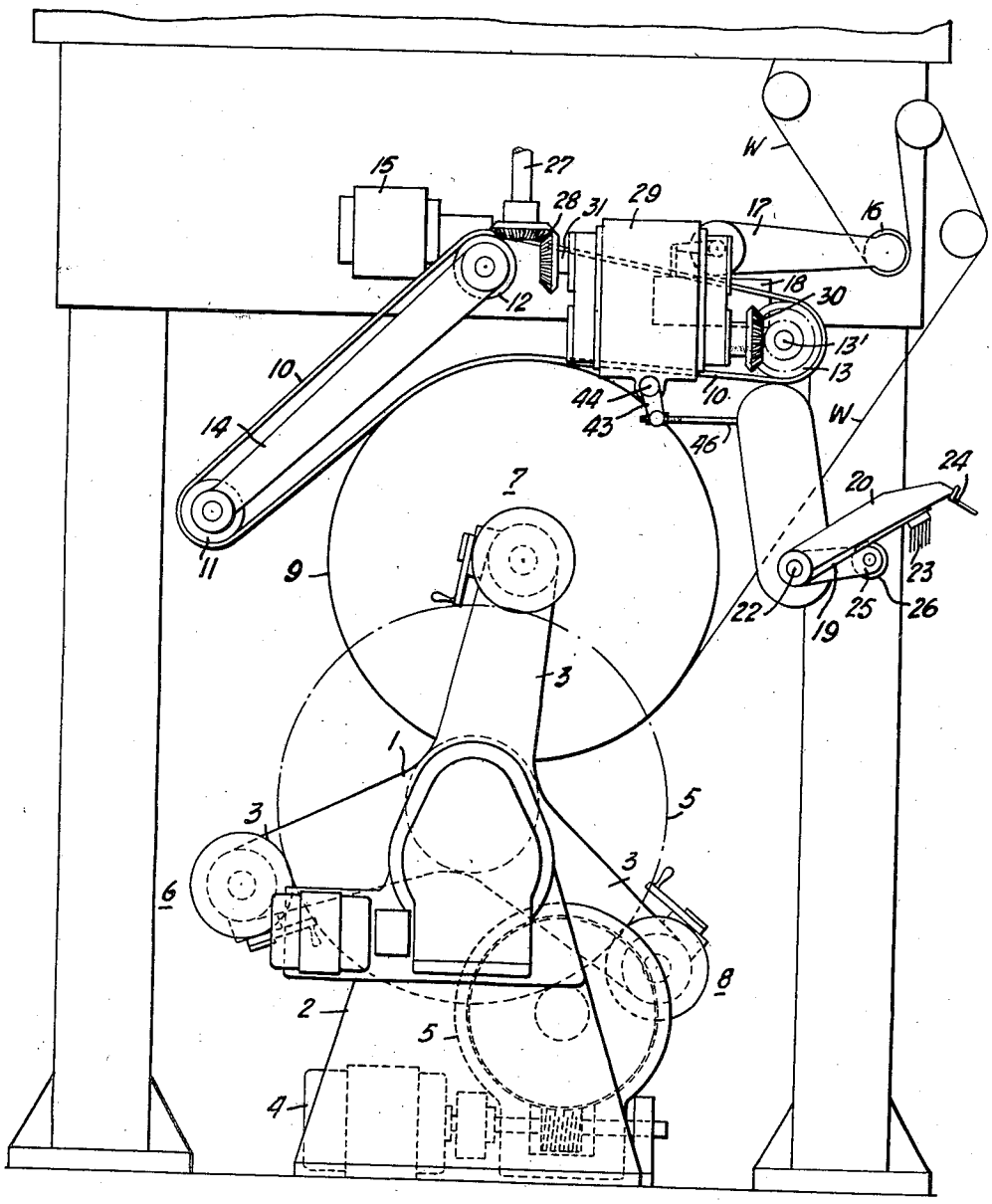
Dec. 9, 1952 T. R. BENNETT 2,620,994

WEB-RENEWING MECHANISM FOR PRINTING AND OTHER MACHINES

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FIG. 1.



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FIG. 2.

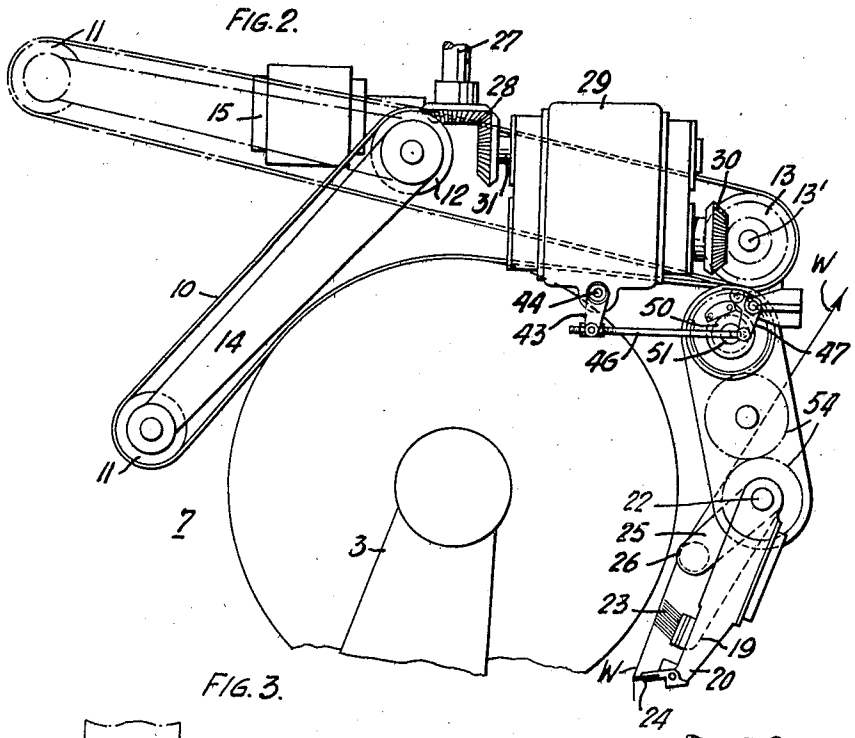
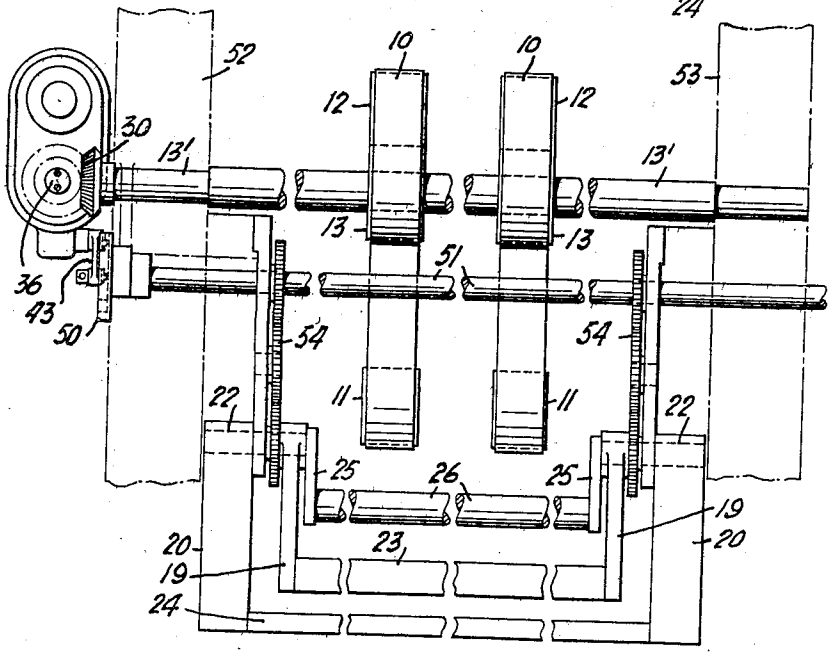


FIG. 3.



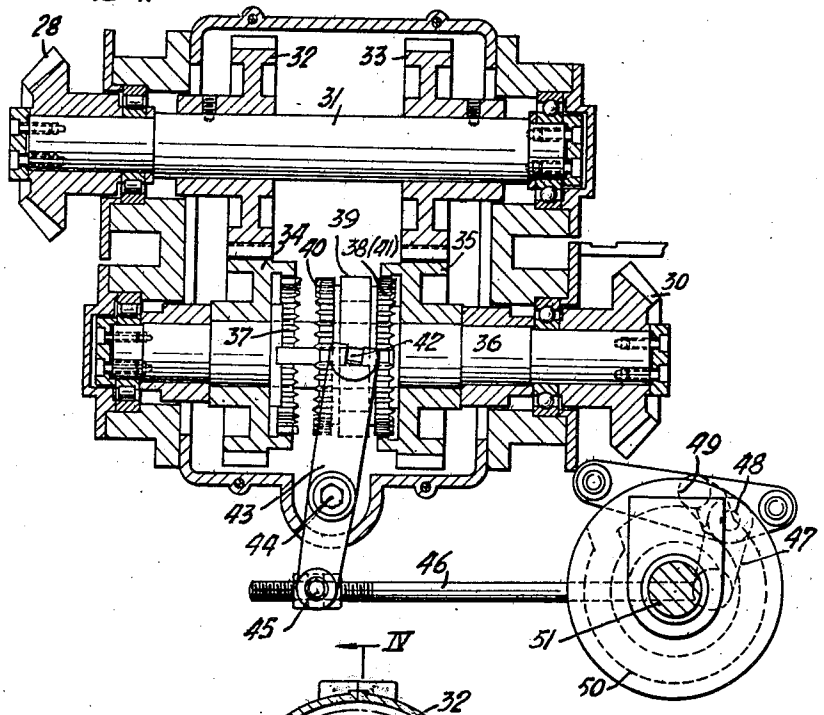
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FIG. 4.



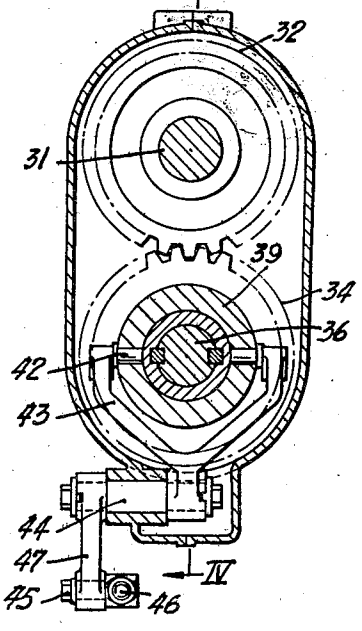


FIG. 5.

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Patented Dec. 9, 1952

2,620,994

UNITED STATES PATENT OFFICE

2,620,994

WEB-RENEWING MECHANISM FOR PRINTING AND OTHER MACHINES

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Application May 9, 1950, Serial No. 160,997
In Great Britain May 17, 1949

2 Claims. (Cl. 242—58)

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This invention relates to mechanism for effecting the renewal of the web supply to printing and other web-using machines. The invention is concerned with the kind of mechanism in which the web is drawn from web-rolls and in which web renewal is effected by accelerating from rest a replacement web roll to the periphery of which an adhesive has been applied and by causing engagement between the web passing from the roll in use (i. e. the running roll) and the rotating replacement roll.

In this kind of mechanism, it is known to control the tension of the web passing from the running roll by a belt (or belts) which are driven from the machine to which the web is being fed at a speed slightly below the speed at which the web is drawn on by the machine; this latter belt engages the periphery of the running roll and variation in web tension is effected by varying the extent to which the belt is wrapped about the roll periphery. It is also known to accelerate the replacement roll by a driven belt (or belts) which are moved to engage the roll periphery at the time the roll is to be accelerated.

The present invention is concerned with accelerating and web-tension arrangements as referred to, but according to this invention one and the same belt is employed for effecting the acceleration of the replacement roll and for the control of the web tension of the roll when it becomes the running roll; to enable this to be effected, the belt is driven through a speed selector which enables the belt to be driven selectively at a speed to effect acceleration of a roll to the running web speed or at a speed to effect control of web tension.

The invention can be applied to any of the various arrangements now in use to effect engagement between the running web and the rotating replacement roll: the arrangement could be such that the selector gear of this invention is automatically actuated to render the low speed drive operative when the web-renewal has just been effected.

The invention is illustrated in the accompanying drawings in which Figure 1 is a side elevation of a web-supply mechanism incorporating the invention, Figures 2 and 3 detail views to a larger scale of the mechanism of the invention, Figure 2 being a side elevation and Figure 3 an end elevation, and Figures 4 and 5 detail views to a still larger scale of a selector gear which can be used for the purpose of the invention, Figure 4 being a longitudinal sectional elevation on the line IV—IV Figure 5 and Figure 5 being a transverse section.

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Referring firstly to Figure 1 this figure illustrates the kind of web supply mechanism to which the invention is applicable: this mechanism comprises a support 1 which is rotatable in a stand 2 and which has a series of arms 3 (three as shown) each arranged to support a web roll. The support 1 is arranged to be turned by a motor 4 operating through gearing 5, this movement bringing the various roll positions successively into the loading positions 6, the running position 7 and the replacement or expiring position 8.

The roll 9 in the running position 7 is engaged by endless belts 10 which pass over pulleys 11, 12 and 13 the belts being driven by the web-consuming machine at a speed slightly below the speed at which the web W is drawn on by the machine from the roll 9. This operates to impose a degree of tension in the web W: this tension is regulated by varying the amount which the belts 10 are wrapped about the roll 9: this is achieved by mounting the pulley 11 on arms 14 which can swing about the axis of the roller 12 and by controlling the position of the arms 14 by an electric motor 15 which is itself controlled by a roller 16 which moves in response to change in the tension in the web W which is passed over that roller.

In the particular arrangement shown, the roller 16 is carried by an arm 17 which is free to rock to allow the roller 16 to move in response to change in the web tension from a predetermined value; this change in the position of the roller 16 and hence the arm 17 is caused to operate through an electrical control gear for the motor 15, this control gear being housed in a casing 18. This web tension control apparatus can conveniently be made as described in the co-pending application Serial No. 148,304 filed March 8, 1950.

When the roll 9 in the running position 7 is nearing exhaustion, the motor 4 is energised to move the support 1 to carry the roll 9 from the running position 7 to a renewing (or expiring) position 8: this action brings a roll newly loaded into the support at the position 6 into the running position: the web from the roll 9 now in the expiring position 8 still passes to the machine but it now passes adjacent a web deflecting and severing device: this device as shown comprises arms 19, 20 which are pivoted about the centre of a spindle 22 so that they can be swung from the out of use position shown in Figure 1 to the operative position shown in Figure 2. The arms 19 carry a deflecting brush 23 and the arms 20

carry a sheath 24 for a severing knife. Further arms 25 are associated with the arms 19, 20 to swing with them and these arms carry a bar 26 to engage the web W as it passes from the roll in expiring position 8.

When the roll in expiring position 8 is about to expire the arm 20 is released to cause the web W to be deflected against the periphery of the replacement roll in the position 7; this roll has had an adhesive applied to the end of its web and it has also been caused to rotate at a speed corresponding to the speed at which the web W is being drawn on by the machine. Thus the expiring web W pressed against the replacement roll is caused to adhere to the web of the replacement roll and the replacement web and the web W pass on together: the knife in the sheath 24 is next released and the web W severed so that the web supply is now drawn from the replacement roll in the running position 7.

The mechanism so far referred to is now well known and it is therefore believed to be unnecessary to give further description for that already given is sufficient for an understanding of the present invention.

As has been stated, it is required that the replacement roll shall be speeded up from rest to the speed at which the web W is running to the web-consuming machine: it is also required that belts 10 shall be used to control the tension of the web as it is drawn from the running roll, these belts being for this purpose driven at slightly below web speed to impose the necessary tension.

The main purpose of this invention is to utilize the one set of belts 10 for the dual purpose of speeding up the replacement roll in readiness for the web-renewing operation and for controlling the tension of the web passing from that roll after the renewing operation has been effected.

Broadly speaking this is achieved by driving the belts 10 at the two different speeds for the two different requirements, the belts for this purpose being driven through a speed-selector device or variable speed drive.

Referring more particularly to Figures 2–5, the belt pulley 13 is arranged to be driven and this drive is effected by a shaft 27 which extends for drive connection to some convenient part of the web consuming machine: this shaft 27 transmits drive through bevel gears 28 to a variable speed drive 29 having two gear ratios and the output from this device is taken through bevel gears 30 to the spindle 13' on which is mounted the pulley 13.

The variable speed drive 29 comprises a primary shaft 31 fast with one of the driving bevel gears 28, this shaft having secured to it two gear wheels 32, 33: these gear wheels are in constant mesh with gear wheels 34, 35 respectively which are loose on a secondary shaft 36 secured to one of the bevel gears 30: the opposed faces of the loose gears 34, 35 are formed with dog-clutch teeth 37, 38. Slidable between the gears 34, 35 but non-rotatable on the secondary shaft 36 is a dog clutch 39 having at its opposite end faces clutch teeth 40, 41 to engage respectively the teeth 37, 38: this dog clutch has a pin 42 engaged by a shifting fork 43 pivoted at 44, the manipulation of this fork serving to connect either the gear 34 or the gear 35 to the secondary shaft 36. The ratio of the two sets of gears 32, 34 and 33, 35 are different from one another and are such as respectively to drive the shaft 36 and hence the pulley 10 at two different speeds one speed being that requisite to speed-up the replacement roll and the other to impose tension on the web passing from that roll when it becomes the receiving roll.

The dog clutch is of the type employing a large number of dogs or teeth 37, 38, 40, 41 to facilitate its engagement with a minimum of shock: these teeth are also as shown of V form to minimize any tendency for the teeth to become opposed edge to edge. It may be desirable to interpose in the drive from the clutch to the belt pulley 10 a synchronous gear arrangement or a heavy torsion spring which will assist in absorbing any shock which may arise with the purpose of preventing disturbance at the time of change in the web passing from the roll.

The operation of the shifting fork 43 can be arranged to depend on the completion of the web-renewing operation: thus in the kind of renewing mechanism shown in Figure 1, the operation of the fork could be controlled by the renewing movement of the brush arm 19 or of the projection of the severing knife from the sheath 24.

On the other hand it could be controlled by the movement of the renewing assembly comprising the brush and knife arms 19 and 20 from their inoperative to their operative position: such an arrangement is shown in the drawings. As has been stated, the brush and knife arms are normally in their inoperative position as shown in Figure 1: in this normal condition the belts 10 are required for use in controlling the tension of the web in the normal running position 7: when the web supply is about to be transferred from the running roll to the replacement roll loaded in position 6 and moved to position 7, the brush and knife arms are swung down to their operative position in readiness to effect the renewing operation: in this operative position the belts will be required to speed up the replacement roll now in position 7.

To utilize this movement of the arms to operate the shifting fork 43, that fork is connected by a swivel block 45 to an operating rod 46 pivoted at one end to an arm 47. This arm is pivoted at 48 and has a cam roller 49 engaging a cam 50 on a shaft 51: this shaft extends completely across between the side frames 52, 53 of the machine. This shaft is rocked when the brush and knife arms 19, 20 are rocked and then the cam 50 sets the shift fork 43 to a corresponding position and so sets the gear ratio accordingly.

As is shown in Figure 3, the brush and knife arms 19 and 20 and also the arm 25 are actually in the form of U frames: the knife frame 20 and the roller frame 25 are both secured at each end to a shaft 22 in the form of a stub while the brush frame 19 is loose on the stub shafts but is normally latched to the knife frame to move with it. To ensure that the spaced arms of the various frames move together the stub shafts are connected through gears 54 to the cross-shaft 51 which thus acts not only to transmit drive from the frames to the cam 50 but also to tie the arms of the frames together.

I claim:

1. For renewing the web supply to a web-consuming machine, apparatus comprising a rotatable web roll support to carry a number of web rolls, means to move the support to carry the rolls successively into renewal position, an endless belt to engage the periphery of a roll in that position, renewing means to cause the periphery of a roll in the replacement position to be en-

gaged by the web passing from an active roll on the support, the renewing means being bodily movable into and out of operative position, means to transmit drive from the web consuming machine to the belt, the said transmitting means comprising two sets of constantly meshing gears having different ratios, a clutch device selectively to couple the gears to the belt and means connecting the clutch to the renewing means to set the clutch in dependence on the bodily movement of the renewing means into and out of operative position.

2. In a web renewing mechanism comprising a rotatable support for a plurality of web rolls, one of the rolls being an active roll and another a replacement roll, a belt to engage the periphery of the replacement roll, means bodily movable to and from operative position to effect web renewal by causing engagement between the web passing from the active roll and the surface of the replacement roll, a gear change device operable to drive the belt selectively at two different speeds, one speed suitable to speed up the replacement roll from rest to a speed approximating the speed of the web passing from the active roll,

preparatory to web renewal, and the other, a slower speed to impose a drag on the web when it is being drawn from the replacement roll, a mechanical connection between the gear change device and the said bodily movable means, for controlling the said device, to drive the belt at the first mentioned speed when the bodily movable means is in web renewing position, and alternatively to drive the belt at the lower speed when the bodily movable means is not in web renewing position.

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