

Feb. 11, 1941.

L. PITTALUGA

2,231,735

PAPER REGISTERING SYSTEM

Filed March 8, 1940

3 Sheets-Sheet 1

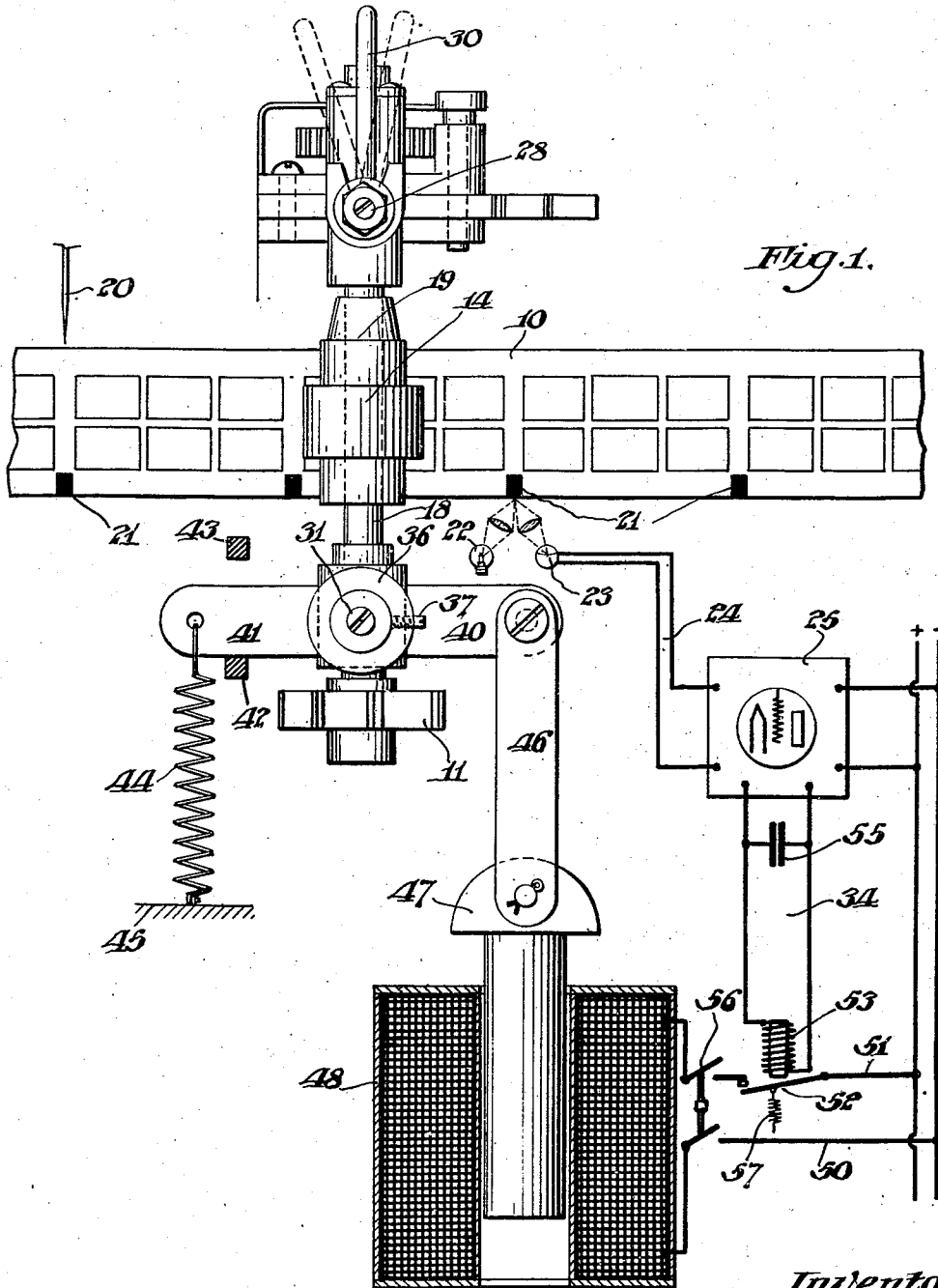


Fig. 1.

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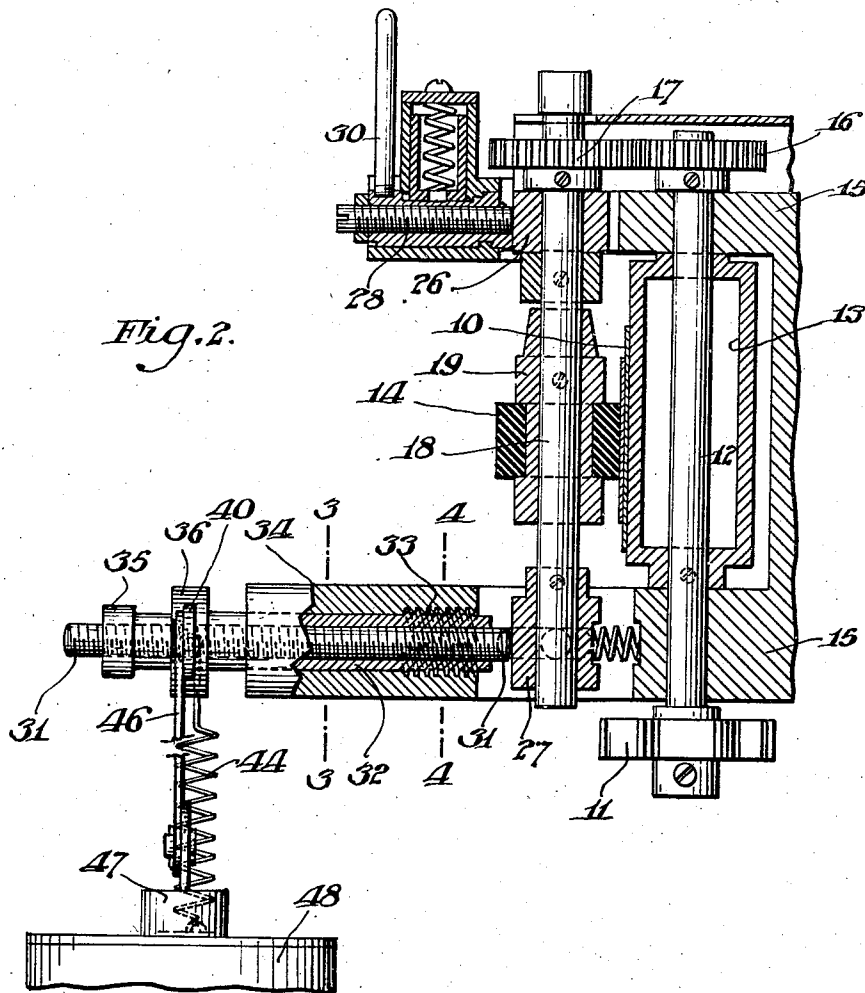


Fig. 3.

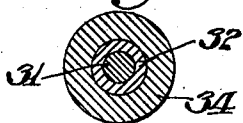
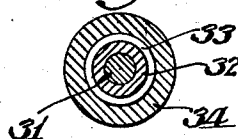


Fig. 4



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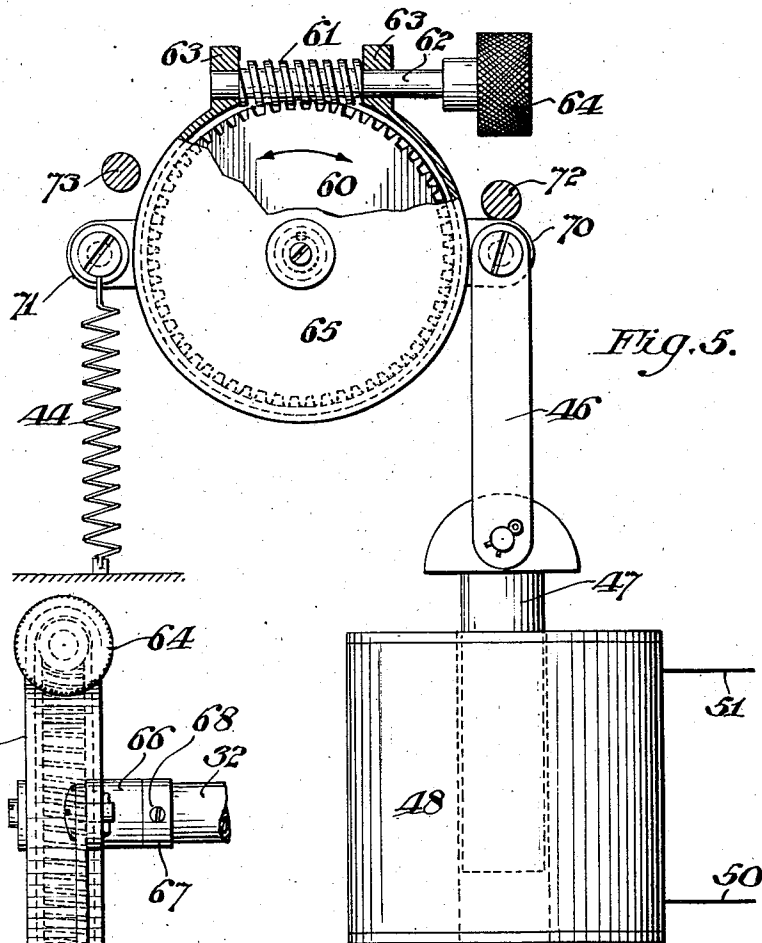
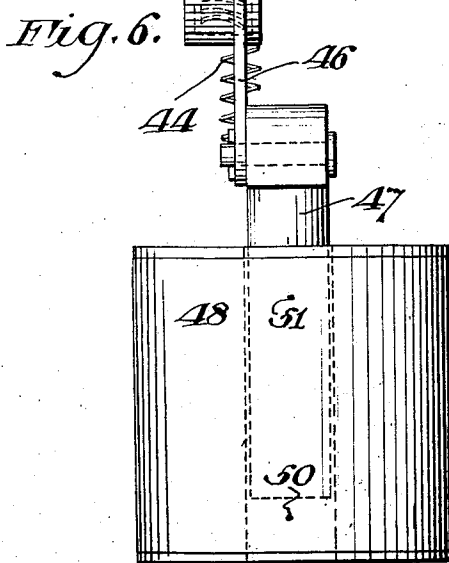
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3 Sheets-Sheet 3



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UNITED STATES PATENT OFFICE

2,231,735

PAPER REGISTERING SYSTEM

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Application March 8, 1940, Serial No. 322,872

12 Claims. (Cl. 271-2.6)

The present invention relates to a feeding mechanism for webs of paper or other material and more particularly to a control for maintaining an accurate register of sections of a web of material with a severing knife or other associated means. The present invention is illustrated as applied to the paper registering control of U. S. Letters Patent No. 2,119,670 and is an improvement thereon as well as upon U. S. Letters Patent No. 2,108,767. Thus as will appear more in detail the mechanism with which the invention is associated is for feeding a web of material having a plurality of pictures or designs printed thereon, each of which when severed from the web forms an individual wrapper for one piece of chewing gum or other confection or article. Thus for proper wrapping relation between the article and the illustrated wrapper, it is essential that the feeding of the web be so controlled as to always register the dividing line between wrappers with the severing knife. Without such control the creep of the web, either forward or backward, soon results in such misalignment that a single wrapper will show parts of two designs instead of the intended one complete design.

Some of the objects of the present invention are to provide an improved feed control for a web of material; to provide a novel mechanism for maintaining an accurate register between a given point, such as a severing knife, and a definite point on a web of material; to provide a simple registering control for a web of material wherein complicated electrical circuits, including relays, thermal control switches, and delicate contacts are eliminated and incidentally out of control conditions inherent in such circuits; to provide a registering control wherein a travelling web of material is restored quickly and accurately to a predetermined registered relation with a severing device when such registered relation has been disturbed; and to provide other improvements as will hereinafter appear.

In the accompanying drawings Fig. 1 represents a fragmentary side elevation of a web feeding mechanism equipped with one form of registering control embodying the present invention; Fig. 2 represents a sectional elevation of the web feed and the associated control of this invention; Fig. 3 represents a section on line 3-3 of Fig. 2; Fig. 4 represents a section on line 4-4 of Fig. 2; Fig. 5 represents a front elevation, partly broken away, of a modified form of

the invention; and Fig. 6 represents a side elevation.

Referring to the drawings one form of the present invention is shown as a part of an article wrapping machine and in association with the web feeding means as a registering control therefor. The feeding means for the web with its tension control and web roll mounting may be that shown in Fig. 1 of Patent No. 2,108,767 for imparting the desired intermittent motion to the web by means of the Geneva wheel 11 which is keyed to the shaft 12 to turn the metal or other hard surfaced feed roller 13. A control roller 14 of resilient or deformable material is mounted to press the web 10 against the metal roller 13 to feed the web. The action of the Geneva wheel and its adjuncts is such that each feeding movement causes the web 10 to travel a length equal to the length of one wrapper. Thus when the web carries a succession of designs, one for each wrapper, each rotation of the Geneva wheel 11 will cause a length of paper to be fed corresponding with the distance between corresponding portions of successive designs. The shaft 12 is journaled in the frame 15 to transmit its intermittent motion through gears 16 and 17 to a control shaft 18 which drives the hub 19 of which the resilient control roller 14 is a part and forms a circumferential radially projecting web propelling surface. Thus each rotary movement of the shaft 12 is transmitted through the gears 16 and 17 to rotate the shaft 18 in the opposite direction. Thus the intermittent rotation of the shafts 12 and 18 results in the linear propulsion of the web 10 step by step under the pressure of the control roller 14. In accordance with the present invention the set relation of the control roller 14 is such that the web 10 is subject to a small backward creep, measured for example in thousandths of an inch per design, and the function of the mechanism of the invention is to automatically restore the web to registration quickly and accurately when the aforesaid creep becomes a predetermined maximum. Thus by increasing the pressure of the control roller 14 at the time when the creep has reached the point where the severing means functions on a design instead of between two designs the web can be quickly brought back to registered relation. By reference to the portion of the web 10 shown in the drawings it will be seen that the severing knife 20 is in register with one of the black index marks 21 on the web 10, this

position being the normal correct framing which is to be automatically maintained by a light source 22 focused on the margin of the web 10, as a beam intercepting an index mark 21, in association with a photo-electric cell 23. This latter is in an electric circuit 24 including an amplifier 25 energized from a source of current such as 110 volt A. C.

For varying the pressure of the control roller 14, the shaft 18 has its ends respectively journaled in blocks 26 and 27, each slidable on the frame 15 so that the distance between the parallel shafts 12 and 18 can be varied according to requirements. Thus the block 26 is normally set by an adjusting screw 28 for manual control of the pressure by the lever 30. The block 27 which is under control of the mechanism of the present invention for automatic correction of out of register conditions is operated by the following preferred construction.

An elongated screw 31 is threaded through an adjusting sleeve 32 having a quick pitch external thread 33 riding in a complementary internal thread of an elongated fixed nut 34 which also forms a journal for the sleeve 32. The screw 31 is slotted on its projecting end to receive a screw driver whereby it can be fed to a set position holding the block 27 where the control roller 14 exerts the predetermined pressure on the web 10 for normal feed with the aforesaid small increment of backward creep. In this set position a lock nut 35 anchors the screw 31 to the sleeve 32 so that both parts will turn together.

For controlling the operation of the sleeve 32, a collar 36 is fixed to the sleeve 32 by a set screw 37 or the like and carries two diametrically opposite lever arms 40 and 41 arranged to swing on an arc determined as to length by fixed stops 42 and 43 located in the path of one of said arms. Normally the arms 40 and 41 are in the full line position shown, which corresponds to the normal setting of pressure on the control roller 14, and are so held by the tension of a spring 44 stretched between the arm 41 and a fixed part 45 located at a convenient location on the frame of the wrapping machine. The arm 40 is pivotally attached to one end of a link 46 which has its opposite end likewise connected to the plunger 47 of a solenoid 48. This solenoid 48 is arranged to be energized by a circuit including conductors 50 and 51 leading respectively from the current source lines. As shown the solenoid circuit is controlled by a pivoted switch in the form of an armature 52 of a relay 53 which latter is in a circuit 54 receiving the amplified current emanating from the circuit of the photo-electric cell. The circuit 54 is provided with a condenser 55 sufficiently large so that the relay 53 only responds to the current relative to the stationary position of the registering index, and is unaffected by the intermittent motion of the paper. A manually operated switch 56 may be located in the solenoid circuit, if desired, to ensure de-energization of the solenoid during adjustments of web renewals.

In the form of the invention shown in Figs. 5 and 6, the sleeve 32 has a worm wheel 60 keyed thereon so that rotary movement thereof will control the pressure of the control roller 14 upon the web of material. Thus a clockwise turning of the worm wheel 60 will increase the pressure to restore registration while counter-clockwise turning will decrease the pressure to that of normal setting.

For operating the worm wheel 60, a worm 61 is in mesh with the wheel 60 and consists of a spindle 62 mounted in bearing ears 63 with the worm 61 of larger diameter than the spindle 62 and interposed in abutting relation to the aforesaid ears 63. Thus the ears 63 become thrust abutments for the worm 61 preventing linear movement thereof to thereby translate the motion into a rotation of the wheel 60. A knurled head 64 is fast to the spindle 62 for manual operation if desired. As shown the ears 63 are formed integral with a circular housing 65 which is supported by the sleeve 32 though freely rotatable relative thereto. A hub 66 forms a part of the housing 65 to provide a substantial bearing area. A collar 67 is secured to the sleeve 32 by a set screw 68 to prevent axial displacement of the housing 65. At diametrical opposite points the housing 65 is provided with apertured lugs 70 and 71 for attachment of the respective actuating means which controls the turning movement of the housing 65. Since the preferred setting of the control roller 14 is to initiate a backward creep the link 46 of the solenoid armature 47 is pivotally attached to the lug 70 in order that a clockwise turning of the housing 65 and worm wheel 60 will feed the sleeve 32 in the proper direction to increase the pressure of the feed roller 14. Hence the restoring spring 44 is attached to the other lug 71. Stops 72 and 73 are respectively located to define the limit of swing of the parts as required. In this form of the invention the manually operable worm 61 serves to set the worm wheel 60 relative to the housing 65 so that the selected normal pressure is applied to the control roller and thereafter the worm wheel 60 and housing 65 move together in response to the energization of the solenoid 48 or the action of the spring 44. Due to wear or other causes the pressure setting can be promptly readjusted by turning the head 64 as required.

In the operation of the control of the present invention the two adjusting screws 28 and 31 are so set as to cause the resilient feed roller 14 to bear upon the web 10 in such a manner that the step-by-step travel is accompanied by a fractional backward creep at each forward movement. When accumulated creep reaches such a maximum as removes an index 21 from the vision of the photo-cell 23, the amplified current in circuit 34 energizes the relay 53 to close the switch 52 and thus energize the solenoid 48. The solenoid 48 draws its plunger 47 inward and thereby rocks the lever 40 to turn the sleeve 32 clockwise and thereby shift the screw 31 axially (to the right as seen in Fig. 2) to move the block 27 closer to the frame 15. This action results in increasing the pressure of the control roller 14 so that at the next forwarding feeding step the web 10 is accelerated to quickly restore the registration of an index 21 with the knife 20. Such restoration is sensed by the photo-cell 23 upon the restored index whereupon the current in the circuit 34 is now insufficient to maintain the relay 53 energized and consequently the switch 52 is opened by the pull of the stretched spring 57 and the solenoid 48 deenergized. The spring 44 now functions to return the lever arms 40 and 41 to the initial position and thereby withdraw the sleeve 32 until the screw 31 reaches its original setting holding the control roller 14 under the initial predetermined creep pressure.

While in the foregoing the invention has been applied to a backward creep relation it is to be understood this is only by way of example as the

action might be entirely reversed without departing from the invention.

From the foregoing it will be apparent that a novel mechanism has been devised for correcting an out of register condition in a travelling web of material which is required to be cut into equal lengths at certain points. In registration control means it has been heretofore a main object to provide a control so highly sensitive that an immediate response to creep in either direction takes place for correction purposes. Such mechanisms, however accurate have been found to require constant adjustment, frequent repairs, and over watchful attention of operators, this latter meaning careful selection of skilled workers, and attendant time loss in teaching operatives. By the present invention a relatively coarse control, as distinguished from the now usual sensitive find control, is provided and which fosters a cumulative creep until it reaches the magnitude of an out of register condition. When this happens the response of the control is immediate and the web is practically kicked back to registered position. Thus intricate and complicated electrical circuits, contacts and controls are reduced to a minimum and the operator is relieved of keeping track of numerous indicators which have heretofore been a part of the more complicated control mechanism. Furthermore unskilled workers can be placed on machines without long trial and learning periods.

Having thus described my invention, I claim:

1. A material feed control comprising the combination of a pressure device for feeding a web of material step by step past a predetermined point and being initially set to register said web with said point in a predetermined relation in each stop position, means to adjust said device to cause said web to gradually creep in a selected direction to finally bring said web relation to said point out of register, and means for automatically changing the adjustment of said device to vary the pressure of said device to restore said registered relation.
2. A material feed control comprising the combination of a pressure device for feeding a web of material step by step past a predetermined point and being initially set to register said web with said point in a predetermined relation in each stop position, means to adjust said device to cause said web to gradually creep in a selected direction to finally bring said web relation to said point out of register, means for automatically changing the adjustment of said device to vary the pressure of said device to restore said registered relation, and means to reset said device to its initial web pressure creeping relation after said readjustment.
3. A material feed control comprising the combination of a pressure device for feeding a web of material step by step past a predetermined point and being initially set to register said web with said point in a predetermined relation in each stop position, means to adjust said device to cause said web to gradually creep in a selected direction to finally bring said web relation to said point out of register, and means including a solenoid for automatically changing the adjustment of said device to vary the pressure of said device to restore said registered relation.
4. A material feed control comprising the combination of a pressure device for feeding a web of material step by step past a predetermined point, said web having indicia thereon and being initially set to successively register said indicia with said

point as said web travels, means to adjust the pressure of said device to cause said web to gradually creep in a selected direction to finally bring said indicia out of register with said point, means including a solenoid for changing the pressure adjustment of said device, and means including a photo-electric cell controlled by said indicia for energizing said solenoid.

5. A material feed control comprising the combination of a pressure device for feeding a web of material step by step past a predetermined point, said web having indicia thereon and being initially set to successively register said indicia with said point as said web travels, means to adjust said device to cause said web to gradually creep in a selected direction to finally bring said indicia out of register with said point, means including a solenoid for changing the pressure adjustment of said device, means including a photo-electric cell controlled by said indicia for energizing said solenoid, and means to reset said device to web pressure creeping relation when said solenoid is deenergized.

6. A material feed control comprising the combination of a device for feeding a web of material step by step past a predetermined point, said device including a resilient roller coacting with said web, a control screw arranged to be adjusted to cause said roller to press against and feed said web with a gradual creep in a selected position, a sleeve threaded on said control screw and having an external thread of quick feed pitch, a fixed nut internally threaded complementally to said sleeve external thread, means including a solenoid for shifting said sleeve to vary the adjustment of said control screw, and means responsive to an out of register relation of said web for energizing said solenoid.

7. A material feed control comprising the combination of a device for feeding a web of material step by step past a predetermined point, said device including a resilient roller coacting with said web, a control screw arranged to be adjusted to cause said roller to press against and feed said web with a gradual creep in a selected position, a sleeve threaded on said control screw and having an external thread of quick feed pitch, a fixed nut internally threaded complementally to said sleeve external thread, means including a solenoid for shifting said sleeve to vary the adjustment of said control screw, means responsive to an out of register relation of said web for energizing said solenoid, and spring operated means for restoring said sleeve to its initial position when said solenoid is deenergized.

8. A material feed control comprising a resilient feed control roller, means including an adjusting screw for holding said roller in feeding relation, with a pressure permitting a web of material to gradually creep in one direction, a reciprocable part connected to said screw for moving the latter to vary the pressure of said roller, means including a solenoid for moving said reciprocable part to increase the pressure of said roller and accelerate the travel of said web, means responsive to an out of register relation of said web for energizing said solenoid, and spring operated means for moving said part to restore the normal set pressure on said roller.

9. A material feed control comprising a resilient feed control roller, means including an adjusting screw for holding said roller in feeding relation, with a pressure permitting a web of material to gradually creep backward, a reciprocable part connected to said screw for moving the latter to

vary the pressure of said roller, means including a solenoid for moving said reciprocable part to increase the pressure of said roller and accelerate the travel of said web, means responsive to an out of register relation of said web for energizing said solenoid, and spring operated means for moving said part to restore the normal set pressure on said roller.

10. A material feed control comprising the combination of a device for feeding a web of material past a predetermined point and being initially set to register said web with said point in a predetermined relation, rotative means for varying the pressure of said device, a rock member operatively associated with said rotative means for control purposes, a solenoid for rocking said member in one direction, a spring for rocking said member in the opposite direction, and means responsive to out of register relation between said web and point to energize said solenoid to restore registration conditions.

11. A material feed control comprising the combination of a device for feeding a web of material past a predetermined point and being

initially set to register said web with said point in a predetermined relation, rotative means varying the pressure of said device, a worm wheel mounted to operate said means, a housing abutted to said wheel, a worm rotatably mounted on said housing in mesh with said wheel, and means responsive to out of register relation between said web and point for turning said housing to actuate said wheel to vary the pressure of said feed device.

12. A material feed control comprising the combination of a device for feeding a web of material past a predetermined point and being initially set to register said web with said point in a predetermined relation, rotative means varying the pressure of said device, a worm wheel mounted to operate said means, a housing abutted to said wheel, a worm rotatably mounted on said housing in mesh with said wheel, and means including a solenoid responsive to out of register relation between said web and point for turning said housing to actuate said wheel to vary the pressure of said feeding device.

LOUIS PITTALUGA

CERTIFICATE OF CORRECTION.

Patent No. 2,231,735.

February 11, 1941.

LOUIS PITTALUGA.

It is hereby certified that the above numbered patent was erroneously issued to "Frank H. Fleeer Corporation, a corporation of Delaware", as assignee of the entire interest in said invention, whereas said Letters Patent should have been issued to the inventor, Louis Pittaluga, and to Frank H. Fleeer Corporation, a corporation of Delaware, said corporation being assignee of one-half interest only in said invention, as shown by the record of assignments in this office; 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 25th day of March, A. D. 1941.

(Seal)

Henry Van Arsedale,
Acting Commissioner of Patents.