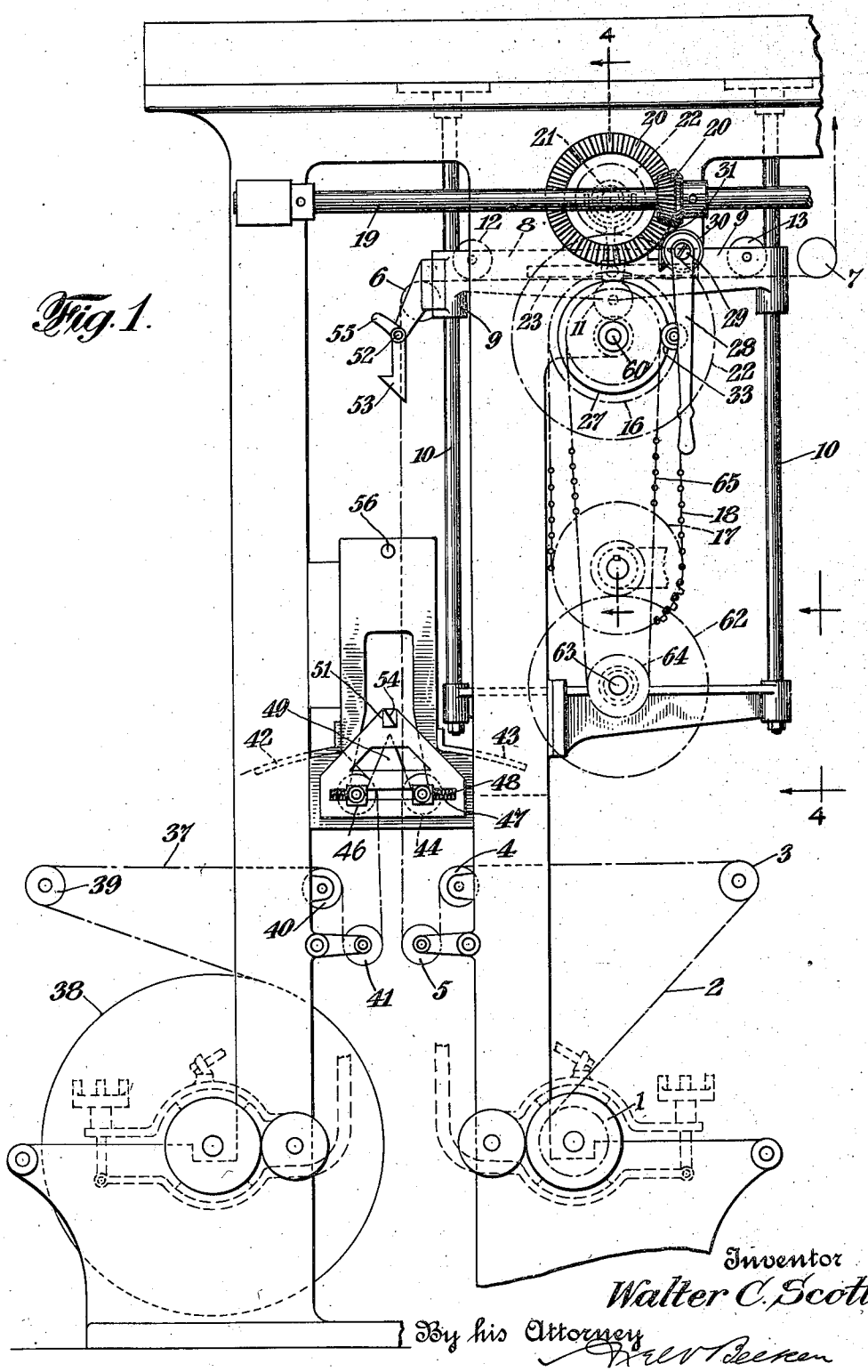
April 5, 1927. 1,623,277

W. C. SCOTT

METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 1

Fig. 1.



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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 2

Fig. 2.

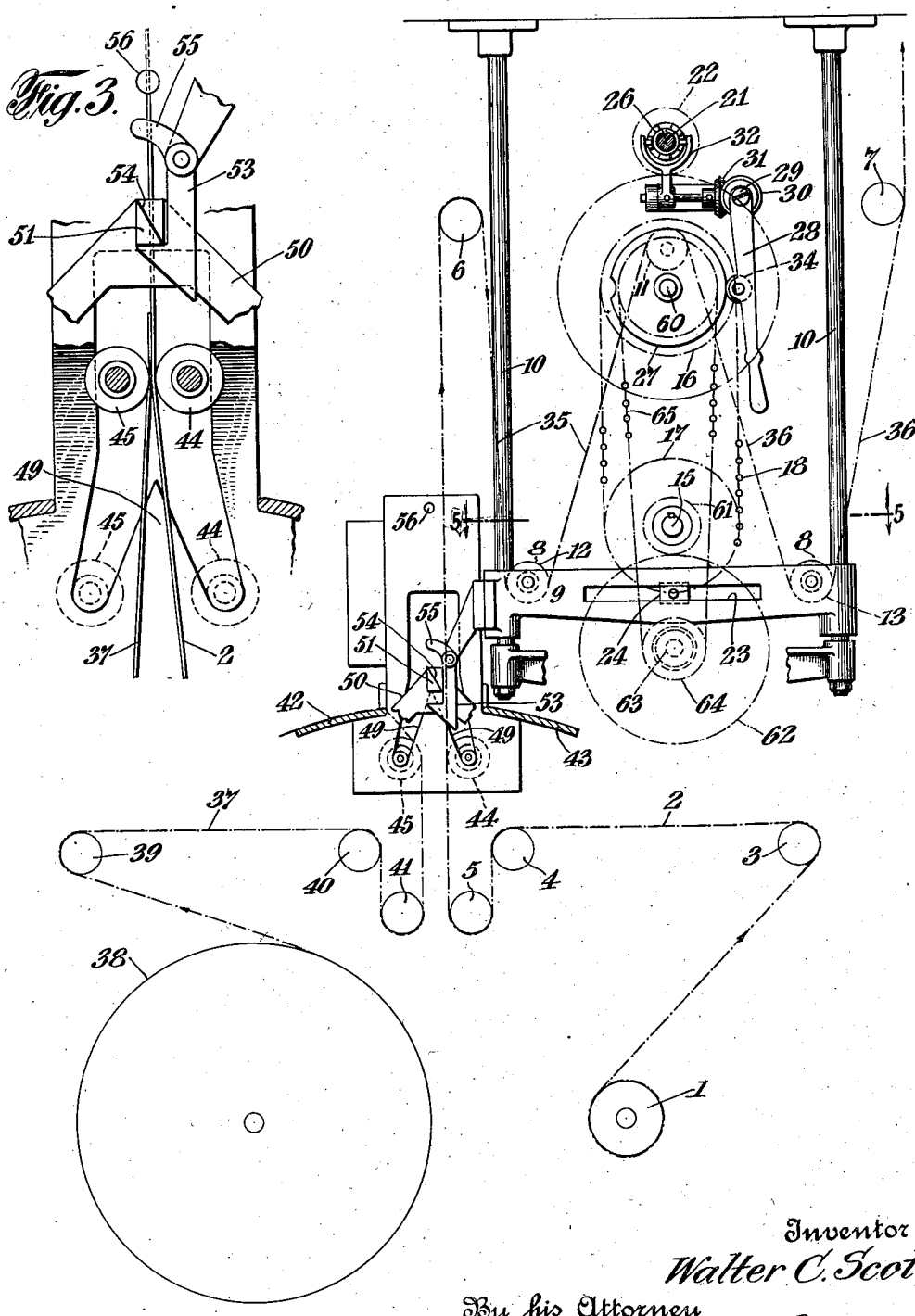


Fig. 3.

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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

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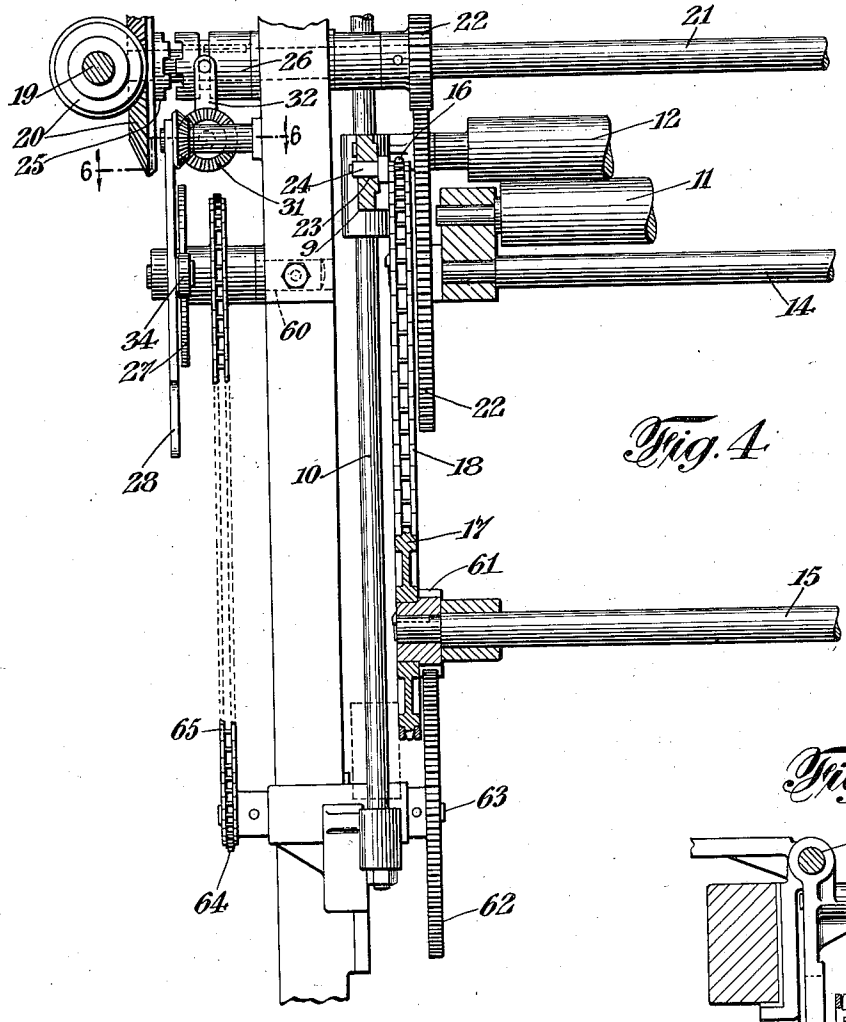


Fig. 4.

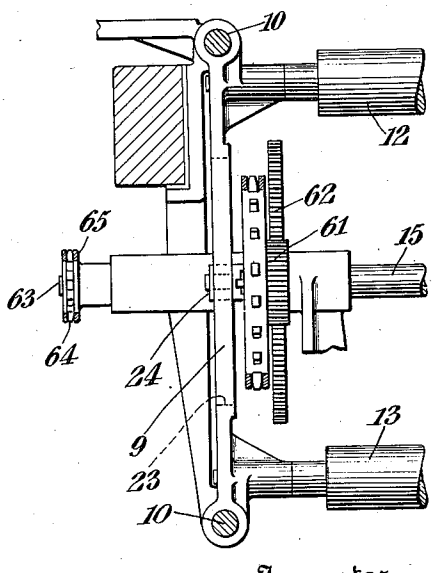


Fig. 5.

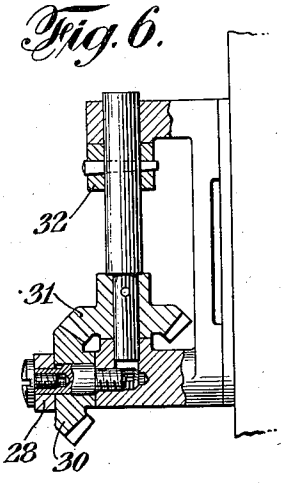


Fig. 6.

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Dell Becker

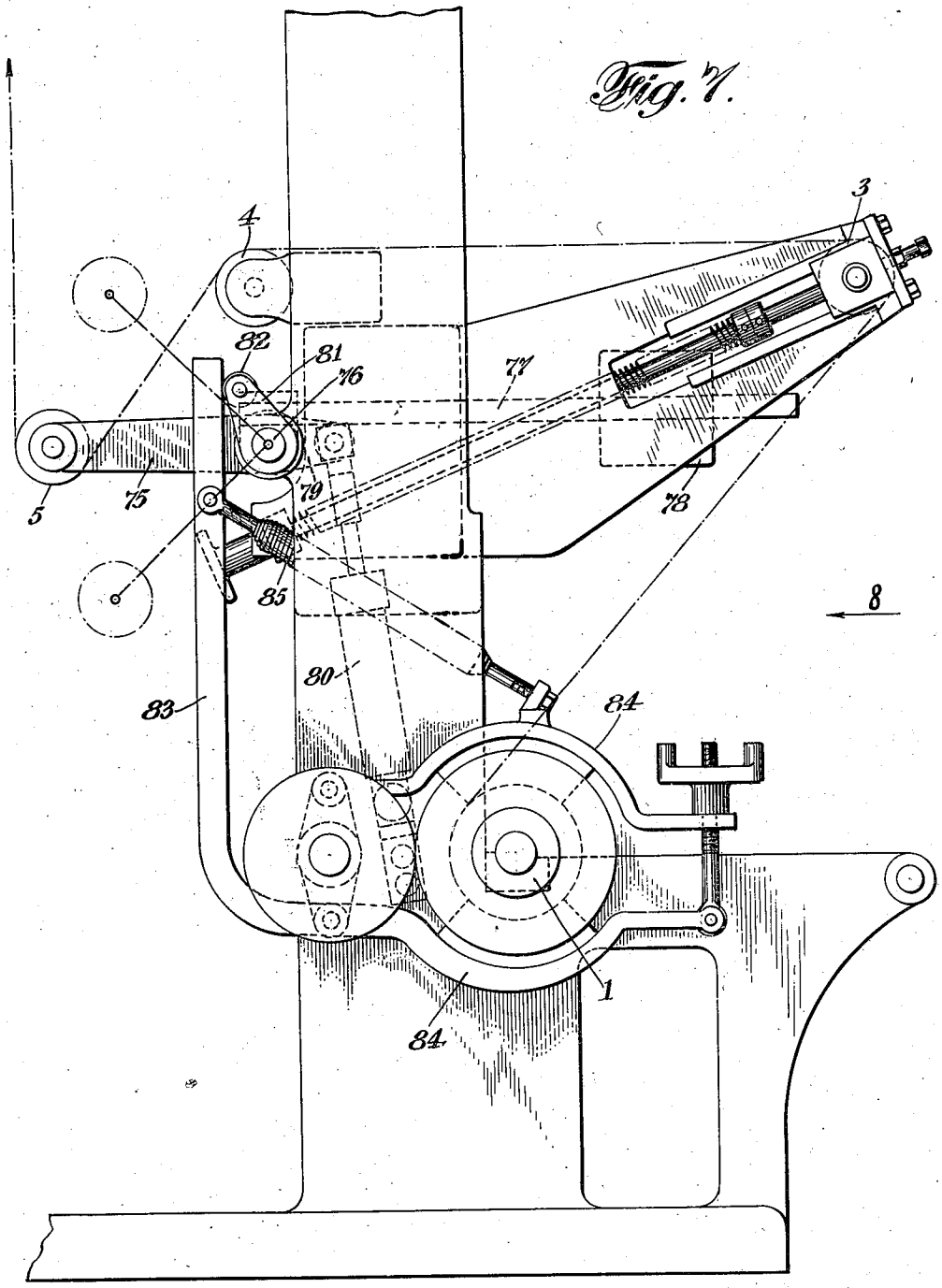
April 5, 1927. 1,623,277

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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 4

Fig. 7.



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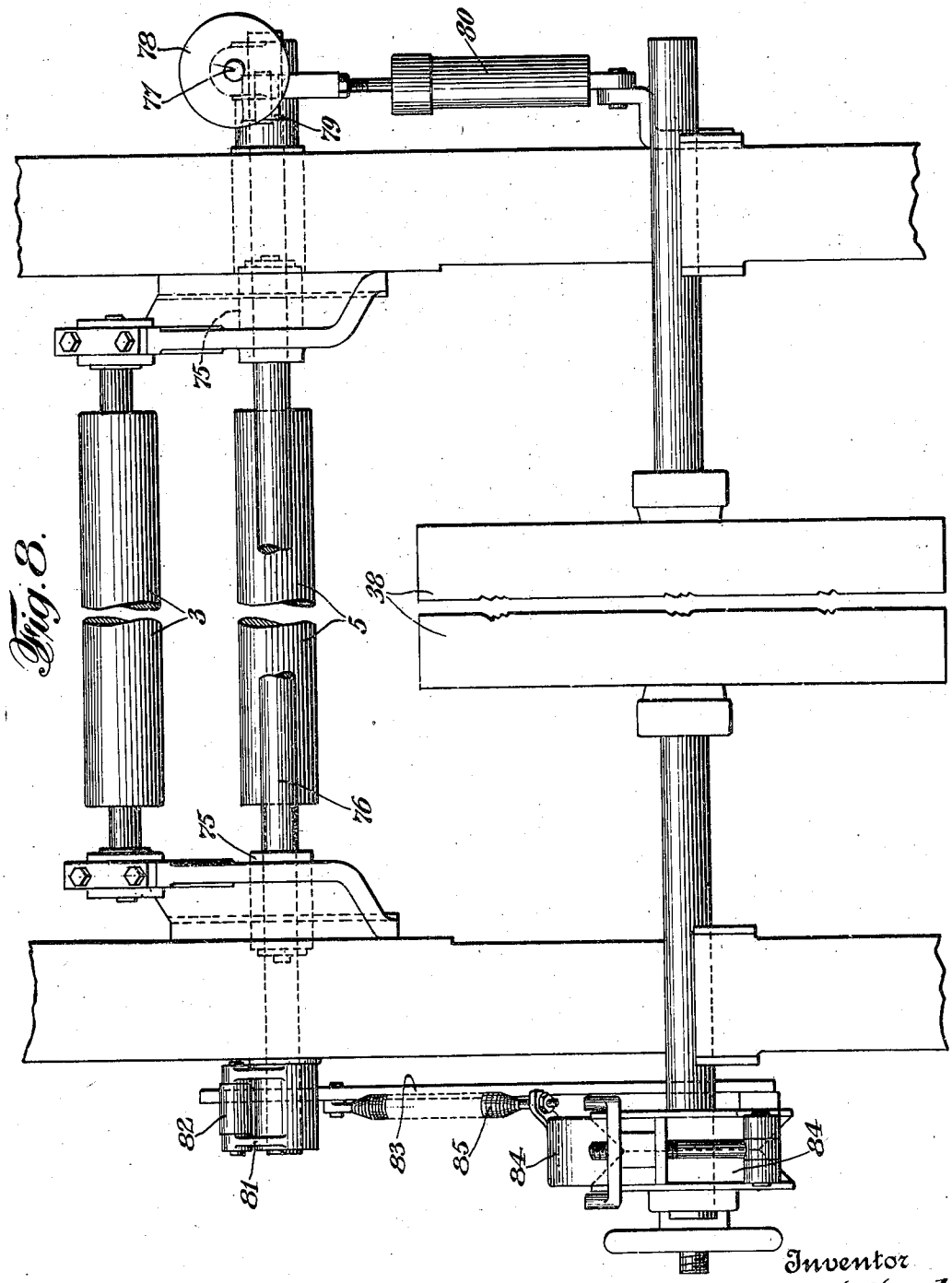
April 5, 1927. 1,623,277

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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 5

Fig. 8.



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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 6

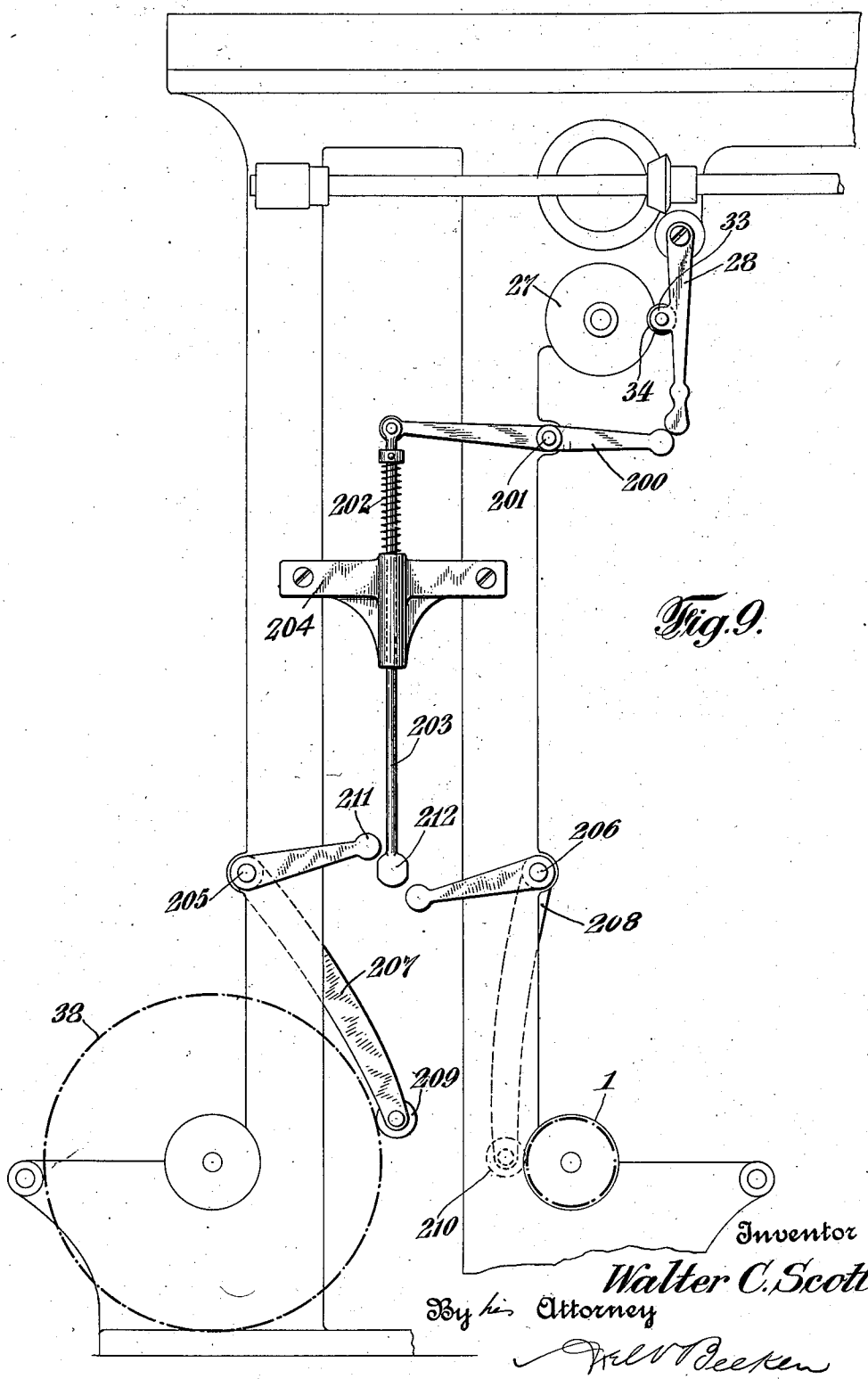


Fig. 9.

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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

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Fig. 10.

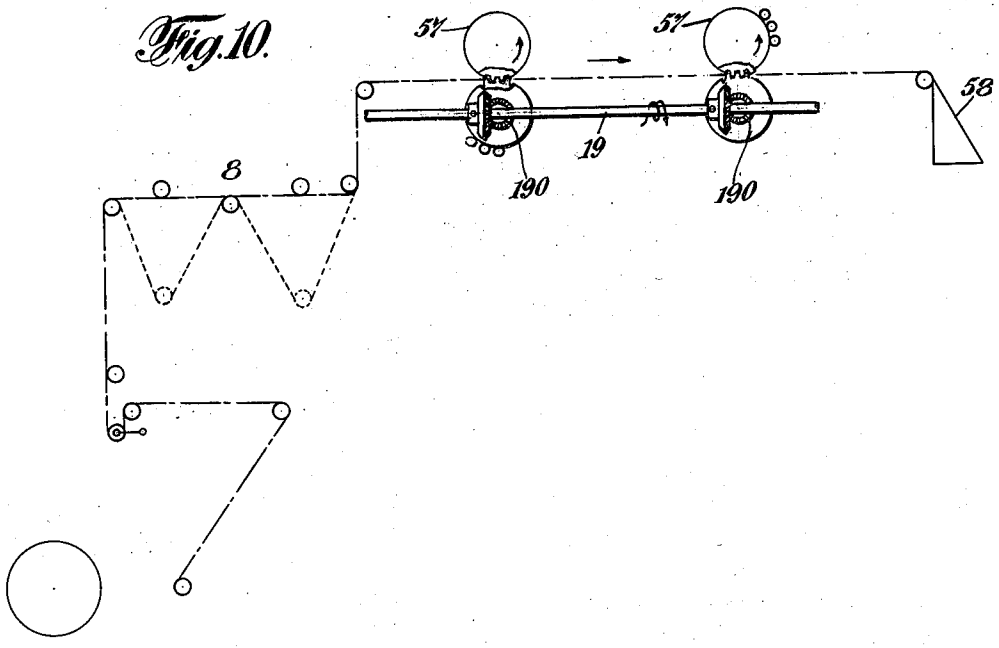
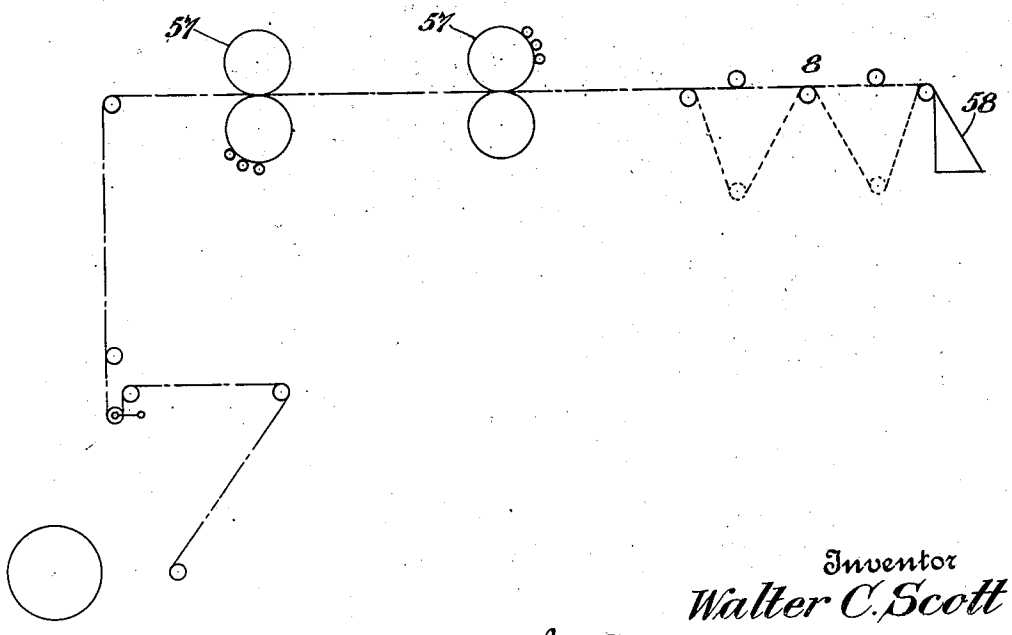


Fig. 11.



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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 8

Fig. 12.

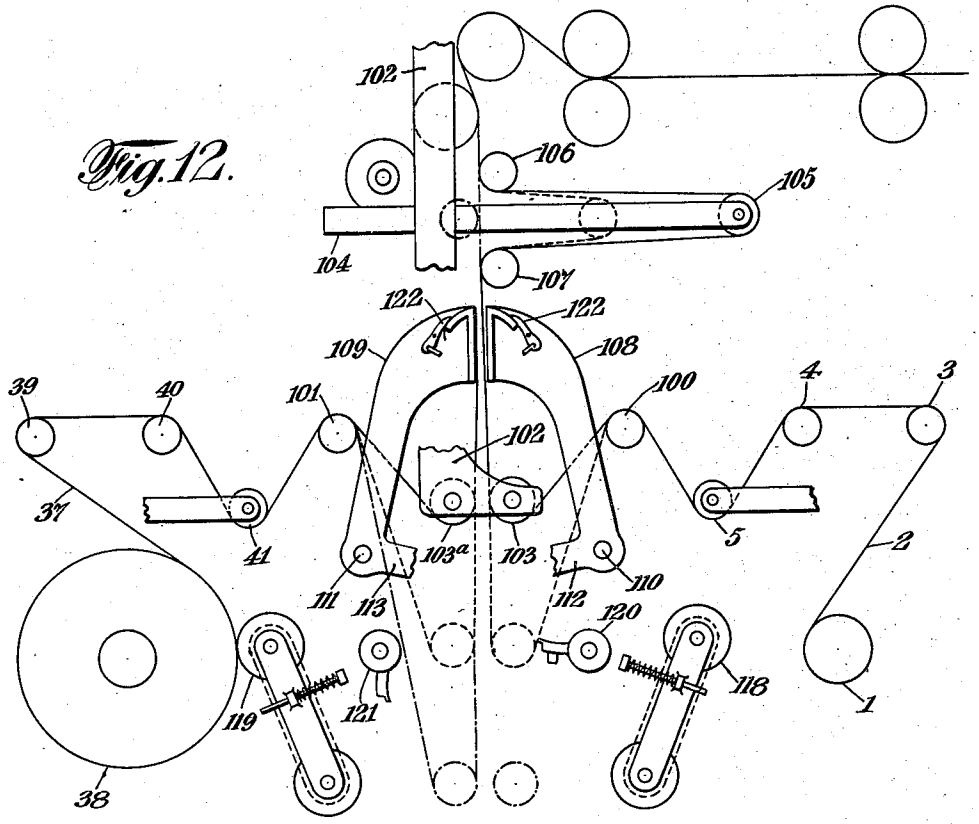
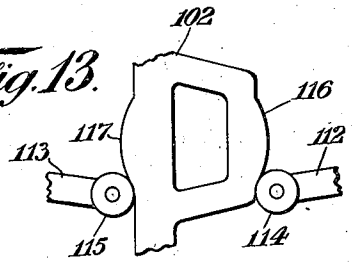


Fig. 13.



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METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER

Filed July 18, 1925 9 Sheets-Sheet 9

Fig. 14.

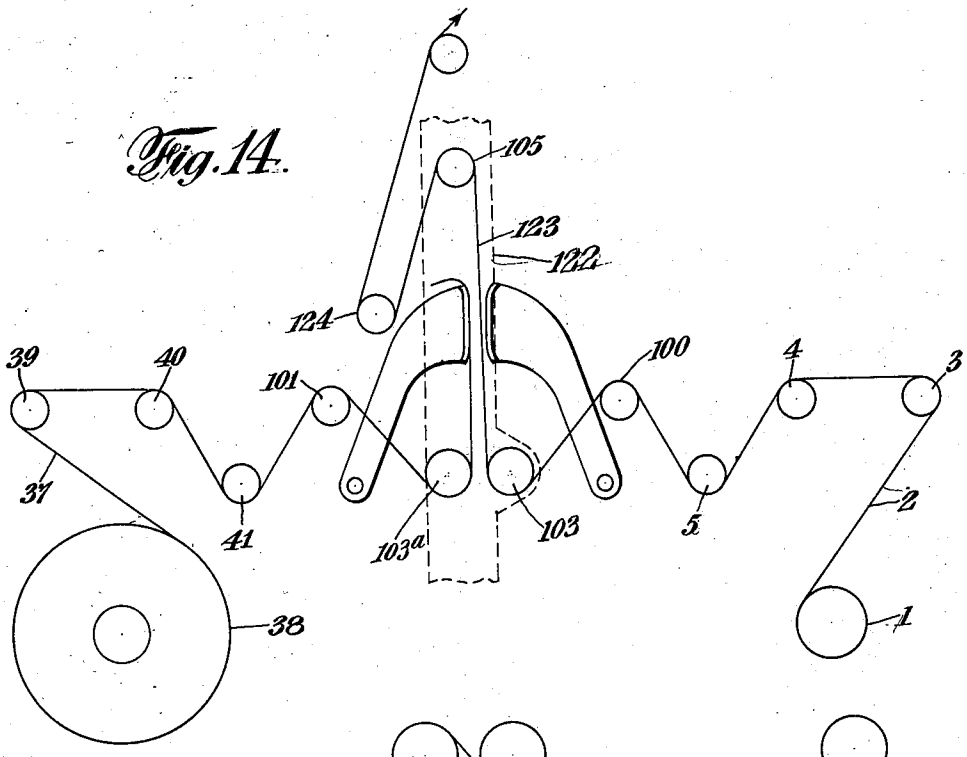
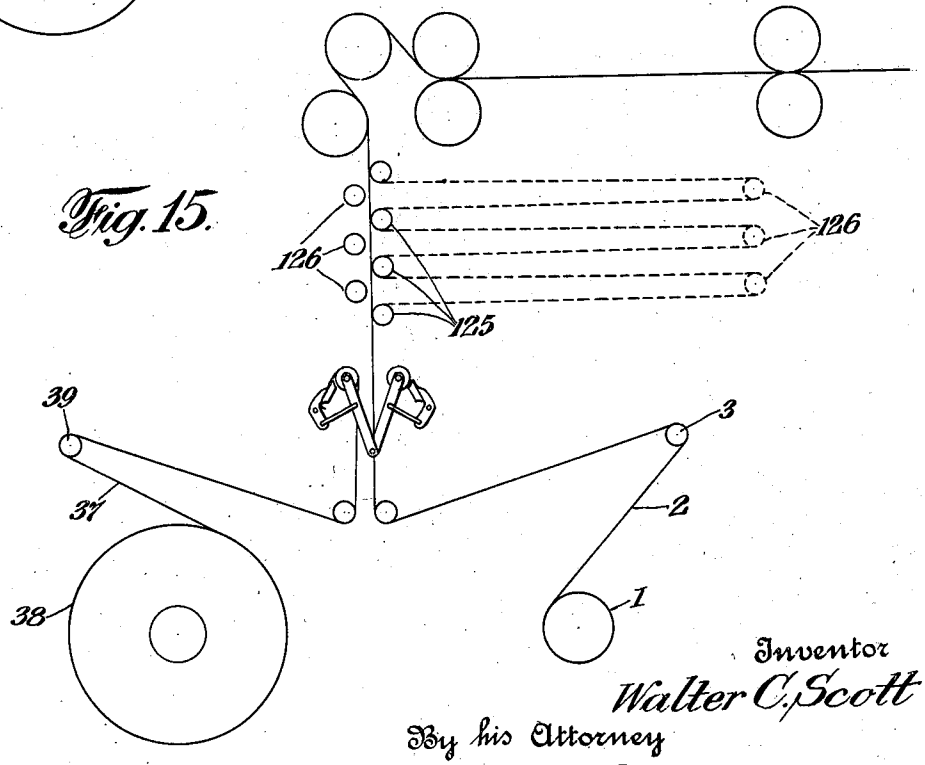


Fig. 15.



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Arthur Deeken

Patented Apr. 5, 1927. 1,623,277

UNITED STATES PATENT OFFICE.

WALTER C. SCOTT, OF PLAINFIELD, NEW JERSEY, ASSIGNOR TO ISABELLA SCOTT AND DAVID J. SCOTT, EXECUTORS OF THE ESTATE OF WALTER SCOTT, DECEASED, DOING BUSINESS AS WALTER SCOTT & COMPANY, OF PLAINFIELD, NEW JERSEY.

METHOD OF AND MEANS FOR UNINTERRUPTEDLY FEEDING A WEB OF FLEXIBLE MATERIAL WHILE CHANGING FROM ONE WEB ROLL TO ANOTHER.

Application filed July 18, 1925. Serial No. 44,506.

This invention relates to a method and means to be used in printing, folding or other web-pulling machines for uninterruptedly feeding a web of flexible material while changing from an employed roll to a replenishing roll.

This application is a continuation in part of application Ser. No. 727,501, filed July 22, 1924.

When a web supply feeding to a machine is about to become exhausted it is the practice to bring a replenishing roll into action and to attach the web from such replenishing roll to the web of the employed roll so that the continuity of the web will not be interrupted. In newspaper or other rotary printing machines it has been customary to stop the machine for the purpose of replenishing the web supply but, as the modern newspaper printing machine feeds from a plurality of rolls of paper at the same time and as it takes only from fifteen to twenty minutes to use up the paper in the average roll and as the several rolls of paper do not run out at the same time, the interruption occasioned by stopping the press every time a roll runs out decreases to a very material extent the actual time that a printing machine can run during a given period of time.

Attempts have been made to provide means for effecting the change of rolls while the printing machine is in motion so as to reduce the loss in production. These attempts, although they have to some extent gone into commercial use, have not met all the requirements of the art because they utilize the principle of causing the replenishing roll to run at a surface speed approximately equal to the surface speed of the employed roll and then attaching the web of the former to the web of the latter. It will be appreciated that this is a difficult thing to do especially if it is done while the paper is traveling at substantial speeds. First of all it is difficult to drive the replenishing or substitute rolls (which vary in diameter) at a surface speed exactly equal to that of the employed rolls; and, secondly, it is difficult to make contact between the two webs at precisely the right moment to make a perfect joint. In practice, therefore, it has been found extremely difficult to accomplish the substitution of one web roll for another except at extremely slow speeds, frequently the actual "threading speed" of the machine which is usually ten cylinder revolutions per minute.

The main object and feature of this invention is to provide a method and means whereby this substitution may be accomplished at relatively higher speeds, and preferably, but not necessarily, at the full running speed of the machine using the web.

To this end one feature of the invention consists in slowing down the speed of one portion of an employed web as compared with the speed of another portion while said web is subject to a substantially uniform tension and attaching a second web to the slowed-down portion of the first web. Preferably, but not necessarily, this web portion may be brought substantially to a standstill so as to facilitate the attaching of another web thereto and to afford sufficient time in which to make a perfect joint. After the two webs are joined the speed of the slowed-down or standing-still portion is gradually increased until running speed is attained thereby bringing the replenishing web up to speed.

The steps of the method may be widely varied. In one preferred form not only is a portion of the employed web slowed down or brought to a stand-still but so likewise is the employed roll and after the web from the replenishing or substitute roll is joined to the employed web the latter may be severed by hand or automatically or the employed roll may be left spinning until exhausted.

In another preferred form the employed roll is kept running and the replenishing web and roll are started up before pasting of the two webs takes place, after which the web of the employed roll is severed.

The method of slowing down or bringing to a stand-still one portion of a web, or the employed roll and a portion of its web, is accomplished by accumulating a surplus in the employed web to thereby control the speed of a portion of the web independently of the the speed of another portion and it will be understood that while this surplus is being dissipated or fed out a portion of the web may be slowed down or stopped and another web attached thereto.

There are several ways of accumulating

this surplus. If the surplus is accumulated between the web roll and the printing or other machine, the printing machine may continue to run at its full speed, or at a lesser speed as may be found desirable, and the employed roll may be speeded up above the speed of the printing or other web pulling machine; or, the employed web roll may continue to run at say normal speed and the speed of the printing machine may be slowed down below that of the web roll. If the surplus is accumulated between a printing machine and a folder, then the folder may continue to run at full speed, or at a lesser speed as may be found desirable, and the printing machine and employed roll may be speeded up above the speed of the folder; or, the printing machine and employed roll may continue to run at say normal speed and the speed of the folder may be slowed down. These different ways are merely illustrative of some of the many that may be used.

Other features of the invention will appear as the specification proceeds.

Several preferred and concrete embodiments of the invention are shown in the accompanying drawings in which:

Fig. 1 is a side elevation of mechanism whereby the invention may be practiced, the accumulating device being shown in its uppermost position.

Fig. 2 is a view substantially like Fig. 1, with parts removed and in section, and with the accumulating device in its lower position.

Fig. 3 is a fragmentary view partly in section on a larger scale showing the pasting rolls in active position.

Fig. 4 is a vertical sectional view on the plane of irregular line 4—4 of Fig. 1, the parts being on a larger scale than in Fig. 1.

Fig. 5 is a horizontal sectional view on the plane of line 5—5 of Fig. 2, also on an enlarged scale.

Fig. 6 is a horizontal detail section on the plane of line 6—6 of Fig. 4.

Fig. 7 is a view in side elevation, on an enlarged scale, showing the Jones tension brake applied to the device of the invention.

Fig. 8 is an end view of the parts shown in Fig. 7 looking in the direction of arrow 8 of Fig. 7.

Fig. 9 is a detail view, somewhat diagrammatic, of the means, controlled by the diameter of the employed roll, for throwing in the clutch of the accumulating or web controlling device.

Figs. 10 and 11 are diagrammatic views showing the invention applied in two different ways to a printing machine.

Fig. 12 is a more or less diagrammatic view showing the invention embodied in another form in which two oppositely acting web surplus accumulating and dissipating devices are used.

Fig. 13 is a detail view of the cam mechanism used in the form of Fig. 12 for actuating the pasting members.

Fig. 14 is a diagrammatic view showing a modification of the form of Fig. 12.

Fig. 15 is a more or less diagrammatic view showing a third form of the invention.

Referring first to Figs. 1 to 6, 1 indicates a source of supply of web or employed web roll feeding web 2 to a machine or device for utilizing the web, the machine selected here for illustration being a printing machine. Web 2 passes over suitable guide rollers 3 and 4 to web directing roll 5 from which latter the web passes in a nearly vertical though slightly inclined path to guide roll 6 from whence it passes in a nearly horizontal path to guide roll 7. From this point the web passes to the cylinders of a printing machine. 8 is a web surplus accumulating and dissipating device or web controlling device which, in the present instance, takes the following form: 9 is a carriage that is reciprocable in a vertical direction on posts or uprights 10. This carriage carries a plurality of rollers or guides, in the present instance, two marked 12 and 13, above the horizontal stretch of web between guide rolls 6 and 7. 11 is a guide roll below the web and fixed on the framework. Suitable means are provided for reciprocating the carriage or the guides carried thereby, said means here taking the following form: 14 and 15 indicate two shafts carried by the framework, said shafts being provided with sprocket wheels 16 and 17 over which travels flexible connection or sprocket chain 18. Motion may be imparted to shaft 14 by any suitable means as from driving shaft 19, through bevel gears 20, shaft 21 and spur gears 22. Mounted on carriage 9 is a horizontal guideway 23 and carried by chain 18 is a block or slide 24 that engages in guideway 23. A clutch is interposed at a suitable point in the driving connections, such clutch being here indicated by means of members 25 and 26. Member 25 is carried by one of bevel gears 20 loose on shaft 21 and member 26 is fast on shaft 21 but slidingly mounted thereon. It will be understood that when the clutch members are disengaged no rotation of shafts 14 and 15 takes place and that when the clutch is thrown in, rotation is imparted to said shafts. The means for controlling the clutch are, in the present instance, as follows: mounted loosely on stud shaft 60 is a cam disk 27 which is driven by a train of gears from shaft 15, said gears being so proportioned that said disk makes one revolution to each complete circuit of block 24 from a point, coincident with the vertical

center line passing through sprockets 16 and 17, at the upper side of said sprocket 16 around the lower sprocket 17 and back again. This train of gears comprises spur pinion 61, spur gear 62, shaft 63, sprocket 64, chain 65 and sprocket 66 on shaft 60. Adjacent the cam disk is a lever 28 pivotally mounted at 29 and carrying at its pivotal support a bevel gear 30 that meshes with another bevel gear 31 on which latter is mounted a clutch operating lever 32 by means of which clutch member 26 is moved toward and from its complementary member 25. Cam disk 27 is provided with a notch 33 in which roller 34 of lever 28 normally is seated. When the operator moves lever 28 to throw in the clutch, he, by the same movement, releases roller 34 from notch 33. Rotation is now imparted to shaft 14 and hence to the cam disk so that when the operator releases lever 28, roll 34 can no longer fall into notch 33 and therefore the clutch remains in and rotation of the parts continues until the disk has made a complete revolution when roll 34 enters notch 33 and throws the clutch out, thereby stopping rotation of shaft 14 and the trains of connections therefrom. As previously pointed out, block 24 will, during this period, have made a complete circuit from a point at the top center of sprocket 16 around sprocket 17 and back to its original position.

It will now be understood that block 24, carried by chain 18, by its engagement with guide 23 of carriage 9, will cause a downward movement of said carriage, which movement is at first slow, owing to the curve of the sprocket which moves block 24 at first in a curved path. Full speed having now been attained, when block 24 has traveled ninety degrees the carriage descends at the same speed as the downward movement of block 24 moving in a straight line. During the ninety degree movement block 24 slides in guide 23. The downward movement continues until block 24 arrives at sprocket 17 when the downward movement is gradually slowed down until block 24 has traveled ninety degrees and reaches a central point at the lower side of sprocket 17 when the downward movement ceases. During the ninety degree movement block 24 slides back to a central position in guide 23. Continued movement of the sprockets now causes block 24 to start on its upward travel first with a slow movement which is gradually accelerated during the first ninety degrees and then at a uniform rate during the straightline movement of block 24 after which the upward movement is retarded while block 24 travels over sprocket 16 until said block reaches a state of rest and the clutch is thrown out. During its upward course block 24 slides in guide 23 but in a manner reverse to that which occurs during the downward movement. In other words, the carriage 9, during its stroke in each direction, moves from a minimum speed, preferably zero, to a maximum speed and then back to minimum.

The following will illustrate one way of carrying out the invention. The cooperation of guide 23 and block 24 causes descent of carriage 9 and with it guides 12 and 13 and then an ascent of the same parts. During the descent the guides in conjunction with rolls 6, 7 and 11 form loops 35 and 36 in the employed web or accumulate a surplus. That is to say, more paper is drawn off the employed roll 1 than is required by the printing machine which remains running either at full or reduced speed and the web continues to run over the various guides and rollers. When the carriage ascends, and with it guides 12 and 13, the surplus is dissipated, the ascent being quick enough to feed out the web from the surplus to properly supply the printing or other machine, with the result that the stretch of web between guides 5 and 6 may be slowed down, or, if desired, brought substantially to a standstill. During this period another web 37, coming from replenishing roll 38, may be pasted or otherwise attached to web 2 and thus one roll is substituted for another. When block 24 reaches sprocket 16, its speed begins to decrease until finally after ninety degrees of travel it is brought to a complete stop. As soon as block 24, near the end of upward movement of carriage 9, begins to slow its speed to less than the paper required by the printing or other machine, the web will be fed out from the surplus at a diminishing rate. As a result of this, the printing machine begins to draw paper from the stretch between guides 5 and 6 and 41 and 6, at first, very slowly and then more rapidly until full speed is attained, thereby gradually bringing the new web 37 up to speed. In like manner, when carriage 9 first begins its downward movement, block 24 will first descend slowly and then at an increasing speed until the straight-line chain movement is reached. If the printing machine is running at full speed, the pull on roll 1 will be gradually increased and its speed gradually accelerated. When block 24 reaches sprocket 17, the pull on web roll 1 is gradually relaxed, then reversal of carriage 9 takes place, and then the pull on web roll 1 is relaxed at a gradually increasing rate while the printing machine begins to pull paper from the surplus at a gradually increasing rate until it draws its entire supply from the surplus and pull on the web roll entirely ceases.

It will be seen from the foregoing that the tension on the paper is substantially uniform, but, if desired, it may be rendered still more uniform by the employment of brakes operated automatically by the tension on the

web. To this end the action of this device may be facilitated by the employment of devices similar to those shown in U. S. Letters Patent Nos. 558,426 of April 14, 1896, to Walter Scott or 1,395,830 of Nov. 1, 1921, to Thomas J. Jones. These devices constitute brake mechanism for web rolls and are so constructed that when pull on the web lessens, a brake is applied and vice versa. If rolls 1 and 38 are supplied with devices of this kind the shock of starting and stopping the web supply rolls is minimized. So also if, after the two webs are joined, the old web is severed the old web roll 1 will be automatically slowed down or stopped. Likewise when carriage 9 begins its ascent and the surplus is being fed out, web roll 1 will automatically slow down or stop. I wish it, however, distinctly understood that I do not consider these devices necessary to but only convenient in carrying out the main features of invention because obviously the paper roll can be stopped by hand braking, or it can be allowed to spin without materially affecting the operation.

In Figs. 7 and 8 are shown detail views of the brake mechanism governed by tension of the web, and the particular device here shown is the one disclosed in the Jones patent above referred to. As here indicated roll 3 is a spring roller of the ordinary construction and provides some yield to the variations in the winding of the various rolls of paper. From this roll the paper passes to guide roll 4 and then underneath automatic tension adjusting roll 5. Tension adjusting roll 5 is carried by arm 75 on shaft 76 pivoted in the framework. On shaft 76 there is a rod 77 having a balance weight 78 which is adjustable by sliding it closer to or farther from shaft 76 and this counterbalances the weight of roll 5 and arms 75. Carried also by shaft 76 is a lever 79 connecting with dash pot 80 which may be an air or oil checking device to steady the travel of web tension roll 5 and to prevent violent and continuous vibration of the roll. There is also carried on shaft 76 adjusting lever 81 having a roll 82 that operates on lever 83 actuating brake 84. Spring 85 tends to keep lever 83 against roll 82. If for any reason pull on the web is increased, the action of the brake is diminished and, if, on the other hand, pull on the web should decrease the action of the brake is increased.

Any desired method of attaching the new web to the old may be employed. Thus the new web may be pasted and joined to the old web by hand, but it is preferred to use an automatic or semi-automatic device in this connection, which device may be constructed as follows: web 37 passes over guide rolls 39 and 40 and thence over web directing roll 41 from which, after web 37 is joined to web 2, it passes in a nearly vertical, though slightly inclined direction, to guide 6. Before the webs are joined the free end of web 37 after leaving guide 41 is passed in an upright direction and is placed on shelf 42 where paste may be applied to it by hand or otherwise. There is a corresponding shelf 43 on the other side for use in connection with web 2 when that becomes the replenishing web and is to be joined to employed web 37. 44 and 45 indicate two rollers arranged on opposite sides of webs 2 and 37 being located above web directing guides 5 and 41 and below shelves 42 and 43. These rollers are mounted in sliding boxes 46 seated in slots 47 and are urged towards each other by springs 48. A stationary taper cam 49 keeps the rollers separated when the parts are in the position shown in Fig. 1. Slots 47 are formed in a reciprocatory carriage 50 vertically slidable in the framework and this carriage has a lug 51. Pivotally supported at 52 on carriage 9 is a hook 53. When carriage 9 descends, this hook, by reason of cam surface 54 on lug 51, engages beneath the latter so that when carriage 9 ascends carriage 50 is elevated. As 50 moves upwardly rollers 44 and 45 approach each other, owing to conformation of cam 49, and finally bring webs 2 and 37 into contact thereby pasting the webs together. During the ascent of carriage 50 member 55 of hook 53 strikes stop 56 thereby releasing carriage 50 which latter then drops down to its original position, cam 49 separating rollers 44 and 45.

If desired, a web severing means may be carried by one of the rollers to automatically sever the old web, but such device is not necessary to the carrying out of the invention.

In Fig. 9 is shown means to place the web controlling device or surplus accumulating and dissipating device automatically in action when the employed roll is nearly exhausted or is reduced to a small diameter. As here shown, a lever 200 is pivotally supported at 201 its free end coming adjacent to lever 28. Normally, this lever is retained in the position indicated in the drawing by means of spring 202 on rod 203 sliding in bracket 204. Pivotally supported at 205 and 206 are two bell cranks 207 and 208 having rollers 209 and 210 bearing against the web rolls. When a web roll, as 38, is of large diameter, the end 211 of a bell crank will be above knob 212 of rod 203 but, as the diameter of the web roll diminishes, end 211 will eventually engage knob 212 and will pull down rod 203 against the action of spring 202 and swing lever 28 to the right, in the drawing, thereby releasing roller 34 from notch 33 in cam disk 27 and throwing in the clutch. When a new web roll is placed in position, end 211 of the bell crank will be raised and will move

rod 203 in an upward direction. This, however, will not disturb lever 28. From the construction it will be seen that the replenishing roll, be it 1 or 38, will control the automatic throwing in of the clutch.

In Figs. 10 and 11 are shown different ways of utilizing the invention. In Fig. 10 is shown diagrammatically a printing machine 57 and a folder 58. The surplus accumulating device is indicated diagrammatically at 8 and is here located in advance of both the printing machine and folder. In this form of the invention both the printing machine and folder may run uninterruptedly while changing from one roll to another. By "uninterrupedly" it is not meant to convey the idea that the speed of the printing machine and folder may not purposely be slowed down during the period of transition from one web roll to the other. As indicated in this view, shaft 19 which drives the accumulating device may be intergeared, or otherwise synchronized with the cylinders of the printing machine, by suitable reduction gearing diagrammatically shown at 190. It will be seen therefore that a direct relation exists between the web pulling machine and the accumulating device because the surface speed of the printing cylinders is directly in proportion to their speed of revolution, that is: unlike winding machines, the diameters of the pulling members do not increase as no material is accumulated thereon. It will further be understood that the members of each printing couple are intergeared in the usual way and that the folder is likewise driven in synchronism with the printing machine. In Fig. 11 the surplus accumulating device is interposed between the printing machine and folder. In this instance, the folder would continue to run but may be slowed down to provide the surplus, the printing machine continuing to run: or, the folder may continue to run at full speed, in which case the printing machine and web roll will have to be speeded up above normal. When the web comes to a standstill the printing machine would have to be stopped.

In Figs. 12 and 13 is shown a modified form of the invention. In this instance, in addition to guide rolls 3, 4 and 5 for web 2 and guide rolls 39, 40 and 41 for web 37, there are provided two stationary rolls 100 and 101. 102 is a vertically reciprocable member actuated by suitable means and this member carries at its lower end two rolls 103 and 103a suitably spaced so that the webs may pass between them. Member 102 and rolls 103 and 103a are located intermediate rolls 100 and 101. 104 is a horizontally reciprocable member, also actuated by suitable means, having a roll 105 that engages the web between stationary rolls 106 and 107, said parts being located above rolls 103 and 103a. 108 and 109 indicate two jaws pivotally supported at 110 and 111, these jaws having arms 112 and 113 provided with rolls 114 and 115 that engage cams 116 and 117 carried by vertically movable member 102. 118 and 119 indicate driven rolls that frictionally engage the replenishing roll, when thrown into contact therewith, to assist in starting rotation of said replenishing roll; and 120 and 121 are severing devices for severing the employed web after the replenishing web has been joined thereto.

Member 104 and its roll 105, in conjunction with stationary rolls 106 and 107, constitute a surplus accumulating device; and member 102 and its rolls 103 and 103a, in conjunction with stationary rolls 100 and 101, constitute a second surplus accumulating device. These two accumulating devices act oppositely; that is, when member 104 is accumulating a surplus, in the web, member 102 is dissipating another surplus, and vice versa. The function of member 104 is the same as the function of accumulating device 8; that is, to accumulate a surplus and then dissipate it to thereby decrease the speed of a web portion or stop it as may be desired. The function of member 102 is to accumulate a surplus to keep the employed roll running until after pasting or until its web has been severed; to admit of starting up the replenishing roll and its web before pasting; and to afford material that may be taken up by member 104 to create its surplus.

One method of operating the modification shown in Figs. 12 and 13 is as follows: under normal conditions member 104 will occupy the full line position and its roll 105 will be in the position at the extreme right in Fig. 12, while at the same time member 102 will occupy the full line position and its rolls 103 and 103a will be in the uppermost position shown in Fig. 12. Normally, that is, web 2, for instance, would be running over the guide rolls 3, 4, 5, 100 and 103 and would then pass in a nearly straight upward path to roll 107, thence over same, around roll 105 and thence around roll 106 to the printing or other machine. Let us assume that the printing machine is running at printing speed and that it is desired to change a web roll. Web 37 is now passed over rolls 39, 40, 41, 101 and 103a and up between jaws 108 and 109 which latter may at this time be separated as much as may be desired and the end of web 37 is placed in a gripper 122 or other web-securing device and has its end covered with paste. The accumulating devices are now started in operation thereby causing member 104 to move to the left and member 102 to move down in Fig. 12; also, roll 119 is moved into engagement with web roll 38. Meanwhile, we will assume that the printing machine re-

mains at printing speed and that jaws 108 and 109 are still slightly separated. Member 104 and roll 105 now move to the left in the drawing, at first slowly, and then more rapidly, until, say, the intermediate dotted position of roll 105 is attained. At the same time member 102 is moving downward, at first slowly, and then more rapidly, until, say, the intermediate dotted position of rolls 103 and 103ª is attained. During this action (from full to intermediate dotted line position) the printing machine will draw at first very little of the surplus of accumulating device 104 but will draw most of the required web from roll 1. As the accumulating devices speed up, however, the printing machine will draw more and more from the surplus of accumulating device 104 and less and less from roll 1 until finally, at the intermediate dotted position, the printing machine can draw its entire supply from the surplus of 104 and nothing at all from roll 1.

The web section between the jaws 108 and 109 is now standing still (or if desired may move slightly). At this time, owing to downward movement of member 102, cams 116 and 117 act on rollers 114 and 115 and close jaws 108 and 109 thereby pasting the two webs together. The jaws then separate and member 120 can then sever web 2. Considering now what happens to web 37, it will be understood that as soon as member 102 commences its downward movement, from its uppermost position, roll 103ª will commence to draw web 37, at first very slowly, and then more rapidly, until the intermediate dotted line position is reached when said web 37 will attain full printing speed back of 103ª. The action of roller 119, or other power device, will facilitate this. The substitute roll 38 will therefore have been brought up to speed before pasting takes place; or, to put it differently, webs 2 and 37 will, of necessity, move at substantially the same speed. The sections of both webs between the first and second accumulating devices may, however, be at rest, or substantially so, so that sections of both webs are substantially at a standstill at the moment they are joined together. The pasting now having taken place, the jaws separate. During the continued downward movement of rolls 103 and 103ª from the intermediate dotted position to the lower dotted position, their motion is gradually retarded as is also the movement of roll 105 from the intermediate position to the left-hand dotted position. The result is that the printing machine begins to move the joined web sections (the end of web 37 slipping out of gripper 122 which latter may be opened mechanically) at first very slowly, and then more quickly, until said lower and left-hand position is reached, the speed of roll 38 remaining substantially constant. When the upward stroke of rolls 103 and 103ª and the right-hand stroke of roll 105 takes place, the web is running at full speed but the surplus of the second accumulating device is being dissipated and the surplus of the first accumulating device is being created, one balancing the other. On the upward stroke, rolls 114 and 115 are rendered ineffective with regard to cams 116 and 117 so that no second closing of the jaws 108 and 109 takes place.

The above construction may be briefly described as consisting of two surplus accumulating and dissipating devices, one (104—105) being a main and the other (102, 103, 103ª) being an auxiliary device. It will be seen that the cycle of operation of the surplus accumulating and dissipating device 104, in Fig. 12, is the reverse of that disclosed in Fig. 1 in that in Fig. 12 the device dissipates the surplus and then creates a new surplus to be used during the next cycle of operations of the device.

In Fig. 14 is shown a modification of the forms shown in Figs. 12 and 13, the only difference being that rolls 103, 103ª and 105 are all carried by the same member 122, there being in this case a roll 124 by means of which roll 105 forms its surplus. That is to say, part of each of the main and auxiliary web accumulating and dissipating devices are carried by the same member. Otherwise the action is the same as in Figs. 12 and 13.

The devices shown in Figs. 12, 13 and 14 are not specifically claimed herein but form the subject matter of a separate application filed October 21, 1925, Serial No. 63,817.

In Fig. 15 is shown still another modification. Here the accumulating and dissipating device consists of a series of stationary rolls 125 and a series of rolls 126 preferably mounted on a common member and movable in unison. Web 2 from the employed roll passes between the stationary and movable rolls. When a roll change is to take place the movable rolls will be in the dotted line position at the right in Fig. 15 and, say, six lengths of web will have been accumulated. During the dissipation of the surplus, the webs are joined and the replenishing roll is brought up to speed. In this case likewise the speed of rolls 126 may in their bodily movement vary from a minimum to a maximum and then to a minimum. In this instance, the web section in rear of the surplus may not stop. If, for example, the circumference of the cylinders of the web pulling machine is forty-three inches and rolls 126 move seven inches to each cylinder revolution, there being six lengths of material in the surplus only forty-two inches of surplus is dissipated while the web pulling machine is using up forty-three inches. The web, therefore, will never stop but its speed

will be so slow as to readily admit of another web being joined thereto. In this case, likewise, the replenishing roll may be started up initially by hand or power.

The specific form of the invention shown in Fig. 15 is not specifically claimed herein but forms the subject matter of a separate application filed August 24, 1925, Ser. No. 51,983.

In describing the operation of the several forms of the invention it has been assumed that web 2 is the employed web and web 37 the replenishing web, but it will be understood that when web 37 has been attached to web 2 said web 37 becomes the employed web and that the next change will be made by slowing-down or stopping a portion of web 37 and attaching thereto what would then be a replenishing web 2. This alternation may, of course, continue indefinitely.

I claim:

1. The method of joining two webs of flexible material which consists in: accumulating a surplus in an employed web, dissipating said surplus to thereby slow down the speed of a portion of the web, and then attaching a second web to the slowed-down portion of the first web.

2. The method of joining two webs of flexible material which consists in: accumulating a surplus in an employed web, dissipating said surplus to thereby stop a portion of the web, and then attaching a second web to the stopped portion of the first web.

3. The method of joining two webs of flexible material which consists in: accumulating, under tension, a surplus in an employed web, dissipating, under tension, said surplus to thereby slow down the speed of a portion of the web, and then attaching a second web to the slowed-down portion of the first web.

4. The method of joining two webs of flexible material which consists in: accumulating, under tension, a surplus in an employed web, dissipating, under tension, said surplus to thereby stop a portion of the web, and then attaching a second web to the stopped portion of the first web.

5. The method of joining two webs of flexible material which consists in: accumulating a surplus in an employed web, dissipating said surplus to thereby first slow down and then increase the speed of a portion of the web, and attaching a second web to the slowed-down portion of the first web.

6. The method of joining two webs of flexible material which consists in: accumulating a surplus in an employed web, dissipating said surplus to thereby first gradually stop and then gradually start up movement of a portion of the web, and attaching a second web to the stopped portion of the first web.

7. The method of joining two webs of flexible material which consists in: accumulating, under tension, a surplus in an employed web, dissipating, under tension, said surplus to thereby first slow down and then increase the speed of a portion of the web, and attaching, under tension, a second web to the slowed-down portion of the first web.

8. The method of joining two webs of flexible material which consists in: accumulating, under tension, a surplus in an employed web, dissipating, under tension, said surplus to thereby first gradually stop and then gradually start up movement of a portion of the web, and attaching, under tension, a second web to the stopped portion of the first web.

9. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: slowing down the speed of one portion of an employed web, as compared with the speed of another portion of the same web, while said web is subject to a substantially uniform tension, and attaching a second web to the slowed-down portion of the first web.

10. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: slowing down the speed of one portion of an employed web, as compared with the speed of another portion of the same web, while said web is subject to a substantially uniform tension, attaching a second web to the slowed-down portion of the first web, and then gradually accelerating the speed, under substantially uniform tension, of the joined portions of the webs.

11. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: slowing down the speed of one portion of an employed web, as compared with the speed of another portion of the same web, while said web is subject to a substantially uniform tension, attaching a second web to the slowed-down portion of the first web while maintaining a substantially uniform tension in said second web, and gradually accelerating the speed, under substantially uniform tension, of the joined portions of the two webs.

12. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: slowing down the speed of one portion of an employed web, as compared with the speed of another portion of the same web, while said web is subject to a substantially uniform tension, attaching a second web to the slowed-down portion of the first web, then severing the first web behind the joined portions of the two webs, and then gradually accelerating the speed, under substantially uniform tension, of the joined portions of the two webs.

13. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: bringing a portion of an employed web, as compared with another portion of the same web, substantially to a standstill while said web is subject to a substantially uniform tension, and attaching another web to the portion of the first web that is standing still.

14. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: bringing a portion of an employed web, as compared with another portion of the same web, substantially to a standstill while said web is subject to a substantially uniform tension, attaching another web to the portion of the first web that is standing still, and then gradually starting up movement under substantially uniform tension, of the joined portions of the two webs.

15. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: bringing a portion of an employed web, as compared with another portion of the same web, substantially to a standstill while said web is subject to a substantially uniform tension, attaching another web to the portion of the first web that is standing still while maintaining a substantially uniform tension on said second web, and then gradually starting up movement, under substantially uniform tension, of the joined portions of the two webs.

16. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: bringing a portion of an employed web, as compared with another portion of the same web, substantially to a standstill while said web is subject to a substantially uniform tension, attaching another web to the portion of the first web that is standing still, then severing the first web behind the joined portions of the two webs, and then gradually starting up movement, under substantially uniform tension, of the joined portions of the two webs.

17. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: accumulating and then dissipating a surplus in an employed web to thereby control the speed of a portion, independently of the speed of another portion of the web, while said web is subject to a substantially uniform tension, and attaching a second web to the controlled portion of the first web.

18. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: accumulating and then dissipating a surplus in an employed web to thereby first gradually slow down and then gradually speed up a portion of the web, independently of the speed of another portion of the web, while said web is subject to a substantially uniform tension, and attaching a second web to the slowed-down portion of the first web to thereby gradually speed up the second web to the running speed of the first web.

19. The method of uninterruptedly feeding a web of flexible material while changing from one web roll to another which consists in: accumulating and then dissipating a surplus in an employed web to thereby first gradually stop and then gradually start up movement of a portion of the web, independently of the speed of another web portion, while said web is subject to a substantially uniform tension, and attaching a second web to the stopped portion of the first web to thereby gradually start up movement of the second web to bring it up to the running speed of the first web.

20. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: slowing down the speed of the employed roll and temporarily slowing down the speed of one portion of its web, as compared with the speed of another portion, while said web is subject to a substantially uniform tension, and attaching the web of the replenishing roll to the slowed-down portion of the web of the employed roll.

21. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: bringing the employed roll and temporarily a portion of its web substantially to a standstill as compared with another portion, while said web is subject to a substantially uniform tension, and attaching the web of the replenishing roll to the portion of the web of the employed roll that is substantially at a standstill.

22. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus and slowing down the speed of the employed roll and the portion of the web in rear of the surplus, and attaching the web of the replenishing roll to the slowed-down portion of the web of the employed roll.

23. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up

the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus to thereby first slow down and then increase the speed of the employed roll and the portion of the web in rear of the surplus, and attaching the web of the replenishing roll to the slowed-down portion of the web of the employed roll.

24. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus and substantially bringing to a standstill that portion of the web in rear of the surplus, and attaching the web of the replenishing roll to that portion of the web of the employed roll that is substantially at a standstill.

25. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus to thereby first substantially bring to a standstill and then start movement of that portion of the web in rear of the surplus, and attaching the web of the replenishing roll to that portion of the web of the employed roll that is substantially at a standstill.

26. The method of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus and substantially bringing to a standstill the employed roll and that portion of its web in rear of the surplus, and attaching the web of the replenishing roll to that portion of the web of the employed roll that is substantially at a standstill.

27. The methed of uninterruptedly feeding a web of flexible material while changing from an employed web roll to a replenishing roll which consists in: speeding up the employed roll and accumulating, under tension, a surplus in its web, dissipating, under tension, said surplus and substantially bringing to a standstill the employed roll and that portion of its web in rear of the surplus, attaching the web of the replenishing roll to that portion of the web of the employed roll that is substantially at a standstill, and gradually speeding up that portion that is substantially at a standstill and with it the replenishing roll and its web.

28. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, and a web surplus accumulating and dissipating device, for the web from the employed roll, intermediate the sources of web supply and the web pulling machine, acting to dissipate the surplus at a speed varying from a minimum to a maximum and then to a minimum.

29. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device, for the web from the employed roll, intermediate the sources of web supply and the web pulling machine, acting to dissipate the surplus at a speed varying from a minimum to a maximum and then to a minimum, and opposed members to press together, at a point in rear of the surplus, two webs from the two rolls substantially at the time the surplus is being dissipated at maximum speed.

30. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, and a web surplus accumulating and dissipating device for the web of the employed roll, having a back-and-forth movement and located intermediate the sources of web supply and the web pulling machine, acting to dissipate the surplus, during its stroke in one direction, at a speed varying from a minimum to a maximum and then to a minimum.

31. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, and a web surplus accumulating and dissipating device for the web of the employed roll, having a back-and-forth movement and located intermediate the sources of web supply and the web pulling machine, accumulating the web on the stroke in one and dissipating it on the stroke in the other direction and acting on the web, during its stroke in each direction, at a speed varying from a minimum to a maximum and then to a minimum.

32. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device for the web of the employed roll, having a back-and-forth movement and

located intermediate the sources of web supply and the web pulling machine, accumulating the web on the stroke in one and dissipating it on the stroke in the other direction and acting on the web, during its stroke in each direction, at a speed varying from a minimum to a maximum and then to a minimum and opposed members to press together at a point in rear of the surplus, two webs from the two rolls substantially at the time the surplus is being dissipated at maximum speed.

33. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device between the sources of web supply and the web pulling machine to engage a web from the employed roll, and driving means to cause said device to move at a speed varying from a minimum to a maximum and then to a minimum during the dissipation of the surplus.

34. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device between the sources of web supply and the web pulling machine to engage a web from the employed roll, and driving means to cause said device to move at a speed varying from approximately zero to a maximum and then to approximately zero during the dissipation of the surplus.

35. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device, having a back-and-forth movement and located between the sources of web supply and the web pulling machine, to engage a web from the employed roll, and driving means to cause said device to move, during its stroke in one direction, at a speed varying from a minimum to a maximum and then to a minimum.

36. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device, having a back-and-forth movement and located between the sources of web supply and the web pulling machine, to engage a web from the employed roll, and driving means to cause said device to move, during its stroke in one direction, at a speed varying from approximately zero to a maximum and then to approximately zero.

37. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device, having a back-and-forth movement and located between the sources of web supply and the web pulling machine, to engage a web from the employed roll, and driving means to cause said device to move, during its stroke in each direction, at a speed varying from a minimum to a maximum and then to a minimum.

38. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web, one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device, having a back-and-forth movement and located between the sources of web supply and the web pulling machine, to engage a web from the employed roll, and driving means to cause said device to move, during its stroke in each direction, at a speed varying from approximately zero to a maximum and then to approximately zero.

39. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, web controlling means, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate the web controlling means when connected thereto, and means for automatically disconnecting the actuating and web controlling means after the latter means have completed a cycle of operations.

40. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, web controlling means, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate the web controlling means when connected thereto, and means, controlled by the diameter of the employed roll, to connect the actuating and web controlling means.

41. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web

pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, web controlling means, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate the web controlling means when connected thereto, means, controlled by the diameter of the employed roll, to connect the actuating and web controlling means, and means for automatically disconnecting the actuating and web controlling means after the latter means have completed a cycle of operations.

42. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, a web surplus accumulating and dissipating device, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate said device when connected thereto, and means for automatically disconnecting the actuating means and said device when the latter has completed a cycle of operations.

43. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, a web surplus accumulating and dissipating device, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate said device when connected thereto, and means, controlled by the diameter of the employed roll, to connect the actuating means and the device.

44. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, a web surplus accumulating and dissipating device, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate said device when connected thereto, means, controlled by the diameter of the employed roll, to connect the actuating means and the device, and means for automatically disconnecting the actuating means and the device when the latter has completed a cycle of operations.

45. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, a web surplus accumulating and dissipating device having a back-and-forth movement, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate said device when connected thereto, and means for automatically disconnecting the actuating means and said device when the latter has completed a stroke in both directions.

46. Means for uninterruptedly feeding a web of flexible material while changing from one web roll to another including: a web pulling machine, two sources of supply of web material, one an employed roll and another a replenishing roll, a web surplus accumulating and dissipating device having a back-and-forth movement, normally idle, by means of which the web feed may be changed from the employed to the replenishing roll, actuating means to operate said device when connected thereto, means, controlled by the diameter of the employed roll, to connect the actuating means and the device, and means for automatically disconnecting the actuating means and said device when the latter has completed a stroke in both directions.

47. A web surplus accumulating and dissipating device including: a member, to engage the web, movable in opposite directions, an endless actuating member, and a slidable block-and-guide connection between the web-engaging member and the actuating member.

48. A web surplus accumulating and dissipating device including: a member, to engage the web, movable in opposite directions, two rotatable members, an endless member passing over said rotating members, and a slidable block-and-guide connection between the web-engaging member and the actuating member to move said web-engaging member, on its stroke in each direction, at a speed varying from a minimum to a maximum and then to a minimum.

49. A web pulling machine, two sources of web supply, one an employed roll and another a replenishing roll, roll-change means including a web accumulating and dissipating device between the rolls and the web-pulling machine, a brake for each roll, and web tension-actuated means to control the brakes.

50. Means for pasting two webs together comprising: two opposed members on the outer sides of two webs arranged face to face, and mechanism for moving said members lengthwise of the web and bringing them toward each other and for returning them lengthwise of the webs and separating them.

51. Means for pasting two webs together comprising: two opposed members on the outer sides of two webs arranged face to face, and mechanism for moving said members lengthwise of the web in opposite direc-

tions and bringing them toward and away from each other including a carrier reciprocable lengthwise of the webs for slidably supporting the members in a direction at right angles to its own movement, means for urging the rolls toward each other, and means for separating the members when the carrier is in one position and for permitting the members to come together when in another position.

52. Means for pasting two webs together comprising: two opposed members on the outer sides of two webs arranged face to face, mechanism for moving said members lengthwise of the web in opposite directions and bringing them toward and away from each other, a surplus accumulating device for a web movable lengthwise of the web, and means to actuate said mechanism from the surplus accumulating device.

53. Means for pasting two webs together comprising: two opposed members on the outer sides of two webs arranged face to face, and mechanism for moving said members lengthwise of the web in opposite directions and bringing them toward and away from each other, including a carrier reciprocable lengthwise of the webs for slidably supporting the members in a direction at right angles to its own movement, means for urging the members toward each other, and a cam for separating the members when the carrier is in one position and for permitting the members to come together when in another position.

54. Means for pasting two webs together comprising: a pair of members between which the webs pass, means for urging said members toward each other, means for separating the members, and mechanism for moving the members away from the separating means to thereby permit them to come together.

55. Means for pasting two webs together comprising: a pair of members between which the webs pass, means for urging said members toward each other, means for separating the members, and mechanism for moving the members away from the separating means to thereby permit them to come together, a surplus accumulating device for a web, and means to actuate said mechanism from the surplus accumulating device.

56. Means for pasting two webs together comprising: a pair of members between which the webs pass, means for urging said members toward each other, a movable carrier supporting said members, a stationary cam to separate the members, and mechanism to move the carrier with respect to the cam to thereby bring the members together and to allow the carrier to return thereby separating the rolls.

57. Means for pasting two webs together comprising: a pair of members between which the webs pass, means for urging said members toward each other, a movable carrier supporting said members, a stationary cam to separate the members, and mechanism to move the carrier with respect to the cam to thereby bring the members together and to allow the carrier to return thereby separating the members, a surplus accumulating device for a web, and means to actuate said mechanism from the surplus accumulating device.

58. Means for pasting two webs together comprising: a pair of members between which the webs pass, a vertically movable carrier supporting said members, means on the carrier to urge said members toward each other, a stationary cam to separate the members, and mechanism to move the carrier vertically.

59. Means for pasting two webs together comprising: a pair of members between which the webs pass, a vertically movable carrier supporting said members, means on the carrier to urge said members toward each other, a stationary cam to separate the members, a vertically movable lifting device to engage and lift the carrier, means to release the carrier from the lifting means, and mechanism to move the carrier vertically.

60. Means for pasting two webs together comprising: a pair of members between which the webs pass, a vertically movable carrier supporting said members, means on the carrier to urge said members toward each other, a stationary cam to separate the members, a vertically movable lifting device, a pivotally supported member on the lifting device, a cam member on the carrier to which the pivotally supported member becomes latched, and a stop to unlatch the pivotally supported member from the cam member, and mechanism to move the carrier vertically.

61. Means for pasting two webs together comprising: a surplus accumulating device for a web, two members, on the outer sides of the webs, movable toward and away from each other and lengthwise of the webs, and mechanism to control the movement of the members from the accumulating device.

62. Means for pasting two webs together comprising: a surplus accumulating device for a web, pasting members for the two webs, and mechanism to control the action of the pasting members from the accumulating device.

63. Means for pasting two webs together comprising: a surplus accumulating device for first accumulating and then dissipating a surplus in a web, pasting members for the two webs, and mechanism to move the pasting members into pasting position, actuated from the accumulating device during the dissipation of the surplus.

64. Means for pasting two webs together comprising: a surplus accumulating device for first accumulating and then dissipating a surplus in a web, two members on the outer sides of the webs movable toward and away from each other and lengthwise of the webs, and mechanism to move the members toward each other and lengthwise of the web, actuated from the accumulating device during the dissipation of the surplus.

65. Means for pasting two webs together comprising: two opposed members on the outer sides of two moving webs that are arranged face to face, and mechanism for moving said members lengthwise of the webs and in the direction of their movement while pressing them together.

66. Web replenishing mechanism including: two sources of web supply, a reciprocating web surplus accumulating and dissipating device, and a reciprocating device, for attaching to each other webs from the two sources, arranged intermediate the sources of web supply and the accumulating and dissipating device.

67. Means for attaching together two webs arranged face to face including: two opposed members on the outer sides of the webs, means for moving the opposed members toward and away from each other, and means for moving said members lengthwise of the webs in both directions.

68. Web replenishing means including: a web pulling machine, two sources of supply of web one having an employed web roll and another having a replenishing web roll, a web surplus accumulating and dissipating device for the web from the employed roll, and means other than the webs for actuating said device at speeds bearing a direct relation to the speeds of the web pulling machine, to thereby control the speed of a portion of the web while permitting continued flow of the web to the web pulling machine.

69. Web replenishing means including: a web pulling machine, two sources of supply of web one having an employed web roll and another having a replenishing web roll, a device having members engaging a web at several points intermediate the sources of supply and the web pulling machine to accumulate and dissipate a surplus in the web, and means other than the webs for actuating said device at speeds bearing a direct relation to the speeds of the web pulling machine, to thereby control the speed of a portion of the web while permitting continued flow of the web to the web pulling machine.

70. Web replenishing means including: a web pulling machine, two sources of supply of web one having an employed web roll and another having a replenishing web roll, a device having members engaging a web at several points intermediate the sources of supply and the web pulling machine to accumulate and dissipate a surplus in the web, means other than the webs for actuating said device at speeds bearing a direct relation to the speeds of the web pulling machine to thereby control the speed of a portion of the web while permitting continued flow of the web to the web pulling machine, opposed members to attach another web to the controlled portion of the first web, and actuating means for said last-named members to operate them in direct relation to the movement of said device and said web pulling machine.

71. Web replenishing means including: a web pulling machine having rotating web-engaging members the surface speed of which is directly in proportion to their speed of revolution, two sources of supply of web one having an employed web roll and another having a replenishing web roll, a device having members engaging a web at several different points intermediate the sources of supply and the web pulling machine, to accumulate and dissipate a surplus in the web, and means, other than the webs, for actuating said device at speeds bearing a direct relation to the speeds of the members of the web pulling machine, to thereby control the speed of a portion of the web while permitting continued flow of the web to the web pulling machine.

72. Web replenishing means including: a web pulling machine having rotating web engaging members the surface speed of which is directly in proportion to their speed of revolution, two sources of supply of web one having an employed web roll and another having a replenishing web roll, a device having members engaging a web at several different points intermediate the sources of supply and the web pulling machine, to accumulate and dissipate a surplus in the web, means, other than the webs, for actuating said device at speeds bearing a direct relation to the speeds of the members of the web pulling machine, to thereby control the speed of a portion of the web while permitting continued flow of the web to the web pulling machine, and opposed members to attach another web to the controlled portion of the first web, and actuating means for said last-named members to operate them in direct relation to the movement of said device and said web pulling machine.

Signed at New York, in the county of New York and State of New York, this 17th day of July, 1925.

WALTER C. SCOTT.