June 21, 1960 C. E. F. WILLIS 2,941,742

WEB SUPPLY MECHANISM

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Fig. 1.

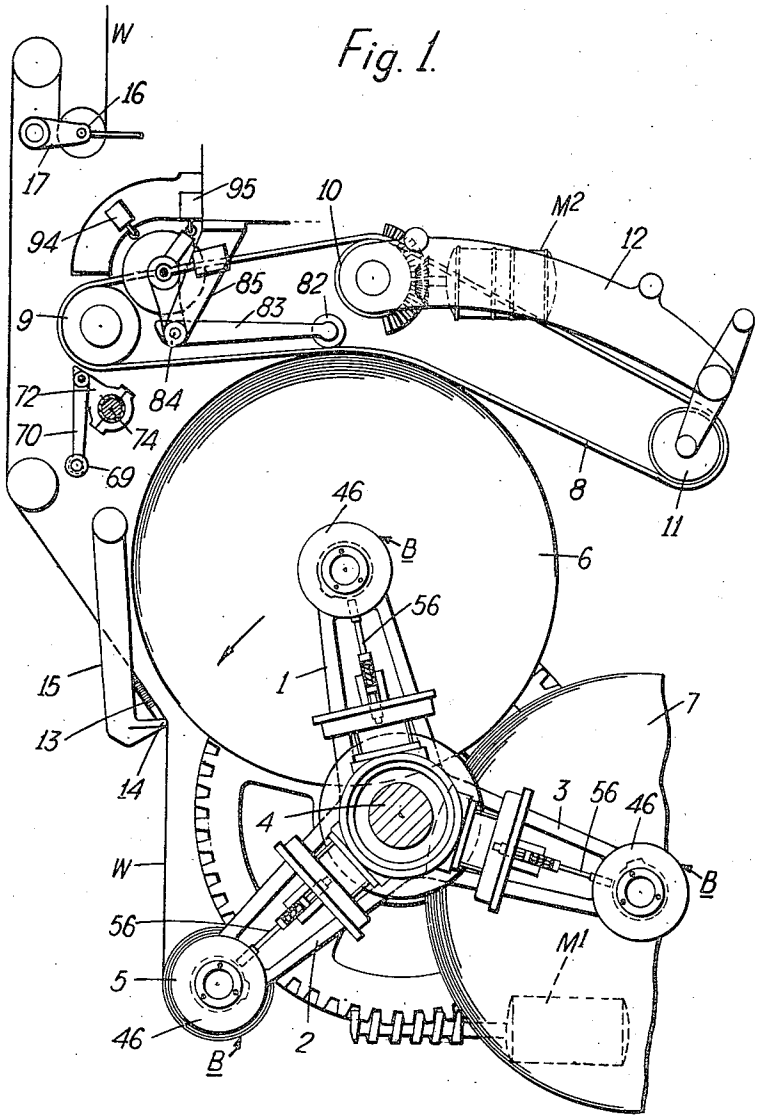

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Fig. 2.

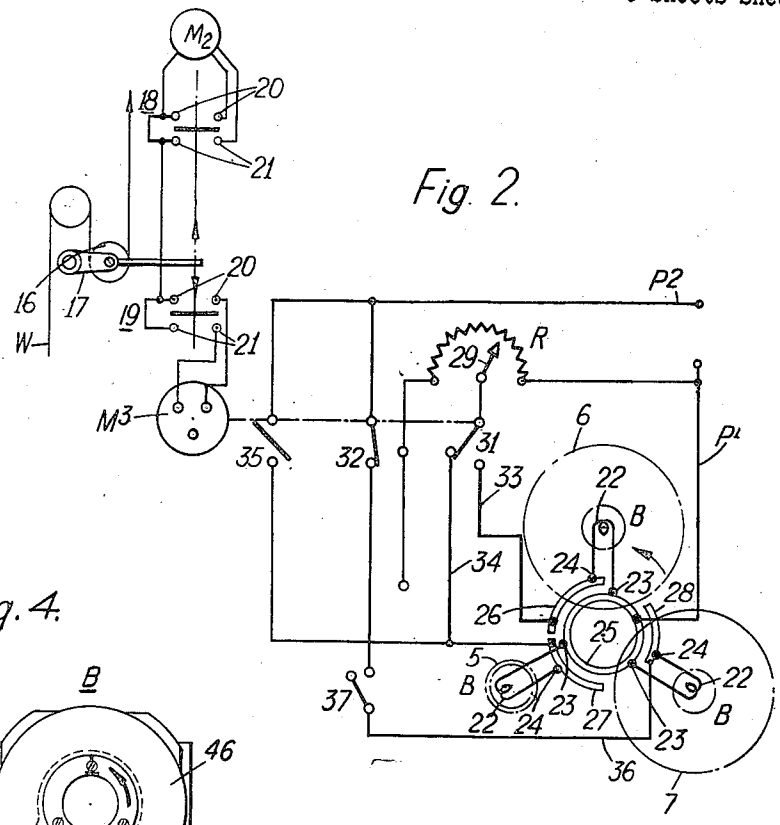

Fig. 4.

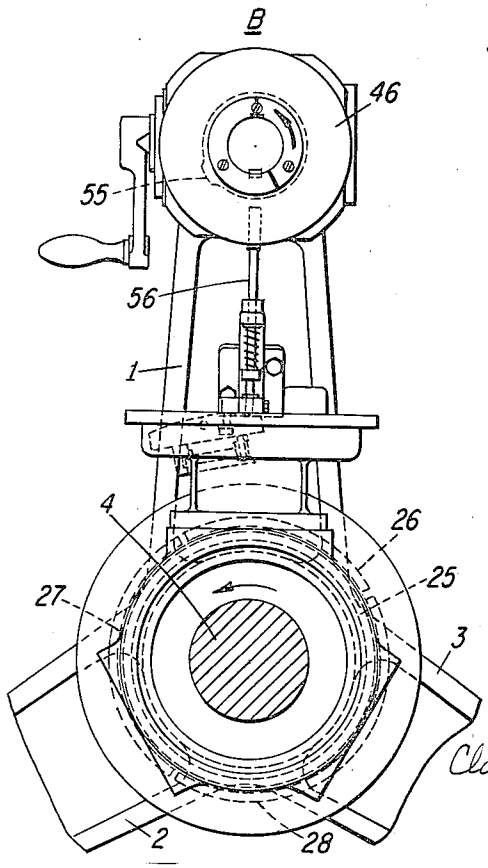

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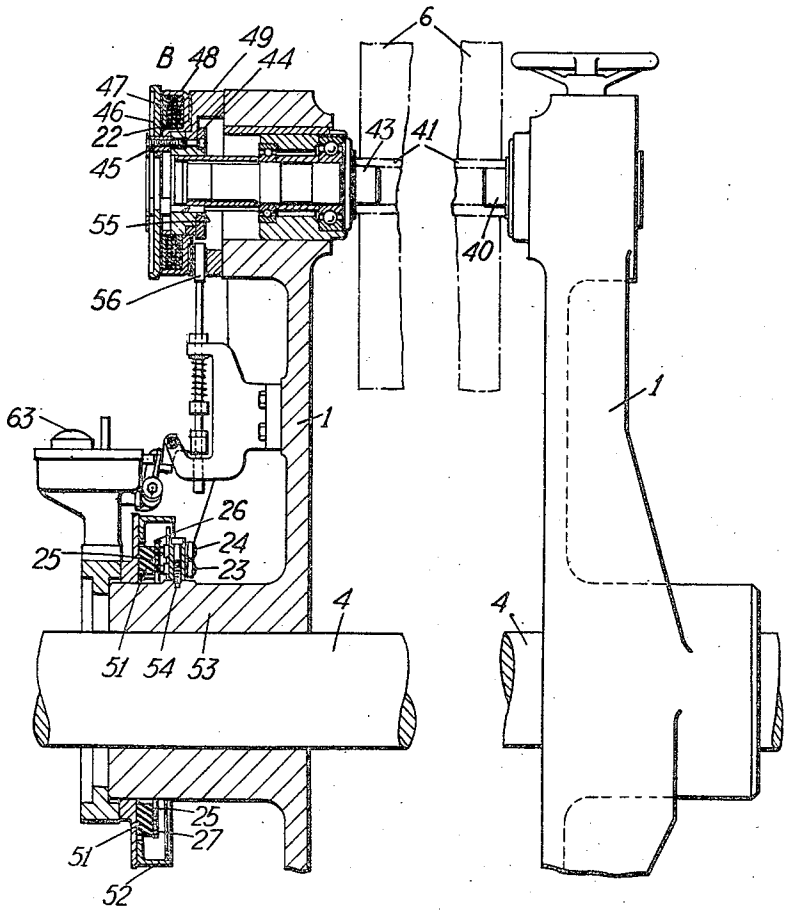
Fig. 3.



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WEB SUPPLY MECHANISM

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3 Claims. (Cl. 242—58)

This invention relates to web supply mechanism for printing and other web consuming machines. The invention is more particularly concerned with such mechanism in which the running web supply is drawn from a running roll on a support which supports at least one other roll forming a replacement roll which can be speeded up to enable its web to be joined, while the web consuming machine is running, to the running web which is then severed.

It is usual for the support to be moved to bring the two rolls into the proper relationship to enable the running web and the periphery of the replacement roll to assume the position in which they can be pressed against one another to be joined. It is common to control the tension in the running web by what can be termed a "peripheral" brake to engage the periphery of the running roll: when however the support is moved to effect a web renewing operation, the running roll passes out of control of the peripheral brake: it is therefore usual to provide another brake to maintain at this time the tension in the running web through its core or centre by what may be termed a "core" brake.

It is the main object of this invention to provide such improvements in this class of mechanism as will result in improved operating conditions and simplification in construction.

The invention consists in providing an electromagnetically operated brake at each roll position and in providing circuit control means for the brakes by which the tension control can be transferred from the peripheral brake to the electromagnetically operated brake to enable the various requirements which are involved in effecting a web renewing operation, to be met in a simple fashion.

The invention is illustrated in the accompanying drawings; in these drawings:

Figure 1 is an end elevation of a web supply mechanism;

Figure 2 is a diagrammatic view showing an electrical control mechanism for electromagnetically operated brakes;

Figure 3 is a sectional side elevation;

Figure 4 is an end elevation showing the arrangement of the electromagnetically operated brakes.

Referring to the drawings, the mechanism comprises a rotatable support consisting of spaced spiders each having arms 1, 2, 3 carried by a spindle 4 which can be turned by a motor M^1 (Fig. 1). The arms carry three rolls 5, 6, 7 which, by turning the support, can be brought successively into a normal running position corresponding to that occupied by the roll 6 as shown. In the setting of the parts shown in Figure 1, the running web W is passing from the roll 5, the support having already been turned to carry the roll 5 from the normal running position (now occupied by the roll 6) to the web-renewing position in which the web W passes in a position adjacent the periphery of the roll 6 so that the web and the

roll 6 are positioned for the renewing operation. The roll 7 is a freshly loaded roll which will in its turn be moved into running and renewing position.

The roll 5 when in its running position is engaged at its periphery by endless belts 8 passing over pulleys 9, 10, 11 of which the pulley 11 is carried by a frame 12 which can swing about the axis of the pulley 10 while the pulley 9 is driven by the printing machine and normally exercise a small drag on the running roll to tension its web. The belts are controlled as to the degree of wrap about the roll to maintain a sensible constant tension in the web W. The belt frame 12 and therefore the belts 8 can swing so as to follow the decrease in the diameter of the running roll 5, when in normal running position.

The apparatus also has a mechanism to prepare the parts for the renewing operation, i.e. to raise the belt frame 12, to turn the arms 1, 2, 3 to bring the at present stationary replacement roll 6 (already prepared with adhesive at its periphery) into a renewing position below the raised belts 8, to lower the belt frame to cause the belts 8 to engage and speed up the replacement roll 6 to a peripheral speed equal to the speed of the web W still running from the running roll 5 which has now been moved from its normal running position to the renewing position shown in Figure 1. A renewing assembly is provided comprising a brush 13 to deflect the running web W against the periphery of the replacement roll 6 and a knife 14 to sever the running web W, the brush and knife being carried by a swinging arm assembly 15. The mechanism so far referred to is well known so that further description is believed to be unnecessary.

When the belts 8 are raised clear of the running roll 5 to enable the rolls to be moved in readiness for a web renewing operation, the belts are no longer able to exercise control in the tension in the running web W. This invention provides a simple and easily controlled mechanism to enable tension control to be transferred to the core of the roll at a time when the belts 8, are raised.

This is effected by providing on the support at each of the roll positions on it an electromagnetically controlled friction brake indicated generally at B the coil or winding of which is controlled by a floating roller 16 which runs in a loop in the web W: this floating roller 16 also controls in any known manner the movement of the frame 12 for applying the web-tension control through the belts 8 when the running roll is in its normal position. The floating roller 16 is carried by an arm 17 to operate two switches 18, 19 (see Figure 2) having in a known manner spaced pairs of contacts 20, 21. If the tension in the web increases, the switches are operated to close one of the pairs of contacts of each switch, and if the tension decreases, the switches are operated to close the other pair of contacts, the gap between the pairs of contacts being sufficient to enable the web tension to fluctuate to a small extent without varying the brake action applied to the roll.

The switch 18 is in the control circuit of an electric motor M^2 to control the belt frame 12. Now for the purpose of this invention the switch 19 is in the control circuit of the windings of the magnets controlling the core brakes B. It is necessary that the rolls shall not be subjected to the braking action of the belts 8 and of the brake B at the same time: it is very desirable that at all times the braking action on the rolls while they are active shall depend on the actual requirements of the web and not on a preset braking action: it is also necessary that the running roll shall be subjected to the control of the core brake B throughout its movement from the normal running position (occupied by the roll 6 as shown) to the renewing and expiring position (occupied by the roller 5 as shown): it is desirable too that when

the web supply has been transferred from the expiring roll 5 to the replacement roll 6, the core brake B for the roll 5 shall be fully applied when the knife 14 has cut the web passing from that roll so as thereby to bring the roll 5 quickly to a standstill to prevent the remaining paper from becoming unravelled: it is further required that when the web feed has been transferred to the replacement roll (the roll as shown at 6), the tension control on that roll shall be applied by the belts 8.

The use of electromagnetically operated brakes enables these various requirements to be satisfied in a very simple manner avoiding such complication which would arise if mechanically operated brakes were used.

Thus, referring mainly to Figure 2, each electromagnet for operating the core brakes B comprises energising coils 22 the supply lines of which are connected to brushes 23, on the support engaging a slip ring 25 and to brushes 24 on the support and which are serially engageable with slip ring segments 26, 27 and 28. One slip ring 25 is continuous and is connected to one side P^1 of a direct current power supply and the slip ring segments 26, 27 and 28 are separated angularly and are variously connected to the other side P^2 of the power supply to enable the different requirements to be met.

The energisation of the electromagnets is controlled by a rheostat R the wiper 29 of which is connected to a motor M^3 itself controlled by the drop roller switch 19: this rheostat is normally inactive but when a renewing operation is to be carried out, it is connected across the power supply lines P^1, P^2 by a switch 32, which can, in the usual way, be operated by an operator or automatically by a response to the reduction in the diameter of the running roll. At this time the motor M^2 is energised by operation of the switch 18 concomitantly with operation of the switch 19 to raise the belts 8 clear of the roll in running position and a switch 31 is operated automatically by this movement to connect the segment 26 to the wiper 29 of the rheostat: the tension control of the web W is now exercised by the drop roller 16 operating through the motor M^3 to control the wiper 29 of the rheostat R and thence via the appropriate segment 26, the energisation of the winding 22 of the core brake B of the roll in running position; this control continues so long as the relevant brush 24 is in engagement with the segment 26.

When now the roll support is turned to move the running roll from the normal running position to the renewing position, the brush 24 connected to the winding 22 of the renewal roll (i.e. the roll 6 as shown) must pass on to the segment 26 so as itself to be controlled later by its friction core brake B. It is however necessary at this time for the renewal roll 6 to be free so that it can be rotated from rest by the belts 8 when they are lowered again into position. It is therefore necessary to disconnect the segment 26 from the power supply: at the same time it is still necessary to maintain the core brake B on the roll 5 which is still the running roll although it is now moving to the replacement position shown by the roll 5.

To achieve these results, the switch 31 is changed over by the movement of the roll support from the line 33 to connect the segment 26 to a line 34 to connect the segment 27 which is now engaged by the brush 24 of the winding 22 of the core brake of the running roll 5. The tension control exerted by the core brake B is thus maintained on the running roll while it is moving to and is in the renewing position.

In the renewing operation, the brush and knife assembly 15 move down to the position shown in Figure 1. So far as the present invention is concerned, this operation can be effected either by the operator or automatically in any of the ways at present in use. At the conclusion of the operation when the knife 14 has cut the web passing from the expired roll, the assembly is moved up to an inoperative position: the line 34 connected to the segment 27 is transferred from the rheostat wiper 29 direct to the line P^2 by a switch 35 so that the appropriate core brake B is fully applied by the energisation of its actuating winding 22 to hold the now expired roll from spinning.

The segment 28 is arranged to be engaged by the brushes 24 of the various roll positions as they successively pass to the loading position occupied by the roll 7 as seen in Figure 1. This segment is connected via a line 36 to the supply line P^2 so that under control of a switch 37 the windings 22 for the electromagnets operating the various core brakes B can be applied and released as found necessary by the operator.

It will be clear now the use of electromagnetically operated core brakes enables the various requirements to be met in a simple fashion: the arrangement moreover enables the transition of tension control from the belts 8 to the core brakes B to be effected without shock to the web.

As a matter of construction reference will be made to Figures 3 and 4 which show the mechanical arrangement of the support. One of the spiders has, at each roll position, a rotatable bung 40 to enter one end of the core 41 of a roll: the other spider has at each roll position a corresponding bung 43 to enter the core at the other end and this bung is fast with a ring 44 carrying studs 45 on which is slidably mounted a ferrous disc 46. The face of this disc rotates over a friction pad 47 in an annular cup 48 which is fast with a ring 49 secured to the spider the disc 46 and the pad 47 constituting the friction core brake B. Housed in the cup are the coils 22 which are connected to the brushes 23, 24 so that when, as has been described, power is applied across the brushes, the coils 22 are energised and by magnetic action draw the disc 46 against the pad 47: this sets up a friction braking action on the disc 46, the bung 43 and hence on the core 41 of the related roll 42.

In these Figures 3 and 4 is also shown the manner of arranging the slip ring 25 and the segments 26—28. These are required to be stationary and coaxial with the shaft 4 carrying the spiders: as shown the slip ring and segments are respectively in the form of a ring and part-rings carried by an insulating ring 51 within a cage 52, disposed about a hub 53 of one of the spiders and the brushes 23, 24 of each roll position are carried by a plate 54 secured to that hub.

The rolls are prepared (usually in their loading position) for the renewing operation by applying adhesive to their peripheries, the running web W when pressed by the brush 13 against the roll adhering by the adhesive to the end of the web of the new roll and so drawing it away. Provision is usually made to ensure that the web W shall bear against the periphery of the new roll as long as possible before the adhesive passes to the web W, and for this reason, the release of the brush 13 is controlled by a timing device which in the present case is constituted by a cam 55 (Figures 3 and 4) fast with each of the bungs 43, the cam operating on a timing rod 56 to control in any usual way the release of the brush 13.

I claim:

1. A web supply mechanism comprising a support to carry a running web roll and a replacement web roll, the support being movable to move the running roll from normal running position to a replacement position and the replacement roll to renewing and running position, a first web tensioning means to act peripherally on the roll in running position and comprising an endless belt driven to control the tension in the web from the running roll and to speed up the replacement roll, means to actuate the said first tensioning means, a second web tensioning means to operate through the centres of the rolls, electromagnetic means to operate said second tensioning means, means to respond to change in tension in the web passing from the mechanism, and means com-

prising an electrical circuit control to transfer automatically the responsive means from the means to actuate the first tensioning means to the electromagnetic means to render the electromagnetic means for the running roll active in running and replacement positions and to render the electromagnetic means for the replacement roll inactive in the running position while the replacement roll is speeded up.

2. Mechanism as claimed in claim 1 and wherein the electrical circuit control is arranged to operate fully the electromagnetic means for the running roll independently of the responsive means when the renewing operation has been completed.

3. Mechanism as claimed in claim 2 in which said circuit control includes slip ring connections between the

support and the electromagnetic means for each roll position.

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