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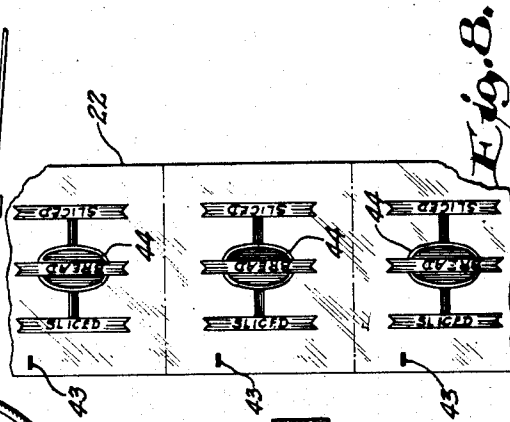
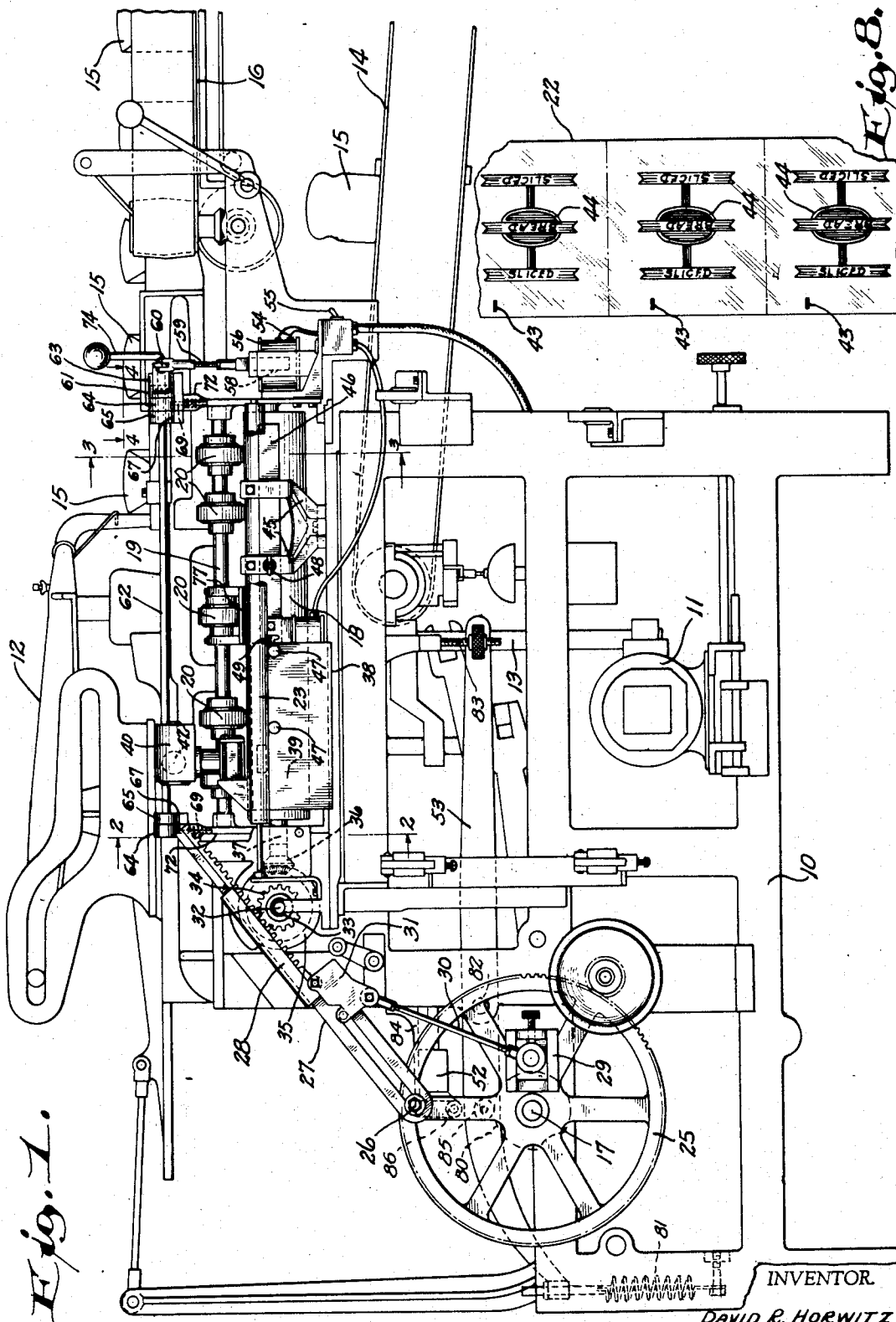
D. R. HORWITZ

2,299,984

CONTROLLING DEVICES FOR WEB FEEDING AND CUTTING MACHINES

Filed March 15, 1941

2 Sheets-Sheet 1



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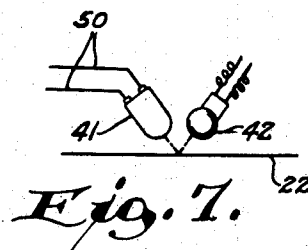
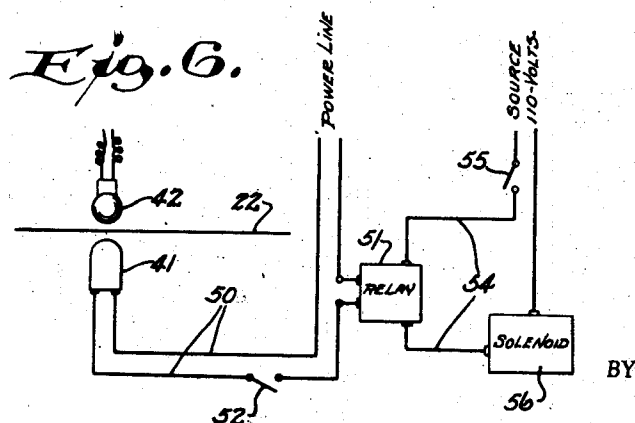
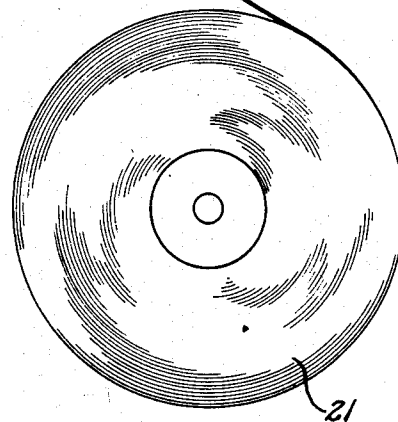
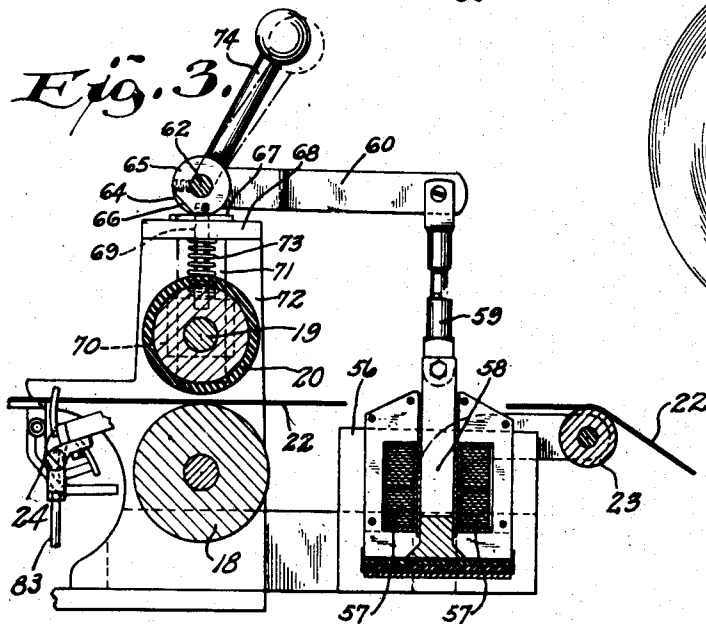
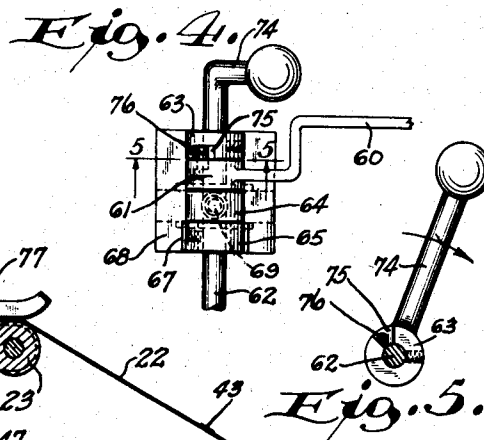
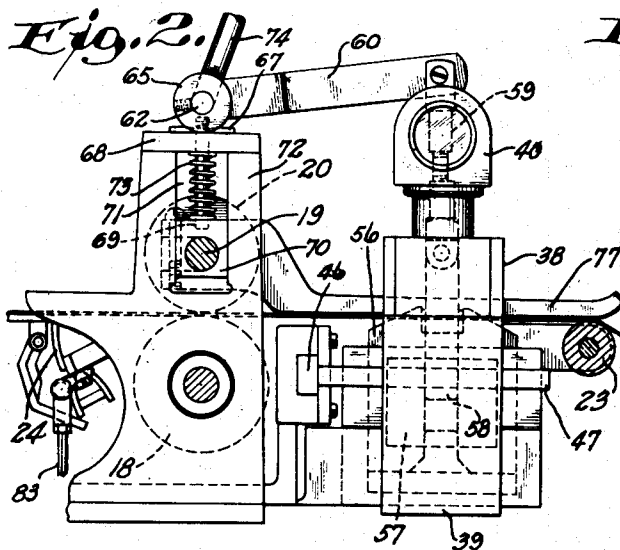
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2 Sheets-Sheet 2



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2,299,984

CONTROLLING DEVICE FOR WEB FEEDING
AND CUTTING MACHINES

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Application March 15, 1941, Serial No. 383,540

7 Claims. (Cl. 164—68)

This invention relates to improvements in controlling devices for web feeding and cutting machines, and more particularly to a controlling device in the nature of an electric eye or light sensitive means for automatically controlling the web feeding means in said machines.

Heretofore, it was standard practice in wrapping machines for loaves of bread, for instance, to feed the wrapping paper in a continuous web from a roll, with the web traveling longitudinally of the machine and transversely of the length of the loaf. At a proper station the paper was periodically cut off in lengths so that a length could be wrapped around a loaf and folded over the ends thereof. In the standard prior machines of the type mentioned it was impossible to accurately control the web feeding mechanism relative to the location of printing matter, designs, or other indicia on the paper in its relation to a wrapped loaf. Because of this difficulty it became common practice to print an entire roll of paper with continuous repeated patterns with the result that no attempt was made during wrapping operations, to accurately register any particular portions of the wrapper indicia with the loaf being wrapped.

It will thus be seen that prior wrappers were rather completely covered with continuous designs or other indicia and a baker could not avail himself of a wrapper which carried only segregated areas of printing which needed correct spacing and locating on a wrapped loaf.

The prior art also includes a type of machine of the class under consideration wherein an upper feed roller for a web is actuated to control the registration, but such mechanisms, of which the patents to FitzGerald Nos. 2,119,670 and 2,108,767 are examples, operate upon the principle of varying the pressure on said roller. The present improvement, however, incorporates means for lifting the upper feed roller entirely free of its companion roller.

According to the present invention the aforementioned objections and limitations are overcome and a web of paper for continuous wrapping may have segregated and spaced indicia thereon because the present improvements so accurately control the paper web feed as to insure positioning of the indicia on a section of wrapper on desired sides of a loaf. Also, according to the present invention it is unnecessary to print that portion of the paper which is folded under the bottom of the loaf.

A further object of the invention is to provide an electric eye control for wrapping machine web feeds which functions with either opaque or light-permeable paper.

A further object of the invention is to provide a control of the character described whereby spaced markings or areas on the wrapping paper

itself serve to accurately stop the web feed so that the cutting operation is always performed in the same position relative to the indicia groups on the wrappers.

5 In general the present invention, in its application of the principle of electric eye control for web feeding and cutting mechanism is somewhat analogous to the Hayssen Patent No. 2,127,028, but the present invention is an improvement thereover in the accessibility for repairs, replacements and adjustments of the electric eye unit, and also in regard to the particular portion of the web feeding mechanism which is controlled by the electric eye.

15 A further object of the invention is to provide an electric eye control for web feeding and cutting machines which is more simple and susceptible of accurate register control than has been produced heretofore.

20 A further object of the invention is to provide an electric eye control for web feeding and cutting machines which is very simple in construction and operation, which is strong and durable, which is automatic and efficient in operation, and which is well adapted for the purposes set forth.

25 With the above and other objects in view the invention consists of the improved electric eye control for web feeding and cutting machines, and its parts and combinations as set forth in the claims, and all equivalents thereof.

30 In the accompanying drawings in which the same reference characters indicate the same parts in all of the views:

35 Fig. 1 is a side view of a bread wrapping machine equipped with the improved electric eye control for the web feeding mechanism;

Fig. 2 is an enlarged transverse sectional view taken on line 2—2 of Fig. 1;

40 Fig. 3 is another enlarged transverse sectional view taken on line 3—3 of Fig. 1, only with the solenoid also being shown in section;

Fig. 4 is an enlarged fragmentary detail view taken on line 4—4 of Fig. 1;

45 Fig. 5 is a transverse sectional view taken on line 5—5 of Fig. 4;

Fig. 6 is a schematic and wiring diagram of the electrical connections for the control system and illustrates the arrangement of a light-sensitive cell and light source relative to the wrapper web when light permeable wrapping material is used;

50 Fig. 7 is a schematic view showing the relative position of the light cell and light source when arranged for use with opaque or semi-opaque wrapping material; and

Fig. 8 is a plan view of a fragment of a paper web such as may be fed into the machine for the wrapping of bread loaves.

Although the invention is illustrated and described as being applied to a bread wrapping ma-

chine it should be understood that the invention is generally applicable to various types of mechanisms for wrapping articles and packages. All such changes, modifications and adaptations are contemplated as may come within the scope of the appended claims.

Referring now more particularly to the drawings it will appear that the depicted break wrapping machine includes a frame 10 on which the various mechanisms are supported in the usual manner. Said mechanisms will not be described in detail as they are similar to those used in conventional machines of this type. There is, however, a motor 11 which is connected by suitable transmissions to operate a paper folding mechanism designated generally by the numeral 12, and an intermittently operable elevator 13 for raising each loaf as it is delivered thereto, into proximity to the folding mechanism 12. The latter functions to wrap paper about each loaf.

An incoming conveyor is designated by the numeral 14. Said conveyor is suitably driven (either continuously or intermittently) and loaves 15 are spaced thereon so that individual loaves successively are moved onto the elevator 13 which lifts each loaf to a wrapping position and then drops to receive the next loaf. An outgoing conveyor 16 is provided above the incoming conveyor 14 to take the wrapped loaves to a suitable collection station remote from the machine.

The present invention is concerned particularly with the feeding mechanism for the wrapping paper web. Rotatably supported in the frame 10 is a transverse shaft 17 which shaft is driven from the motor 11 by suitable power connections. An elongated lower feed roller 18 is mounted on one side of the machine and extends longitudinally thereof with its end portions being journaled in suitable bearings. Above said feed roller 18 there is a shaft 19 which carries spaced-apart co-operating pressure rollers 20, preferably formed of rubber. The end portions of the shaft 19 are mounted in vertically shiftable bearing brackets, as will appear more fully hereinafter.

A roll of wrapping paper 21, having its printed surface upward, is rotatably and replaceably supported on brackets at the front side of the machine, as illustrated in the Hayssen Patent No. 2,127,028. The web 22 from the roll 21 passes over a small diameter guide roll 23 and from thence between the rollers 18 and 20. The web further extends adjacent the folding mechanism 12. An oscillatable cut-off knife 24 of the usual type may be intermittently operated by a suitable transmission from the motor 11 so that paper which is intermittently fed to the wrapping position will be cut off in suitable lengths.

The feed roll 18 is intermittently driven from the constantly revolving shaft 17 by means of a transmission mechanism shown at the left in Fig. 1. A fly wheel 25 is fast on the shaft 17 and a peripheral portion of said fly wheel has a wrist pin connection 26 with a reciprocating connecting rod 27. A rack 28 is secured on an end portion of the connecting rod. Adjustments of the members are facilitated by a crank pin block 29, carried by the flywheel 25, in which an end of a connection 30 is adjustably secured. The other end of said connection is fast to an extension plate 31 on the rack 28.

Suitably mounted in bearing brackets on the

upper portion of the frame 10 immediately below the rack 28 is a transverse shaft 32. Said shaft also carries an overrunning clutch 33 of a conventional type. Loose on the shaft 32, but forming the driving member of the clutch 33 is a pinion 34 which is in mesh with the rack 28. A miter gear 35 is fast to the driven member of the clutch 33 and said miter gear engages a pinion 36 fast on the end of a shaft 37 on which the paper feed roll 18 is mounted. The over-running clutch 33 is so constructed and arranged that when the rack 28 moves in a downward direction the feed roll 18 will be driven to feed the paper (providing the cooperating rollers 20 are in lowered, paper-contacting position), and when said rack travels in an upward direction, because of the clutch, said feed roll 18 will be idle and the paper will not be advanced.

Raising and lowering of the rollers 20, for paper feeding purposes, is controlled through the action of a light sensitive means in the form of an electric eye mechanism. Said electric eye mechanism is an integral unit 38 including a lower control device 39 and an upper light source 40. Within the control device there is a photoelectric cell 41 and in the member 40 there is an incandescent bulb 42.

The paper web 22 (see Fig. 8) may be printed with spaced areas of designs or other groups of indicia thereon. The indicia on a section of the web are intended to be accurately positioned relative to certain selected portions of the loaf to be wrapped. In order to obtain accurate registration, the web 22, which may be paper of either an opaque or light-permeable material, is provided adjacent a side margin with spaced opaque spots, lines, or areas 43. These spots or the like 43 are positioned in a predetermined relation relative to the design or indicia areas 44 on the web sections. When used on opaque paper the spots 43 should provide non-reflective surfaces.

When a transparent or light-permeable web 22 is used, the arrangement of the light source 42 to the photoelectric cell is as shown in Figs. 1 and 6, with the light source and cell being on opposite sides of the paper web whereby the cell is controlled by a light beam passed through the web. If the paper web 22 is opaque it should have a light reflecting surface. In this event it is desirable to position both the light source and the photoelectric cell on the same side of the paper, as shown in Fig. 7. With this arrangement the cell will be controlled by a reflected light beam. The cell and light source are enclosed in suitable light proof casings whereby the cell is not affected by light other than the beam transmitted or reflected thereto.

From Fig. 1 of the drawings it will appear that the units 39 and 40 are connected together and are mounted on the arms of a supporting bracket 45 by means of a longitudinal bar 46 and transverse rods 47. The combination control unit 39-40 may be moved in either direction relative to the shear assembly 24 by moving the bar 46 in its mounting, the bar being secured in adjusted position by means of a lock screw 48, and the unit being secured on the rods 47 by a screw 49. The unit 38-39 should be adjusted so that the cell 41 is in alignment with the row of opaque markings 43 on the paper web. Hence, when one of said markings 43 passes between the cell and the light source, a primary circuit 50, which is controlled by the photoelectric cell and

which, in turn, controls a switching relay 51 in series therewith, is momentarily de-energized. With the use of an opaque paper web and the arrangement of the cell and light source in the manner shown in Fig. 7, the light beam is constantly reflected to the cell except when the non-reflective areas 43 intercept the beams and interrupt the light to the cell.

While the relay 51 is actually incorporated within the unit 39, its relationship to the primary circuit 50 and other electrical instrumentalities is best shown in Fig. 6. The primary circuit 50 includes a normally open switch 52 which is in the form of a limit switch actually controlled by operation of the knife lever 53. When the knife lever moves to operate the knife 24 for a cutting operation it closes said switch 52.

In connection with the above it should be observed that the knife lever 53 is controlled by a cam 80 which is fast on the transverse shaft 17. A suitably mounted coiled spring 81 is connected between a portion of the machine frame and an outer portion of the knife arm 53. Said spring is effective to act on the outer end of the knife arm and when it pulls downwardly on the same the forward or inner end of the knife arm will be lifted. Said knife arm is pivotally mounted, intermediate its ends, on a portion of the machine frame, as at 82. The inner end of the knife arm 53 is connected, through suitable linkage 83, with the knife 24, and the aforementioned lifting of the inner end of the knife arm raises the knife 24 to cut the paper web.

From Fig. 1 it will be observed that the normally open limit switch 52 is carried by a frame bracket 84 adjacent the knife lever 53. When the knife lever is in the illustrated position, said switch 52 is open. The cam 80 is formed with an edge recess, and when a cam roller 85, carried by the knife lever 53, lodges in said recess, said knife lever, due to the spring 81, drops. The switch 52 carries a roller 86 for engagement with the knife lever 53 and the dropping of the knife lever causes movement of said roller 86 and its connections to operate internal contact members in the switch 52.

The primary circuit 50 actually controls the relay 51 and said relay is also included in a secondary circuit 54. When the light beam from the source 42 to the cell 41 is uninterrupted and the knife lever shuts the limit switch 52 the main circuit is closed and the relay 51 is energized. The energization of said relay serves to open a switch element in circuit 54. However, when an opaque or non-reflecting area on the paper web reaches a proper position relative to the unit 39-40 the light beam will be broken, the circuit 50 will be opened, and the relay 51 will be de-energized. Such de-energization of said relay causes a closing of the secondary circuit 54, providing a main control switch 55 therein is closed.

A solenoid 56 is included in the secondary circuit 54. When the secondary circuit is closed by means of the primary circuit 50 being temporarily opened, as just above described, the coils 57 of the solenoid will be energized and the same will pull the metal core or plunger 58 downwardly. The outer end of the solenoid plunger is secured to the lower end of a rod 59 whose bifurcated upper end is pivotally attached to the front end of a rock arm 60. The other end of said rock arm terminates in an apertured disc 61 (see Fig. 4) which is mounted on a portion of a longitudinally extending rod 62. Also on said shaft 62 are discs 63, 64 and 65, the discs 63

and 65 being pinned to said shaft and the discs 64 and 61 being loose on said shaft. The disc 65 has a flattened or cam surface 66 thereon (see Fig. 3). The flat portion of the disc 65 normally rests on a slightly elevated plate 67. The disc 64, while free on the rod 62, has threaded thereinto the upper end portion of a vertical bearing adjusting shaft 69. The lower end of the shaft 69 carries a bearing block 70 which is vertically adjustable within the slot 71 in a frame element 72. A confined coiled spring 72 surrounds the shaft 69 so as to exert a downward force on the bearing block 70. Said bearing block has journaled therein one end portion of the pressure roller shaft 19.

The structure just described is at the right hand end of the shaft 19, relative to Fig. 1. Certain of this structure is reproduced at the opposite end of said shaft. From Fig. 1 it will be observed that discs 64 and 65 are on the opposite end of the shaft 62. The disc 65 is fast on said shaft and has a flattened surface 66 to ride on the plate 67. The disc 64 is free on the shaft but is secured to the upper end of the adjusting shaft 69 whose lower end carries a bearing block 70, as in Fig. 2. The other end portion of the pressure roller shaft 19 is journaled in said bearing block. Although the shaft 62 is susceptible of being raised and lowered automatically as will hereinafter appear, provision is also made for manipulating it manually. This is accomplished by an integral lever arm 74 projecting angularly at one end of the shaft 62. By manually moving said lever arm to the right relative to Figs. 3 and 5 the shaft 62 will turn in a clockwise direction, as will the discs 63 and 65 which are pinned thereto. This movement brings onto the plate 67 a raised portion of the disc 65 whereby, through the rods 69, the pressure roller shaft 19 will be elevated to remove the pressure rollers 20 from the web and the roll 18. Due to the fact that the disc 63 has a slot 75 therein, into which a pin 76 fast on the disc 61 projects, such limited movement of the lever arm 74 is accomplished without turning the disc 61 and without, therefore, affecting the rock arm 60 and the plunger 58 of the solenoid. However, when the solenoid is operating, movement is transmitted to the disc 61 through the rock arm 60. The pin 76 then engages a shoulder of the recess 75 to thereby move the disc 63, the rod 62 and the cam disc 65.

It should be noted that during automatic operation of the pressure roller elevating mechanism, through the solenoid, the cam disc 65 turns only far enough to move its flat surface 66 off the plate 67, as in Fig. 3. The lever arm 74 assumes the full line position in said view. When said lever arm is operated manually it is moved slightly beyond said position, as indicated by the broken lines.

As will be clear from the description heretofore given, when a marking 43 on the paper web 22 registers with the light source 42 and photoelectric cell 41 the solenoid 56 will be energized. Through the mechanism just described the pressure roller shaft 19 will then be automatically elevated and the pressure rollers 20 will be removed from contact with the web, resulting in cessation of the feed of the web. During this interval the knife 24 reciprocates in the usual manner to cut the web and a severed section of paper web is then wrapped about the loaf removing it from the light source 42 and cell 41, reestablishing the circuit 50 because of the closure

of the switch 52. Through the improved mechanism the indicia areas on the wrapping paper section are extremely accurately registered with the desired portions of the loaf.

As has been brought out heretofore movement of the knife lever 53, when the knife 24 reciprocates to cut the paper, engages and closes the normally open limit switch 52. This action, because of reestablishment of the beam to the cell 41 through removal of the cut web, serves to reset or open the relay 51 of the control unit with the result that the solenoid 56 will be immediately de-energized. Such de-energization of the solenoid allows the solenoid plunger 58 to raise and the springs 73 on the rod 69 then depress the bearing blocks 70 so as to lower the pressure roller shaft 19 and re-contact the pressure rollers 20 with the driven roller 18 for paper advancing purposes.

Referring to Fig. 2 it will be observed that the inner end of a paper gripping plate 77 is pivotally mounted on the pressure roller shaft 19. This plate extends forwardly horizontally and rests on the paper web as it passes over the guide roll 23. This paper gripping plate 77 functions, by its weight, to keep the paper web in position while the pressure feed rollers 20 are elevated.

From the foregoing description it will be seen that the improved controlling device for web feeding and cutting machines functions automatically and provides for extremely accurate wrapping web registration. The device is furthermore readily adaptable to standard wrapping machines of various types, is of simple construction, and is well adapted for the purposes described.

What is claimed as the invention is:

1. In combination, a driven web feeding roll, a cooperating pressure roller movably mounted thereadjacent, there being a web between the roll and roller for advancement when the roller forcefully contacts the web, means for severing a section of the web, means for releasably holding said roller against said web, and light sensitive means automatically controlled in accordance with the position of said web for non-contactably releasing said roller holding means directly.

2. In combination, a driven web feeding roll, a cooperating pressure roller movably mounted thereadjacent, there being a web between the roll and roller for advancement when the roller forcefully contacts the web, means for releasably holding said roller against said web, light sensitive means automatically controlled in accordance with the position of said web for non-contactably releasing said roller holding means directly, and means for severing a section of the web.

3. In combination, an elongated, driven, web feeding roll, a shaft parallel thereto, pressure rollers spacedly carried by said shaft, there being a web between the roll and the rollers for advancement when the rollers forcefully contact the web during movement of the driven roll, bearings in which the ends of said shaft are journaled, said bearings being shiftable transversely of the axis of the shaft to vary the proximity of said rollers to the web and driven roll, light sensitive means automatically controlled in accordance with the position of said web for shifting said shaft bearings directly to remove the rollers from the web and driven roll, and means for severing a section of the web.

4. In combination, a driven web feeding roll, a cooperating pressure roller movably mounted thereadjacent, there being a web between the roll and roller for advancement when the roller forcefully contacts the web, solenoid operated mechanism for directly shifting said roller in a direction transversely of the axis of said driven roll to non-contacting position, light sensitive electrical means automatically controlled in accordance with the position of said web for energizing and deenergizing said solenoid, and means for severing a section of the web.

5. In combination, means for supplying a continuous web of wrapping material having thereon indicia at predetermined places, a beam of light rays directed onto said wrapping material, a light sensitive device illuminated thereby and so positioned that the indicia intermittently intercepts said beam, an electrical circuit, means for severing the web, means controlled by the actuator for said web severing means for establishing and disconnecting said circuit, and a transmission for moving the web, said transmission including a driven member and a cooperating pressure member mounted on an axis parallel to the axis of the driven member, means for directly shifting said cooperating member in a direction transverse to the axis of the driven member, and a solenoid in said electrical circuit and operatively connected with said cooperating member shifting means whereby when current flows to said solenoid the same actuates the cooperating member to remove it from the driven web moving means with said circuit being affected to energize the solenoid when indicia on the web intercepts the beam of light.

6. In combination, a driven web feeding roll, a cooperating pressure roller movably mounted thereadjacent, there being a web between the roll and roller for advancement when the roller forcefully contacts the web, means for severing a section of the web, means for releasably holding said roller against said web, light sensitive means automatically controlled in accordance with the position of said web for non-contactably releasing said roller holding means directly, and means controlled by the actuator for the web severing means for re-actuating said roller holding means whereby the roller is returned to web contacting position for continued advancement of the web.

7. In combination, an elongated, driven, web feeding roll, a shaft parallel thereto, pressure rollers spacedly carried by said shaft, there being a web between the roll and the rollers for advancement when the rollers forcefully contact the web during movement of the driven roll, bearings in which the ends of said shaft are journaled, said bearings being shiftable transversely of the axis of the shaft to vary the proximity of said rollers to the web and driven roll, light sensitive means automatically controlled in accordance with the position of said web for shifting said shaft bearings directly to remove the rollers from the web and driven roll, means for severing a section of the web, means automatically controlled by the actuator for said web severing means for thereafter causing movement of said shaft in a direction to engage the rollers with the web and with the driven roll, and manually controlled means operable independently of said light sensitive means for shifting said shaft and rollers relative to the web and driven roll.