between the folding cylinder and the delivery including a web severing and product directing device adjacent the path of the web before it reaches the folding cylinder, control means for said severing device, and a light responsive electrical device positioned and arranged to detect the absence of the product between the cylinder and the delivery, and to actuate said control means when the product is absent, to cause said web severing means to operate, to sever the web and to direct it away from said cylinder.

21. In combination with a rotary folding cylinder for a web printing machine, means to feed light reflecting products upon said cylinder, a light responsive electrical device positioned to detect the presence of the product on said cylinder at an improper time, and control means actuated by said device, when this occurs, to stop the machine, and substantially simultaneously with its stopping of the machine, to cause said feeding means to interrupt the feeding of the product.

22. The combination for use with a machine adapted to operate upon a web and from which a web is being fed, of a folding cylinder to receive the web, folding rollers, a delivery to receive folded products from the folding rollers, and web interrupting means preceding said folding cylinder and disposed across the path of the web, including a web severing device adapted to sever and direct the web away from said cylinder, with means to operate said web interrupting means including a device positioned and arranged to detect the improper disposition of a product relatively to the cylinder and to cause actuation of said web severing and directing device when this occurs, to prevent the formation of chokes adjacent said folding cylinder.

23. In a control device for a printing machine having product folding rollers, a cylinder upon which a product is normally disposed at proper timed intervals in position to be folded by said rollers, means operable to interrupt the operation of the printing machine, apparatus to actuate said means including a device to detect the absence of a product upon said cylinder during a proper interval and being adapted to then operate to cause actuation of said means.

24. In a control device for a printing machine having product folding rollers and a cylinder adapted to receive a product upon its periphery and carry a product into position to be folded by said rollers, means to dispose a product on said cylinder at proper timed intervals, means operable to interrupt the action of said product disposing means, apparatus to actuate said means to interrupt the action of the disposing means including a device to detect the absence of a product upon said cylinder during a proper interval and being adapted to then operate to cause actuation of said means to interrupt the action of the product disposing means when the absence of a product on said cylinder is detected.

ALBERT J. HORTON.
CERTIFICATE OF CORRECTION.

ALBERT J. HORTON.  
July 5, 1938.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, first column, lines 54 and 55, claim 18, strike out the words and comma "means to interrupt the operation of said product passing means," and insert the same before "means" in line 57, same claim; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 22nd day of April, A. D. 1941.

(Seal)

Henry Van Arsdele,  
Acting Commissioner of Patents.
DISCLAIMER


Hereby enters this disclaimer to claims 9, 10, 11, and 12 in the specification.

[Official Gazette August 22, 1939.]