Oct. 29, 1935. H. N. DURHAM 2,018,842

WEB RENEWING MECHANISM

Filed Oct. 21, 1931 4 Sheets-Sheet 1

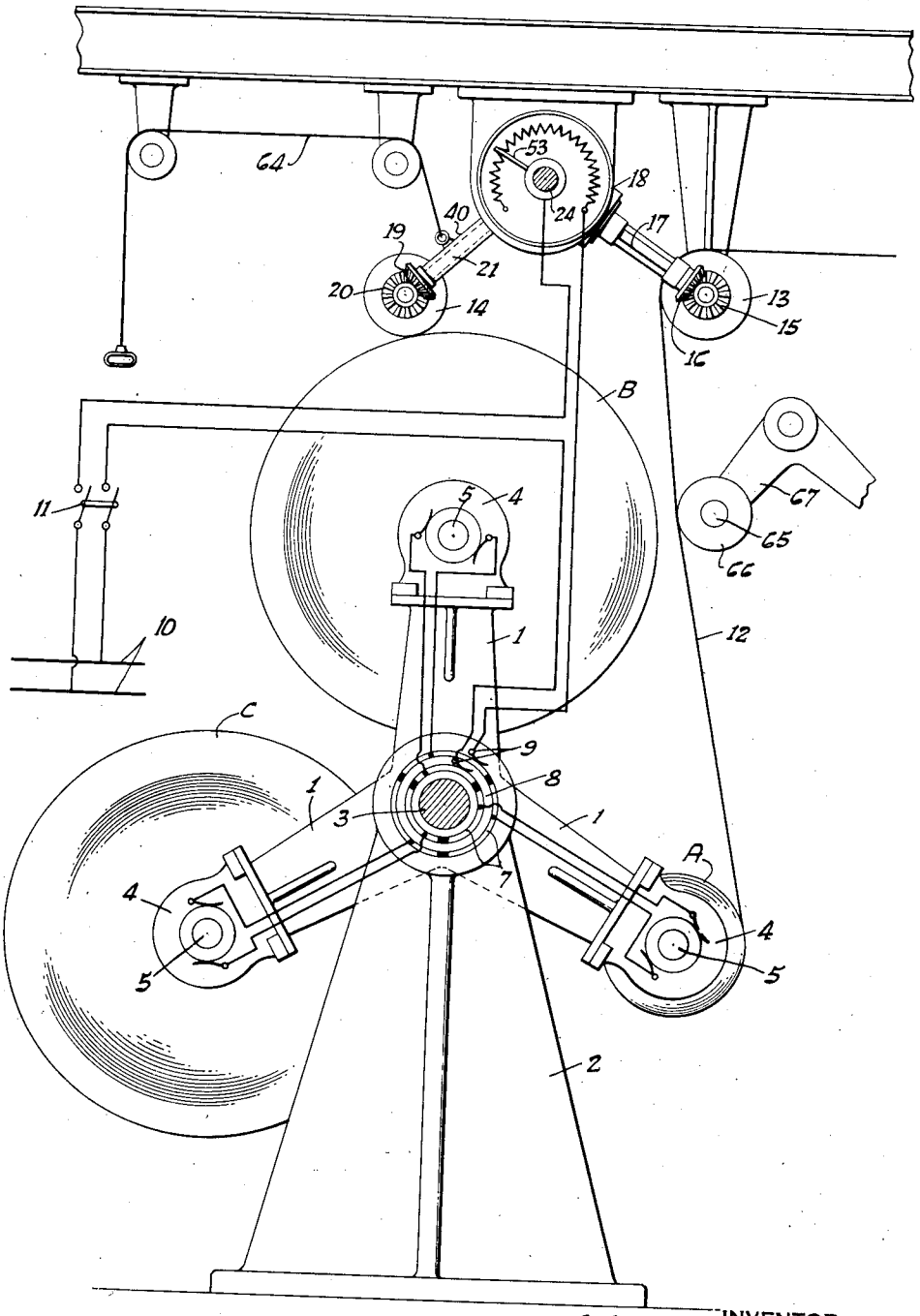



Fig 1

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WEB RENEWING MECHANISM

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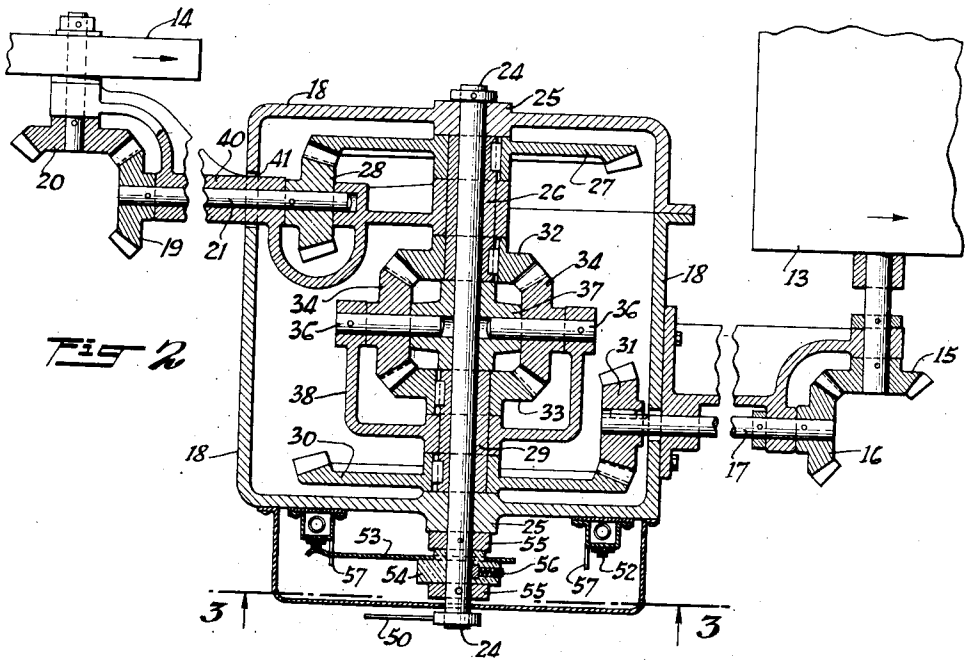



Fig 2

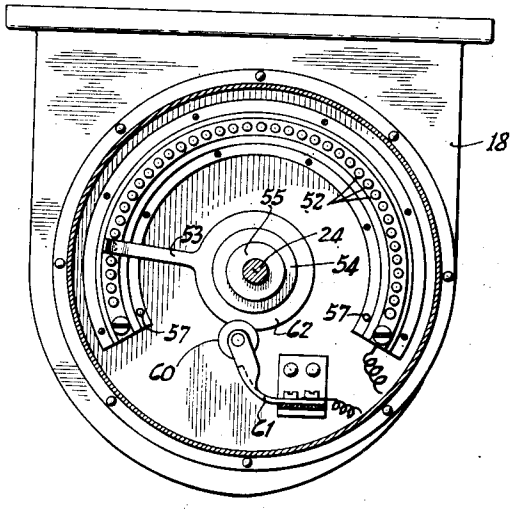



Fig 3

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WEB RENEWING MECHANISM

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Fig 4

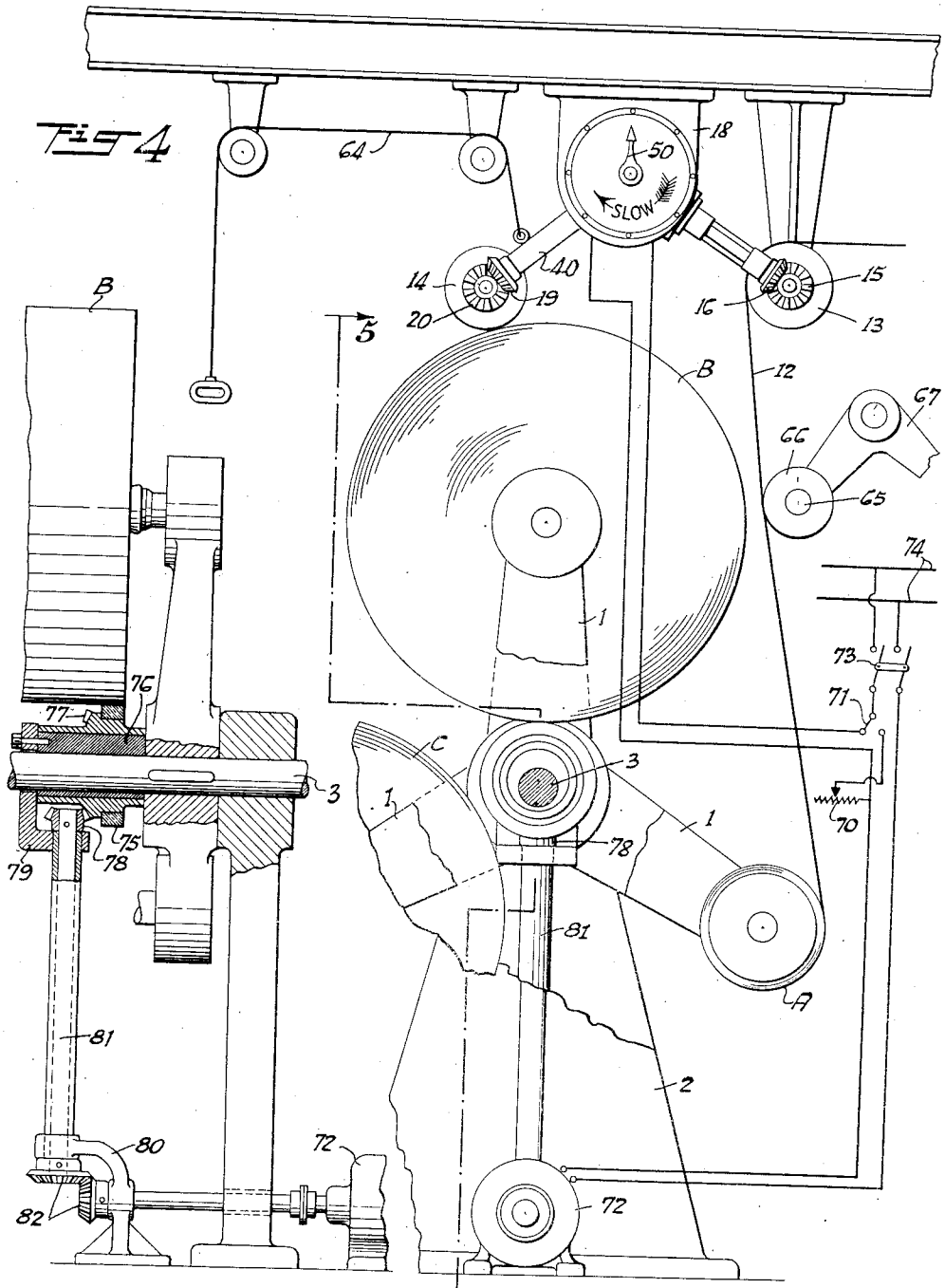



Fig 5

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WEB RENEWING MECHANISM

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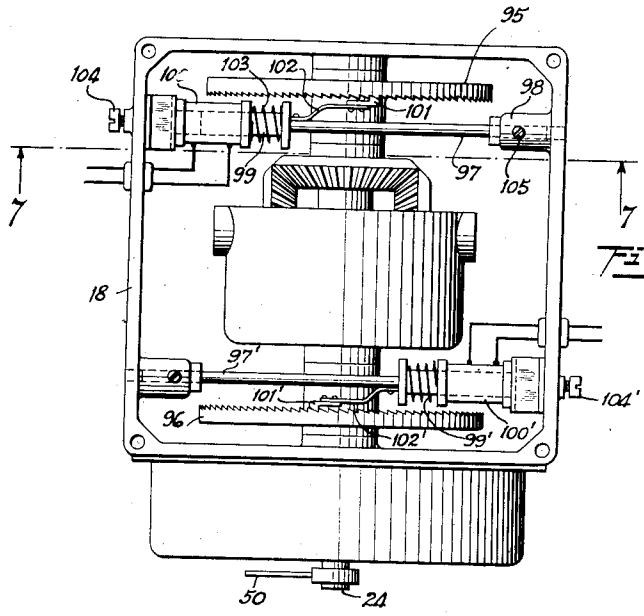



Fig 6

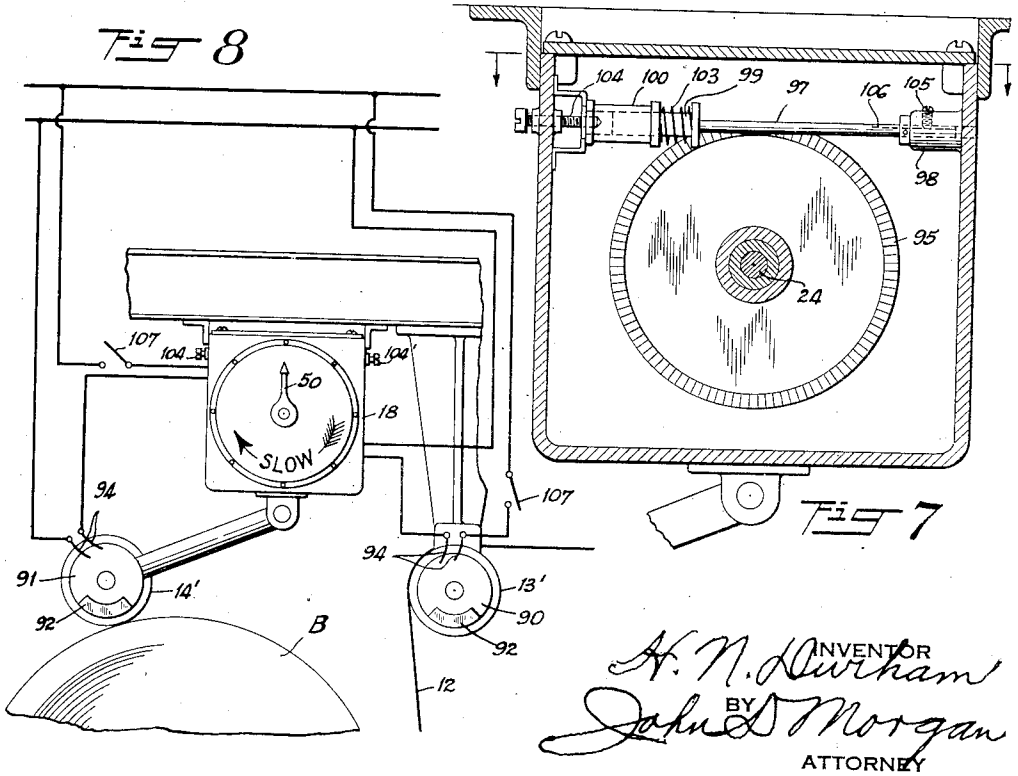



Fig 8

Fig 7

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# UNITED STATES PATENT OFFICE

2,018,842

## WEB RENEWING MECHANISM

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Application October 21, 1931, Serial No. 570,086

26 Claims. (Cl. 242—58)

The present invention relates to web renewing mechanism and more particularly to a novel and improved mechanism for making flying pasters.

Objects and advantages of the invention will be set forth in part hereinafter and in part will be obvious herefrom, or may be learned by practice with the invention, the same being realized and attained by means of the instrumentalities and combinations pointed out in the appended claims.

The invention consists in the novel parts, constructions, arrangements, combinations and improvements herein shown and described.

The accompanying drawings, referred to herein and constituting a part hereof, illustrate embodiments of the invention, and together with the description, serve to explain the principles of the invention.

Of the drawings:—

Figure 1 is a diagrammatic side elevation of the present preferred and illustrative embodiment of the invention.

Figure 2 is a detailed horizontal section showing the synchronizing mechanism employed in connection with the present invention and forming a part thereof.

Figure 3 is a vertical section taken on the line 3—3 of Figure 2.

Figure 4 is a diagrammatic side elevation of a modified embodiment of the present invention.

Figure 5 is a fragmentary detailed vertical section taken on the line 5—5 of Figure 4.

Figure 6 is a plan view of the synchronizing mechanism in accordance with a further modification of the invention, the cover being removed;

Figure 7 is a vertical section taken on the line 7—7 of Fig. 6; and

Figure 8 is a diagrammatic side elevation of the mechanism shown in Figures 6 and 7.

The present invention has for its object the provision of a novel and improved web renewing mechanism particularly adapted for making a flying paster as the web of paper supplied to a newspaper printing press is running at a high speed. Another object is the provision of a means for accurately and exactly synchronizing the rotational movement of a reserve web roll with the running web as it is fed to the printing press. Another object is the provision of automatic synchronizing mechanism whereby the running web roll and reserve web roll are brought to the same peripheral speed and are maintained in synchronism until the paster is made.

A further object is the provision of a synchronizing mechanism for the purpose described which will guide an operator in bringing the reserve web roll up to the speed of the running web. Another object is the provision of driving means for the reserve web roll controlled by the relative peripheral speed of the web rolls. Still another object is the provision of a novel and improved reserve web roll driving means.

In accordance with the present invention, motor means are provided for initiating the rotation of a reserve web roll and bringing it up to the same peripheral speed as the running web roll so that when the reserve web is joined to the running web no undue strain will be placed on either web and faulty pasters will be eliminated. Means are also provided for controlling the speed of the reserve web roll driving means so that substantially exact synchronism can be attained with the running web, the controlling means being operated by the relative speed of the web rolls. Means may also be provided for permitting the operator to control the speed of the reserve web roll in accordance with an indication on the relative speed of the web roll, and other means are provided for automatically connecting the reserve web roll driving means with the reserve web roll as it is moved into pasting position.

It will be understood that the foregoing general description and the following detailed description as well are exemplary and explanatory of the invention but are not restricted thereon.

Referring now in detail to the present preferred and illustrative embodiment of the invention, as illustrated in Figures 1, 2 and 3 of the accompanying drawings the web roll supporting means comprises a conventional form of magazine reel in which the running web roll and reserve web roll or rolls are rotatably supported and by which successive web rolls may be brought into pasting, and then running, position. As embodied, a pair of multi-armed web roll supporting members 1 are spaced apart to receive the rotatable web rolls A, B and C between them, and the supporting members 1 are rotatably mounted on side frames 2 by means of shaft 3. The details of this mechanism, including the web tensioning devices, side registering devices and reel arm rotating mechanism are not shown as they form no part of the present invention.

As shown, web roll A is the running roll and is in running position; web roll B is a reserve web roll in pasting position; and web roll C is a spare roll which will be successively moved into pasting, and then running, position by clockwise (Figure 1) rotation of the web roll supporting arms.

Means are provided for bringing the reserve

web roll up to the speed of the running web so that its peripheral speed will be the same as that of the running web roll A. As embodied, small electric motors 4 are mounted on the ends of the web roll shafts or chuck spindles 5, and are directly coupled thereto so that the motor drives the reserve web roll, gradually accelerating the web roll until it reaches the necessary speed. These motors are preferably small series motors which are susceptible of being overloaded to a considerable extent and will finally attain a speed considerably in excess of that required for synchronism of the running and reserve rolls.

Means are provided for connecting the motor for the reserve web roll B with a source of power, and the motor leads are permanently connected with concentric rings 7 mounted on an insulating base 8 which is movable with the reel shaft 3, each ring being divided into a plurality of segments, one for each web roll. Suitable brushes 9 are provided to contact with the segments of the rings 7 corresponding to the reserve web roll, and as each new roll is brought into pasting position, the corresponding segments of the rings are automatically connected with the brushes to supply the motor with current, from mains 10 through manual switch 11.

In accordance with the present invention, synchronizing means are provided for controlling the rotation of the reserve web roll by the relative peripheral speed of the web rolls and finally maintaining it in rotation at the same peripheral speed as the running web roll A. As embodied, the running web 12, which is being led to the printing press or other web consuming machine, is passed over a guide roller 13 and rotates this roller. A second roller or disc 14 is provided and may be moved into contact with the periphery of the reserve web roll B in pasting position to be driven thereby. At one end roller 13 is provided with a bevel gear 15 meshing with bevel gear 16 mounted on a shaft 17 projecting from the housing 18 and drives one side of the differential gearing. Roller 14 also carries a bevel gear 20 meshing with a bevel gear 19 on shaft 21 and drives the other side of the differential in a reverse direction.

The differential gearing comprises a shaft 24 rotatably journalled in end bearings 25, carried by the housing 18, and near one end carries a loose sleeve 26 to which is fixed a bevel gear 27 driven from shaft 21 by bevel gear 28. At its other end, shaft 24 carries a similar sleeve 29 to which is fixed a bevel gear 30 driven from shaft 17 by bevel gear 31. Near their inner ends, sleeves 26 and 29 have fixed thereto the differential gears 32 and 33, which mesh with the differential pinions 34. Differential pinions 34 are rotatably and revolubly mounted by means of the stub shafts 36, projecting from the hub 37 fast on shaft 24, and are held in mesh with the differential gears by means of the yoke 38, freely rotatable on sleeve 29. A supporting arm 40 for roller 14 and its driven shaft 21, is mounted on sleeve 26 on which it is loosely journalled, and projects through a circumferential slot 41 in housing 18.

The gear ratio of the various gears employed in the differential gearing and the driving means therefor are such that when the peripheral speeds of the rotating web rolls are equal, or the speed of the running web is the same as that of the surface of the reserve web roll, the differential gears 32 and 33 are driven in reverse directions at equal speeds and the differential pinions 34 rotate idly about their own axes without rotating the main differential shaft 24.

Means are provided for indicating lack of synchronism between the web rolls, and an indicating pointer is provided which is stationary when there is no difference in peripheral speed between the reserve web roll and the running web roll. This pointer rotates in one direction when the reserve web roll B is rotating too slowly and moves in the opposite direction when the reserve web roll is rotating too fast, the speed of movement of the pointer being proportional to the difference in speed between the web rolls. Pointer 50 is fixedly mounted at one end of shaft 24, exteriorly of the differential housing, and moves in accordance with the planetary, but not rotational, movement of the differential pinions. By observing the movements of the pointer, the operator can judge the relative speeds of the web rolls, with a high degree of accuracy and can determine whether they are sufficiently synchronized to make the paster.

Means are also preferably provided for controlling or governing the speed at which the reserve web rolls is driven and for automatically synchronizing it with the running web, and for this purpose an automatically varied rheostat is provided in the motor circuit, with means for varying the resistance automatically in accordance with relative web speeds. As embodied, a rheostat having its resistance taps 52 arranged in circular form is mounted on one end of the differential gearing 18, concentric with the main differential shaft 24, and rheostat contact arm 53 is loosely mounted on the main differential shaft 24 by means of the insulating collar 54 positioned between fixed collars 55. A spring pressed friction member 56 is provided on collar 54 and bears against shaft 24 to provide a friction drive for arm 53 from the shaft.

Means are provided for limiting the movement of the rheostat arm and for this purpose stops 57 are mounted at the ends of the series of rheostat taps 52 and project into the path of arm 53, preventing the arm from being moved beyond the ends of the series. When the pinions 34 are revolving, the rheostat arm 53 is moved until it contacts with one or the other of stops 57, at which time the arm is stopped while shaft 24 continues to rotate due to the friction clutch 56.

One end of the rheostat resistance is connected to one of the brushes 9, while a roller 60 is provided mounted on a resilient arm 61 to contact with a circular conducting portion 62 of the rheostat arm 53, and forms the other rheostat connection.

Means are provided for moving the driven roller 14 out of the path of the web rolls to permit new reserve rolls to be moved into pasting position, and a cord 64 is provided for raising the roller and arm 40 during the rotation of the web supporting arms.

Suitable means are also provided for contacting the running web with the pasted lead end of the reserve web roll, and as embodied, a freely rotatable roller 65, having a relatively thick sponge rubber covering 66 to give it great resiliency, is mounted in pivoted arms 67 and can be moved to deflect the running web 12 from its normal path and press it into contact with the reserve web roll B. After contact of the running web with the reserve roll and completion of the paster, the web from the expiring web roll can be torn at its edge or otherwise manipulated to cause it to tear across its width, and the reel arms 1 are then

rotated to bring the roll B into running position.

The operation of the above described embodiment may be summarized as follows:

With the web rolls in the position shown in Figure 1 of the drawings, the operator closes the main switch 11 at some time prior to the exhaustion of the running web roll A. Roller 14 is lowered into contact with the reserve web roll B, and roller 13 is being driven at web speed by running web 12. Roller 13 is being driven much more rapidly than roller 14, thereby rotating shaft 24 in a clockwise direction (Figures 1 and 3) and cutting out all the resistance in the rheostat. This supplies reserve web roll motor 4 with current at the full voltage and it quickly brings the web roll B to the speed of the running web.

As the peripheral speed of the web roll B becomes greater than that of the running web 12, resistance is gradually cut into the motor circuit, reducing the motor torque until it is just sufficient to overcome the friction of rotating the web roll B. Finally rheostat arm 53 remains stationary at this equilibrium point and motor continues to drive web roll B, keeping it rotating at the same speed as the running web, until the operator opens main switch 11 after completion of the paster.

In case the press is slowed down or web roll B otherwise attains a speed greater than that of the running web, roller 14 will be driven faster than roller 13, and rheostat arm 53 will be moved in a counter-clockwise direction to reduce the motor torque by cutting in additional resistance.

In accordance with a modified embodiment of the invention shown in Figures 4 and 5, an optionally usable variable resistance is placed in the motor circuit and may be used in case of failure of the main rheostat, or in place of the automatically varied rheostat, and a single motor is employed to initiate rotation of the reserve roll and bring it up to the speed of the running web.

In accordance with this modification, the synchronizing means may be identical with that previously described, as may be the web roll supporting means.

The manually variable resistance 70, which may be employed in place of the differential controlled rheostat, is connected in parallel with the differential controlled rheostat 52, 53 and these rheostats are alternatively placed in series in the motor circuit by means of the manually operated double-throw single-pole switch 71. The reserve roll driving motor 72, is connected to the mains 74 through the main switch 73 and manually variable resistance 70, or automatic rheostat 52, 53.

For bringing the reserve web roll up to the speed of the running web and for maintaining that speed until the paster is made, a small roller 75 having a thick soft resilient covering of sponge rubber or other suitable material is provided. Roller 75 is revolubly mounted on eccentric sleeve 76 which is loosely journalled at one end of the shaft 3, the eccentric mounting of the roller being sufficient to normally press the roller surface into firm contact with the under surface of the reserve web roll as the reserve web roll is moved to pasting position. Formed integrally with roller 75 is a bevel gear 77, meshing with bevel pinion 78. At one end, sleeve 76 is provided with a retaining plate and pinion support 79 in which and floor bracket 80 is journalled shaft 81 driven by motor 72 through gearing 82. Shaft 81 in conjunction with plate 79 serves to hold eccentric sleeve 76 against rotation.

In the embodiment shown in Figures 4 and 5, the spindles supporting the exhausted web roll A are moved to permit the removal of the roll 4 immediately after the paster has been made and the exhausted web has been severed from the exhausted roll. When this core has been removed, the empty spindles will clear the sleeve 81, the arms 1 may be rotated to their new position and the new reserve roll may be put in place and supported by the spindles.

In the operation of this embodiment, the operator closes the main switch 73 prior to the expiration of the running web 12 and allows motor 72 to drive the reserve roll B bringing it to the speed of the running web. In case the automatic differential is not employed, the operator cuts out the resistance 70, and allows the reserve web roll to be driven until it comes nearly to the speed of the running web. He then cuts in resistance, gradually varying this resistance until the pointer 56 remains at rest, showing exact synchronism between the running web and reserve roll. The paster roller 65 may then be pressed to contact the running web with the reserve web roll, the old running web is severed, and the roll supporting arms are rotated to bring roll C into pasting position automatically placing it in contact with propeller roller 75.

In accordance with the modification illustrated in Figures 6, 7 and 8 of the drawings, the synchronizing mechanism is actuated by electro-mechanical means under control of the running and reserve web.

As embodied, a roller 13' is driven by the running web 12, while roller 14' is driven by frictional contact with the surface of the reserve web roll B. These rollers are provided at one end with a disc 90, 91, each provided with a conducting portion 92 to contact with and close the gap between their respective brushes 94, thereby closing their respective circuits once each revolution of each roller.

The synchronizing mechanism in this modification is generally similar to that previously described, except that gears 37 and 38 are replaced by ratchet wheels 95 and 96 respectively, which are rotated step by step in accordance with the movement of their respective webs. Closely adjacent to the ratchet wheel 95 is mounted a transversely-extending rod 97, slidable in sleeve 98 and held against rotation by screw 105 projecting into keyway 106. At its other end rod 97 is connected to the armature 99 which cooperates with solenoid 100. Pawl 101 is mounted on rod 97 by means of a spring 102 which presses it into engagement with the teeth of ratchet 95 and spring 103 is provided between the solenoid and armature head for moving the pawl 101 on its idle movement. Means are also provided for varying the length of stroke of the pawl 101, to vary the feed of the ratchet 95 each time the solenoid 100 is energized, and for this purpose a stop is provided comprising a screw 104 extending inwardly into the solenoid and against which the armature 99 is moved.

A similar actuating mechanism is provided for the ratchet 96 and comprises a pawl 101' mounted on slidable rod 97' by means of spring 102', and moved by solenoid 100' against the tension of spring 99', the extent of movement of the pawl being determined by the setting of screw 104'.

Solenoid 100 is energized on closure of the brushes 94 by rotation of roller 14', while solenoid 100' is similarly energized on rotation of roller 13'. When the reserve web and running web are

travelling at the same speed, the ratchet wheels 95 and 96 will be driven in opposite directions at equal speeds and shaft 24, as well as the indicator 50 and rheostat arm 53 driven thereby, will remain stationary. When the webs are not travelling at the same speed, one of the ratchet wheels will be driven faster than the other, thereby causing a corresponding movement of the pointer and rheostat arm. Switches 107 are provided in the solenoid circuits by which the solenoids are silenced except when it is desired to synchronize the webs.

The invention in its broader aspects is not limited to the specific mechanisms shown and described but departures may be made therefrom within the scope of the accompanying claims without departing from the principles of the invention and without sacrificing its chief advantages.

What I claim is:—

1. Web renewing apparatus including in combination means for rotatably supporting a running web roll and a reserve web roll, motor means for driving the reserve web roll to bring it to the peripheral speed of the running web roll and synchronizing means including a differential having a revoluble pinion and driven by the running web and reserve web roll, and a rheostat operated by the differential pinion.

2. Web renewing apparatus including in combination means for rotatably supporting a running web roll and a reserve web roll, motor means for driving the reserve web roll to bring it to the peripheral speed of the running web roll and synchronizing means including a differential driven by the running web and reserve web roll, a rheostat operated by the differential and controlling the power supplied to the motor.

3. Web renewing apparatus including in combination means for rotatably supporting a running web roll and a reserve web roll, means for driving the reserve web roll to bring it to the same peripheral speed as the running web roll and synchronizing means including a differential having a revoluble pinion and driven by the running web and reserve web roll and driving control means operated by the differential pinion.

4. Web renewing apparatus including in combination means for rotatably supporting a running web roll and a reserve web roll, means for driving the reserve web roll to bring it to the same peripheral speed as the running web roll and synchronizing means including a differential driven by the running web and reserve web roll.

5. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll and a motor driven propeller roll positioned intermediate the web rolls and having its surface intersecting the path of movement of the surface of the reserve roll whereby said propeller roll is adapted to contact with the reserve roll in one of its positions.

6. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll and a motor driven propeller roll mounted between the web roll eccentric to the axis of rotation of said support.

7. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll to support the reserve web roll in pasting position, a propeller roll mounted between the web rolls and positioned to contact with the reserve web roll in pasting position.

8. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll to support the reserve web roll in pasting position, individual motors for each web roll, means for selectively rendering the reserve roll motor operative only in pasting position of the web roll, and control means controlled by the relative peripheral speed of the web rolls for controlling the speed of the motor.

9. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll to support the reserve web roll in pasting position, motor means selectively operable to drive the reserve web roll in pasting position and means controlled by the relative peripheral speed of the two web rolls for governing the speed of the motor.

10. Web renewing mechanism including in combination a support for a reserve web roll and a running web roll, means for rotating the reserve web roll to bring it to the speed of the running web, an indicator, means for moving said indicator in accordance with the relative speed of the web rolls and means for controlling the roll rotating means to vary the speed of the reserve web roll.

11. Web renewing mechanism including in combination a support for a reserve web roll and a running web roll, means for rotating the reserve web roll to bring it to the speed of the running web, a differential having a revoluble pinion and driven by the running web and reserve roll and an indicator fixed to the pinion of the differential and movable therewith.

12. Web renewing mechanism including in combination a support for a reserve web roll and a running web roll, a motor to drive the reserve web roll, a differential driven by the running web and reserve web roll and an indicator driven by the differential and movable in accordance with the relative peripheral speed of the web rolls.

13. Web renewing mechanism including in combination a support for a reserve web roll and a running web roll, a motor to drive the reserve web roll, a differential driven by the running web and reserve web roll and an indicator driven by the differential and a variable rheostat for controlling the speed of the motor.

14. Web renewing mechanism including in combination, a support for a reserve web roll and a running web roll, a motor for rotating the reserve web roll, a variable rheostat for controlling the speed of the motor, an indicator, means for moving said indicator in accordance with the relative peripheral speed of the web rolls.

15. Web renewing mechanism including in combination, a support for a reserve web roll and a running web roll, a motor for rotating the reserve web roll, a variable rheostat for controlling the speed of the motor, an indicator, means for moving said indicator by differences in relative peripheral roll speeds to indicate relative web speeds.

16. Web renewing mechanism including in combination, a support for a reserve web roll and a running web roll, a motor for rotating the reserve web roll, means for varying the speed at which the web roll is driven by the motor, an indicator, means for moving said indicator by differences in relative peripheral speeds to assist the operator in varying the roll drive.

17. Means for indicating synchronism between two web rolls including in combination a pair of differential gears, each to be driven proportionally to the peripheral speed of a web roll, a differential pinion driven by said gears and an indicator driven by said pinion and movable

in accordance with the relative speed of the rolls.

18. Means for indicating synchronism between two web rolls including in combination a pair of differential gears, one to be driven by a running web from one of the web rolls, the other to be driven by the other roll, and a differential pinion driven by the gears and revolving proportionately to the relative speed of the web and other roll.

19. Web controlling mechanism including in combination a support for a reserve web roll and a running web roll and means to indicate synchronism between said rolls including a pair of switches, means for closing said switches by movement of the reserve web and the running web, differential gearing, electro-magnetic means for selectively driving the gears of said differential and means connecting said electro-magnetic means with said switches.

20. Web controlling mechanism including in combination a support for a reserve web roll and a running web roll and means to indicate synchronism between said rolls including contacts, means for closing certain of said contacts by the running web and others of said contacts by the reserve web, a differential gearing and an indicator driven thereby, solenoid operated ratchets for operating the gears of the differential and means for energizing said solenoids through said contacts whereby the indicator moves in accordance with the relative speed of the webs.

21. Web controlling mechanism including in combination a support for a reserve web roll and a running web roll and means to insure synchronism between said rolls including a pair of switches, means for closing said switches by movement of the reserve web and the running web, a differential gearing and electro-magnetic means operated on closure of said switches to drive the gears of said differential and web speed controlling means operated by the differential.

22. Web controlling mechanism including in combination a support for a reserve web roll and a running web roll and means to insure synchronism between said rolls including contacts, means for closing certain of said contacts by the running web and others of said contacts by the reserve web, a differential gearing and an indicator driven thereby, solenoid operated ratchets for operating the gears of the differential and means for energizing said solenoids through said contacts whereby the indicator moves in accordance with the relative speed of the webs, and web speed controlling means operated by the differential.

23. Web controlling mechanism including in combination a support for a reserve web roll and a running web roll and means to indicate synchronism between said rolls including a member to be moved in accordance with the speed of the running web, a member to be moved in accordance with the speed of the reserve web, a reserve web speed control and means actuating said speed control in accordance with the algebraic sum of the movement of said members.

24. Web renewing apparatus including in combination means for rotatably supporting a running web roll and a reserve web roll, means for driving the reserve web roll to bring it to the same peripheral speed as the running web roll and synchronizing means including a differential having a revoluble pinion and electrically driven by the running web and reserve web roll driving control means and means for operating said control by the differential pinion.

25. Web renewing apparatus including in combination a rotatable support for a running web roll and a reserve web roll to support the reserve web roll in pasting position, means for driving the reserve web roll in pasting position, means for governing the speed at which the reserve web roll is driven and means for electrically controlling said governing means by the speed of the two web rolls.

26. Web renewing mechanism including in combination a support for a reserve web roll and a running web roll, means for rotating the reserve web roll at the speed of the running web, an indicator, means for moving said indicator in accordance with the relative peripheral speed of the web rolls and electrical means for effecting movement of said indicator.

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