

April 30, 1935.

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1,999,618

PAPER BREAK CONTROL FOR PRINTING PRESSES AND THE LIKE

Filed Feb. 16, 1933

3 Sheets-Sheet 1

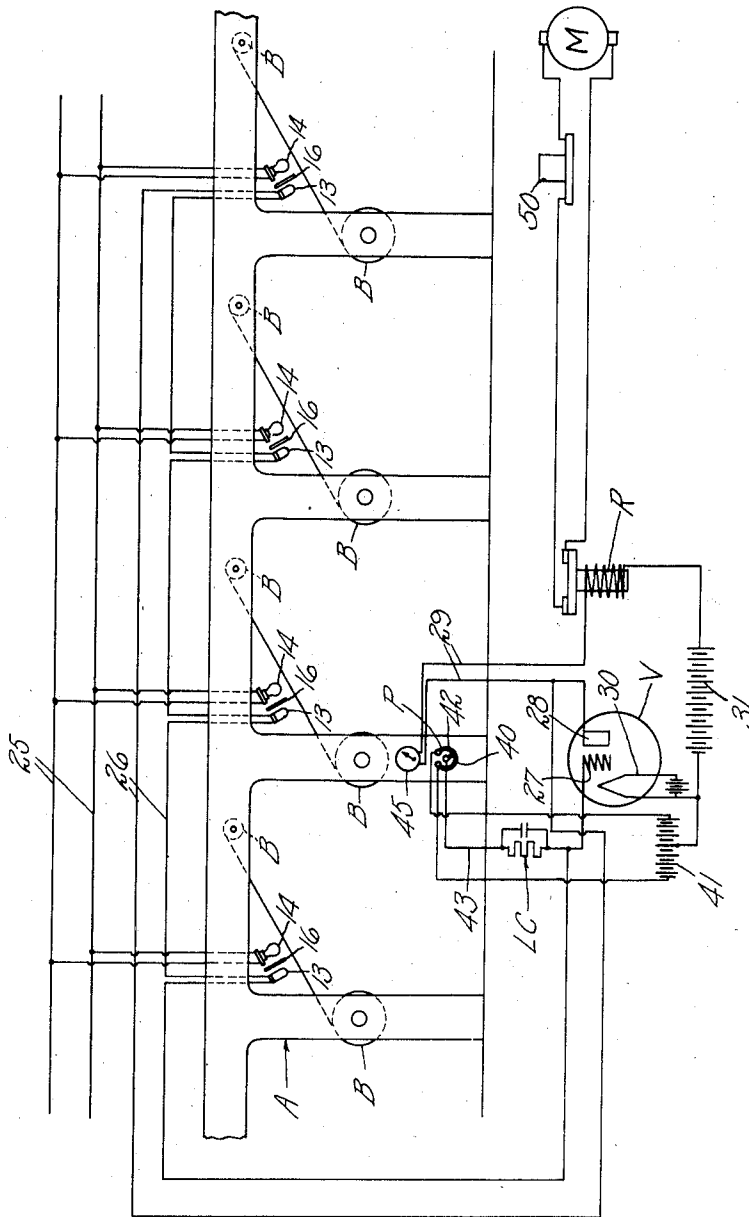


Fig. 1

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Fig. 2

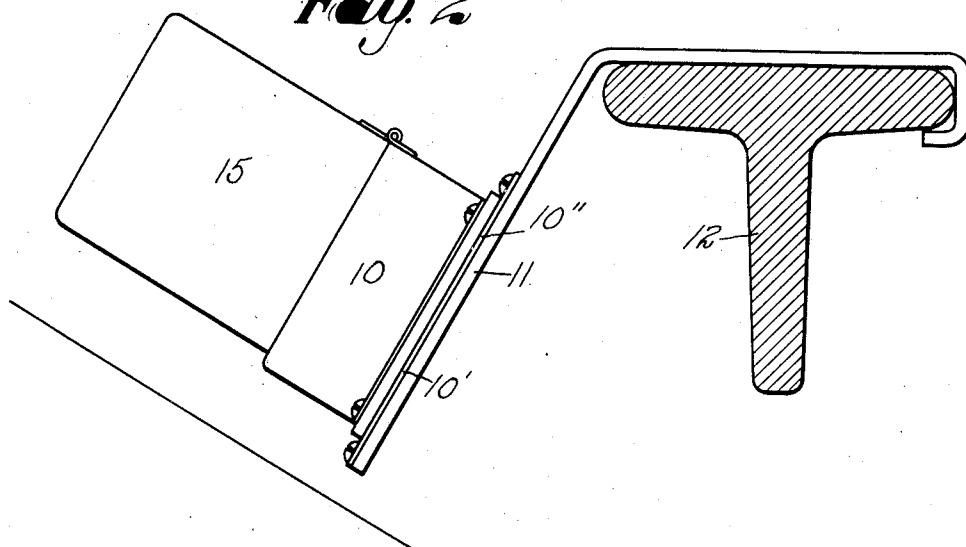
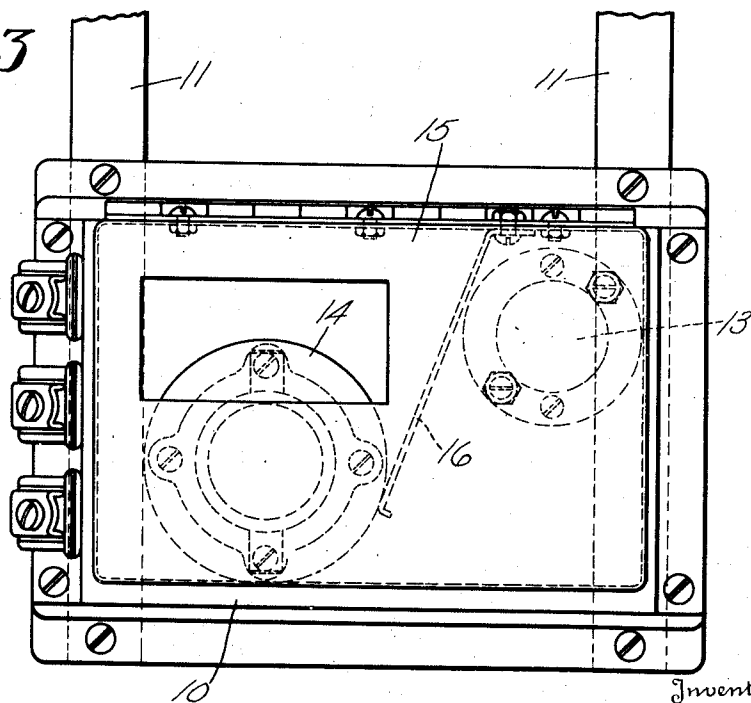


Fig. 3



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Fig. 4

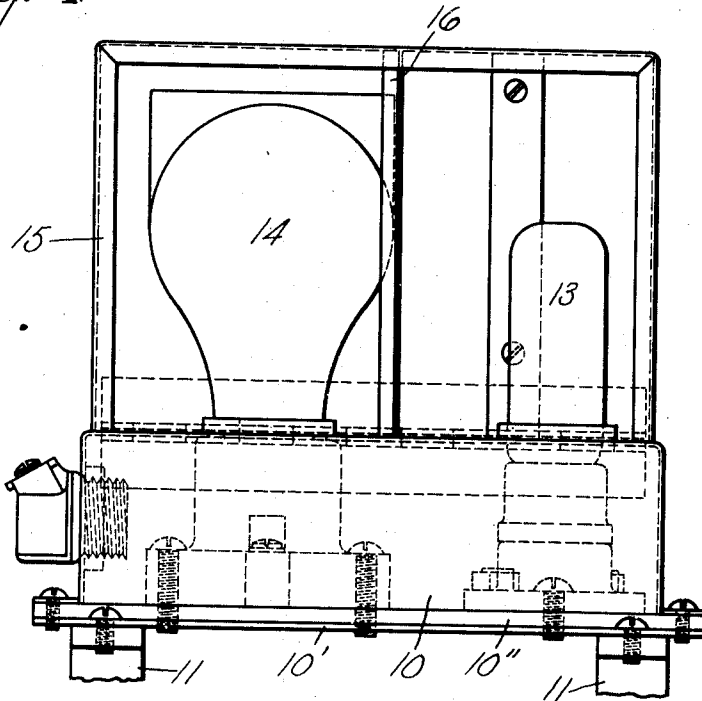
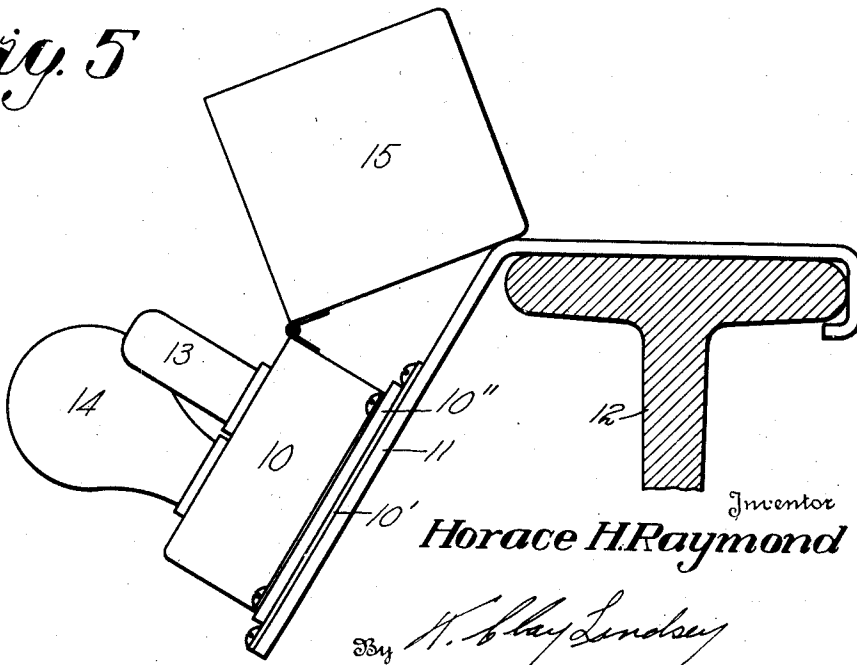


Fig. 5



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UNITED STATES PATENT OFFICE

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PAPER BREAK CONTROL FOR PRINTING
PRESSES AND THE LIKEHorace H. Raymond, Berlin, Conn., assignor to
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Application February 16, 1933, Serial No. 657,029

6 Claims. (Cl. 192—127)

The present invention relates to an arrange-
ment for stopping the operation of a machine in
the event that a web of paper passing there-
through should break. As an instance of a use
to which the present invention may be applied,
reference is had to a newspaper printing press,
it being understood, however, that my improve-
ments may be applied to other machines, such
as paper making machines.

The aim of the invention is to provide an im-
proved arrangement of this sort having various
features of novelty and advantage and which is
particularly characterized by its extreme sim-
plicity; by its economy in manufacture and the
facility with which it may be installed; by its
effectiveness in operation in that it will result
in immediate stoppage of the press in the event
the paper should break; which is very flexible
in operation in that it may be adjusted very quick-
ly and easily to take care of the desired number
of webs of paper passing through the machine;
which is capable of being nicely controlled with-
out any high degree of skill to take care of a
large number of variables such as the character-
istics of the paper, light conditions existing in
the press room, etc., and which is not liable to
get out of order or cause any trouble.

Other objects will be in part obvious, and in
part pointed out more in detail hereinafter.

The invention accordingly consists in the fea-
tures of construction, combination of elements
and arrangement of parts which will be exem-
plified in the construction hereinafter set forth
and the scope of the application of which will
be indicated in the appended claims.

In the accompanying drawings, wherein I have
shown, for illustrative purposes, one embodiment
which the present invention may take,

Fig. 1 is a schematic view showing, more or
less diagrammatically, my improved system of
control applied to a newspaper printing press;

Fig. 2 is an end elevational view of a unit which
includes a photoelectric cell and a lamp;

Fig. 3 is a view looking at the top of the unit;

Fig. 4 is a view of the unit looking at that
side which is normally opposed to the paper web;
and

Fig. 5 is a view similar to Fig. 2 but showing the
cover or hood thrown back.

Referring to the drawings in detail, there is
shown, in Fig. 1 thereof, so much of a printing
press as is necessary to illustrate one application
of my improved system. This printing press is
shown as having a frame A in which are mounted
a plurality of rollers B over which the paper is

adapted to pass. Certain of these rollers may be
driven by an electric motor M. In the present
instance, the press is shown as being adapted to
accommodate four webs of paper but, obviously,
my system may be used in connection with a
press of any size. The rolls from which the
paper is taken, the folders and the other instru-
mentalities with which the press is usually pro-
vided are not illustrated as they form no part
of the present invention.

In accordance with the present invention, there
is provided a plurality of light sensitive devices,
such as photo-electric cells, distributed in the ma-
chine so that there is one at least such device
associated with each web of paper passing
through the machine. Associated with each of
the photo-electric cells is a source of light, such
as an electric lamp, positioned to the same side
of the paper as the cell itself and so located that,
when the paper is passing in front of these in-
strumentalities, the light from the lamp will be
reflected by the paper onto a respective cell.
The cells are connected in series to a suitable
current responsive device which is here shown
as being in the form of a vacuum tube and a
relay coupled therewith. The relay is adapted
to control the motor M which drives the press
and also, if desired, the relay may control a brak-
ing device (not shown) for immediately stopping
rotation of the rolls of paper when the power
is thrown off. The total current passing through
the four photo-electric cells is limited, of course,
by the cell receiving the least light, and the cur-
rent passing through the current responsive de-
vice or vacuum tube is the average of the re-
flected light received by all of the photo-electric
cells from the particular edition of the news-
paper being printed. There are many factors
and conditions of a variable nature which affect
the amount of light received by the cells and
the resultant amount of current impressed upon
the current responsive device, and therefore, in
order that the system may be quickly and easily
adapted to the particular conditions at hand,
there is coupled with that device and the photo-
electric cells means operable at will, for increas-
ing or decreasing the current impressed upon the
current responsive device. There is also provided
an indicator in the form of a milliammeter for
indicating the current passing through the vac-
uum tube and the relay. As hereinafter pointed
out in detail, during the normal operation of the
press if any one of the cells becomes darkened,
which would be the case if the paper should break,
the current through the vacuum tube ceases, with

the result that the relay opens and the press is stopped.

Having now briefly described the general set-up of the system, the various instrumentalities thereof will now be described in detail, reference first being had to the construction of the several electric eye units distributed through the press and each consisting of a photo-electric cell and a lamp.

Each unit includes a base comprising a steel box 10 mounted on a steel base plate 10' which in turn is suitably mounted in inclined position on brackets 11 supported by a cross beam 12 of the press. Interposed between the steel box 10 and the base plate 10' is a relatively thick rubber sheet gasket 10'', which serves the important purpose of keeping out of the base the flying lint charged with printers ink. This fine, black lint is a conductor of electricity and would soon short circuit the photo-electric cell if allowed to get at the terminals thereof. Mounted on the base is a photo-electric cell 13 and a lamp or light bulb 14. Hinged to the upper corner of the box is a cover or hood 15 having a top, rear and end wall. The front of the hood is open. Carried by the hood is a partition 16 which, when the hood is in the operative position shown in Figs. 2, 3 and 4, is interposed between the cell and the lamp so as to prevent rays of light from passing directly from the lamp to the cell. During the normal operation of the press, the light from the lamp will fall onto the paper and be reflected by the paper onto the cell so that current will pass through the latter. In the event the paper should break so that it no longer passes under a unit, the cell immediately becomes darkened causing the resistance of the cell to increase to a point where little or no current will pass through it, whereupon the relay is opened and the press stops. It frequently happens, in running a newspaper printing press or paper making machine that the full capacity of the machine is not employed and no paper is run at a certain location and it is then necessary to render the photo-electric unit operative at that point. With the present arrangement, this is done by merely raising the cover to the position shown in Fig. 5 at that point where no paper is run. With the cover raised, light from the lamp will fall directly onto its associated cell. It will be observed that, with the arrangement of unit described, the terminals of the lamp and photo-electric cell are located in a tight base where dust, printer's ink and moisture cannot enter. The hood, when in closed position, protects the lamp and cell. Also, the light bulb and the photo-electric cell bulb can be wiped off with a cloth after raising the hood, which is a simplified way of keeping the optical parts clean.

The lamps may be connected to the current supply lines 25. The cells 13 are connected in series in a circuit or line 26 which is connected across the grid 27 and the plate 28 of the vacuum tube V. The relay R is located in a circuit 29 which also includes the plate 28, the filament 30 of the vacuum tube and batteries (or a transformer) 31 and a milliammeter 45. So long as there is sufficient current passing through the photo-electric cells to maintain a predetermined negative grid potential, current passes through the relay so as to maintain the same in closed position.

There are many variables involved in the amount of reflected light received by the cells, among which may be mentioned the density of

the newsprint, the color of the paper, the light from a window which may strike the paper and illuminate one section brighter than others, the time of day, the sensitivity of the cells which will vary from time to time, the age of the lamps, dust which may have collected on the lamp and cell bulbs, line voltage variations, and others. With respect to the first mentioned variable, it is apparent that the different photo-electric units look at different pages of the newspaper and the newsprint is not of the same density on all of the pages. For example, black advertisements may be on page 5 directly in line with one unit while ordinary newsprint, not so black, may be in line with another cell on page 2. The total current passing through the four cells, therefore, is limited by the cell receiving the least light. In order to take care of these variables and factors, and thus insure, during normal operation, that the correct amount of current is impressed upon the current responsive device, manually adjustable means are provided for so reducing or increasing the current impressed upon that device as may be required to suit the particular existing light and other variable conditions. This means is in the form of a potentiometer P having a resistance element 40 coupled to a battery 41. The potentiometer has an adjustable contactor 42 adapted to engage the resistance element and connected by a wire 43 to the grid 27, there being interposed in this wire a grid leak and condenser designated generally by the letters LC.

In order to determine the amount of current flowing in the plate circuit and thus determine what the setting of the potentiometer should be, there is interposed in the circuit 29 a meter 45 immediately adjacent the potentiometer. By preference, the milliammeter and potentiometer are mounted together in a box (not shown) fixed to one of the pilasters of the press frame in a position easily reached by the pressman.

The operation of the device is briefly as follows: Just before going to press, the pressman switches on the lights 14 and reads the meter. If the full capacity of the press is not to be used, then the unit associated with the unused section is rendered operative by merely throwing back the cover of that unit as previously described. He then starts the press turning over so that the dark cuts and black headlines of the paper may pass the several photo-electric cells rapidly, thus giving each cell the average impulse. The pressman will now read the meter and, in accordance with that reading, will turn the potentiometer knob one way or the other so as to bring the reading up to standard that is, to a point where it is indicated that the proper potential is impressed upon the grid of the vacuum tube. The pressman may then darken one of the cells, if he wishes, in order to make sure that the control is working properly. He then turns the press at high speed and may wish to give the potentiometer knob a final adjustment as the reading on the meter may change slightly due to the increased rapidity in the passage of the newsprint before the electric cells. The press is now in normal operation and sufficient current is passing through the relay to maintain that relay closed, which means that the motor M for driving the press is maintained in running condition. So long as the paper continues to pass before each unit, light falling on the paper from a lamp will be reflected onto a respective cell. In the event, however, that any section or web of the paper should break, light will no longer be

reflected on the cell associated with that section and that cell immediately becomes darkened and its resistance rises to a point where current will stop flowing. The relay is thereupon immediately released and the motor is stopped. It may be here stated that there may also be associated with that relay a suitable brake device for immediately stopping the rolls of paper of the press as soon as the motor is thrown out so that the roll of paper will not overrun and cause the surplus paper to become tangled in the moving parts of the press. The numeral 50 designates a manually operable circuit breaker, such as a push button, for throwing the current off of the motor, at will.

It is very desirous to have the light reflected from a relatively large area of the paper to each photo-electric cell since if the reflecting area were relatively small, say a spot about one-half an inch in diameter, this reflecting area or spot might coincide with a solid black area on the paper when the press came to a stop and the press could not be started up again without first causing light to be reflected upon the darkened photo-electric cell. It would also be undesirable to have this reflecting area along the margin of the paper because frequently there are torn out places along the margins of the paper. In order to avoid these undesirable features, the electric eye units are so formed and arranged that a relatively large area between the margins of the paper is utilized as the reflecting area. With such an arrangement, small holes in the paper and relatively large ink blots will not affect the electric eyes. The reflecting area in the present instance is also so large that very black cuts will not contain enough solid black spaces as to substantially affect the electric eye.

It will further be observed from the foregoing description taken in connection with the accompanying drawings that the various cells are connected up in series with the relay or other apparatus for stopping the rolls of paper when one of the cells becomes darkened, and these various cells or electric eye units may all be regulated or adjusted from one position by any non-technical or unskilled person. In adjusting the eye units it is unnecessary to use a portable testing meter or other instruments or to reach or climb up to each of the individual units. The system may be very easily and quickly adjusted or regulated for any existing light conditions at the time of going to press.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claims is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. In combination, a machine having means for passing paper webs therethrough, a plurality of electric eye units distributed through the machine and in front of which said webs are adapted to pass, each unit comprising a source of light and a light sensitive device positioned to the same

side of a web and arranged so that the light from the source is reflected by the surface of the web onto the associated light sensitive device, and current responsive means coupled to all of said light sensitive devices and arranged to result in stoppage of the machine in the event a web ceases to pass in front of any one of said units, each of said units including a member normally interposed between the source of light and the light sensitive device for preventing the light from passing directly from the source to the device, said member being movable out of interposed position.

2. In combination, a machine having means for passing webs of paper therethrough, a plurality of electric eye units distributed through the machine; each of said units including a source of light and a light sensitive device positioned to the same side of the web and mounted on a common base so that the light from the source is reflected by the web onto the associated light sensitive device, a hood for said source of light and device open at that side which is adjacent to the web of paper passing in front of the unit, and a partition member in said hood interposed between said source of light and said device when the hood is in operative position said hood being movably hinged to said base so as to withdraw the partition from interposed position; and current responsive means coupled to all of said devices and arranged to result in stoppage of the machine when any one of said devices is darkened.

3. A system of web break control for printing machines and the like, and including a plurality of electric eye units distributed in the machine and each including a source of light and a light sensitive device positioned to the same side of the web and so arranged that the light from the source is reflected by the web onto the associated light sensitive device, current responsive means to which said devices are coupled in series and arranged to result in stoppage of the machine when any one of said devices becomes darkened, adjustable means supplemental to said devices for increasing the current impressed upon said current responsive means, and a meter coupled to said current responsive means for indicating the amount of current impressed thereon.

4. An electric eye unit including a base, a lamp supported thereby, a photo-electric cell on said base, a hood pivoted to said base and adapted to enclose said lamp and cell, said hood being open at that side in front of which a paper web or the like is adapted to pass, and a partition carried by said hood and interposed between said lamp and cell when the hood is in normal position, said hood being swingable to an inoperative position whereby to withdraw said partition from interposed position.

5. In combination, a machine having means for passing paper webs therethrough, a plurality of units distributed in said machine and each comprising a source of light and a photo-electric cell located to the same side of the web and so arranged that the light from the source is reflected by the surface of the web onto the associated cell, a vacuum tube to which all of said photo-electric cells are coupled in series and through which current is adapted to pass so long as all of said cells receive reflected light from the webs, and a circuit interrupting instrumentality operatively connected to said vacuum tube and adapted to stop said machine when opened by increased electrical resistance in any one of said photo-electric cells.

6. In combination, a machine having means for passing paper webs therethrough, a plurality of units distributed in said machine and each comprising a source of light and a photo-electric cell located to the same side of the web and so arranged that the light from the source is reflected by the surface of the web onto the associated cell, a vacuum tube through which current is adapted to pass so long as all of said cells receive reflected light from the webs, all of said cells being connected in series to said tube, a circuit interrupting instrumentality operatively connected to said vacuum tube and adapted to stop said machine when opened by increased electrical resistance in any one of said photo-electric cells, adjustable means associated with said vacuum tube to vary the current impressed thereon and to compensate for variations in the light reflecting characteristics of the webs, and indicating means for determining the amount of current impressed upon said vacuum tube.

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