Feb. 1, 1949. H. L. HASWELL 2,460,694

WEB TENSIONING AND PRESSURE MECHANISM

Filed Aug. 8, 1945 4 Sheets-Sheet 1

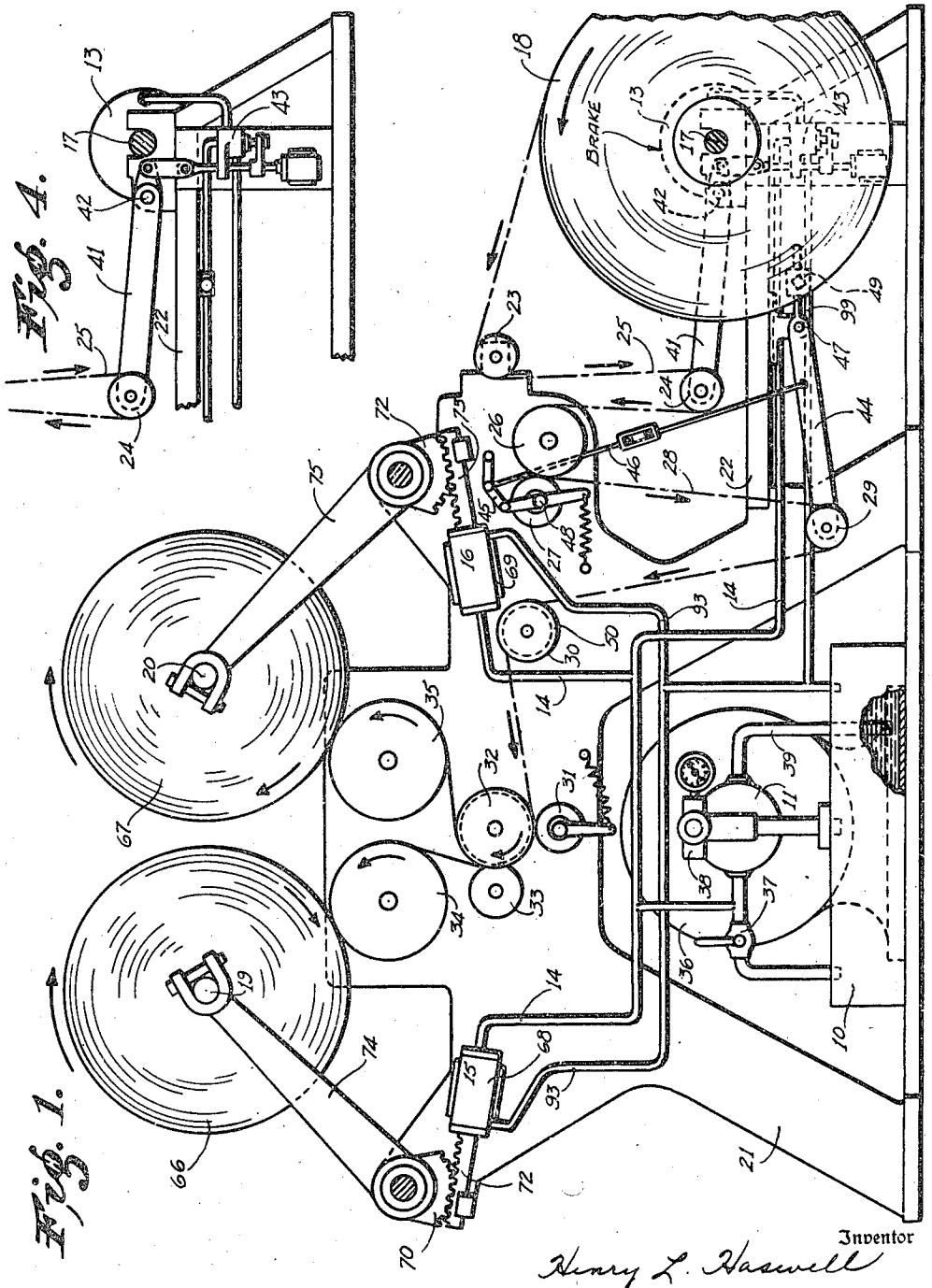

Fig. 4.

Fig. 1.

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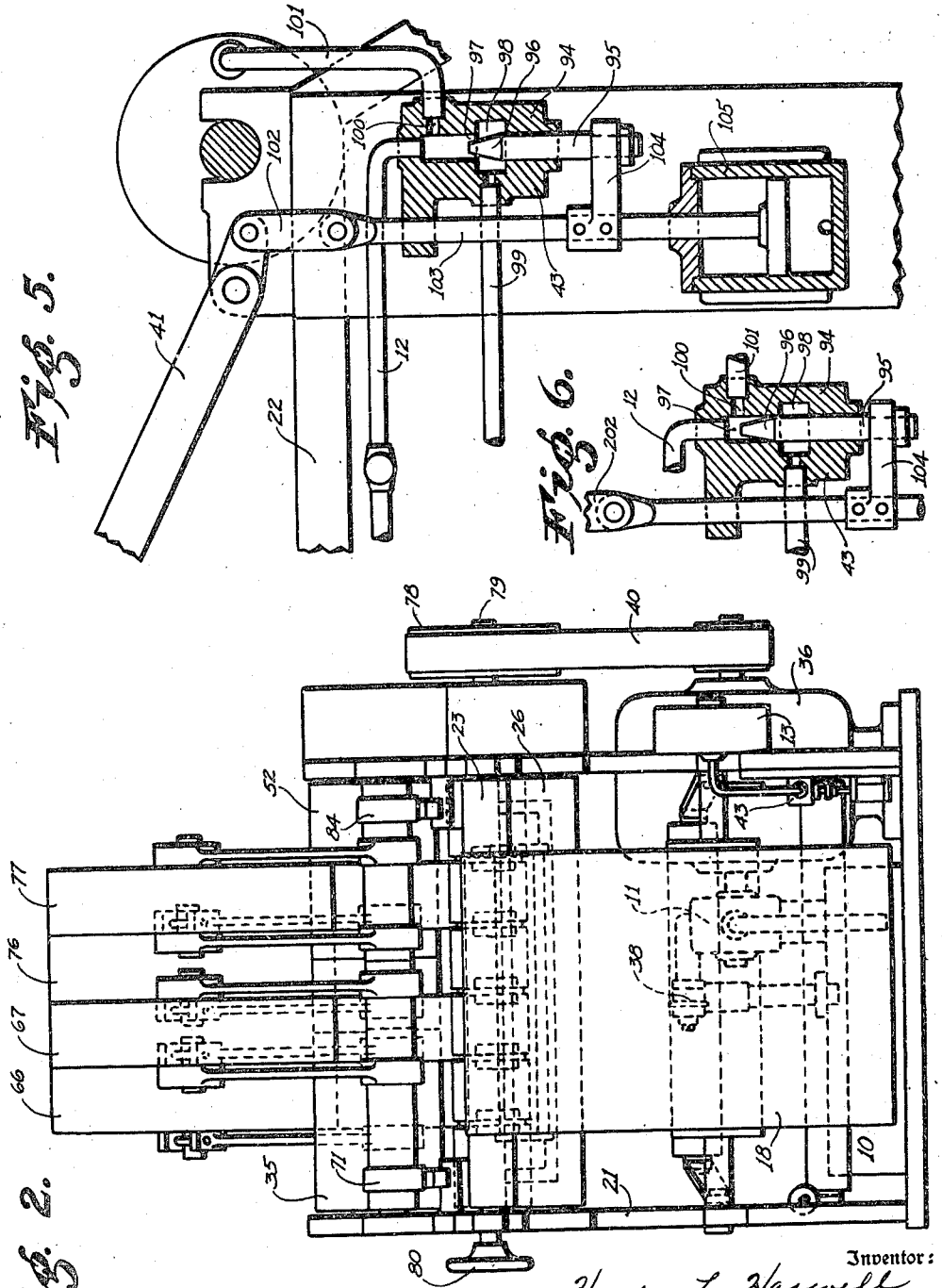

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WEB TENSIONING AND PRESSURE MECHANISM

Filed Aug. 8, 1945 4 Sheets-Sheet 3

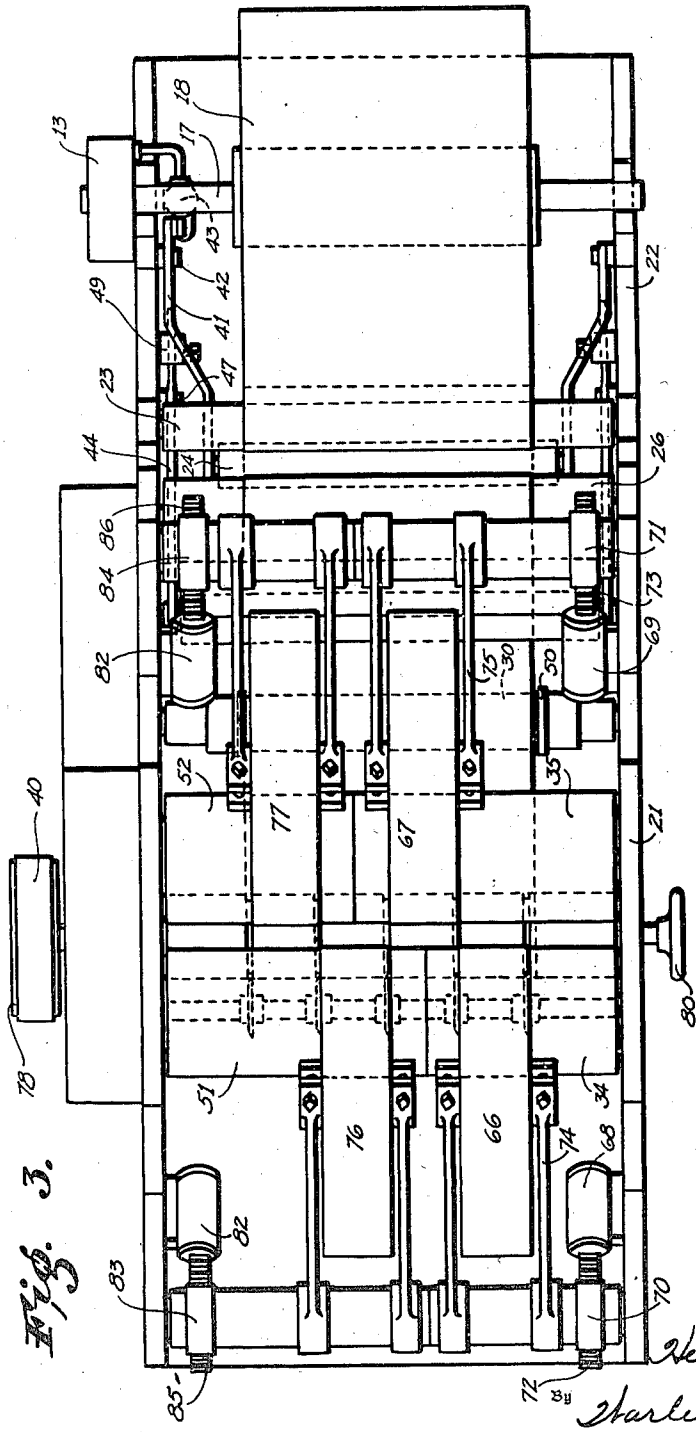

Fig. 3.

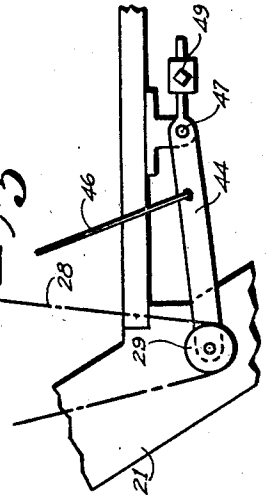

Fig. 8.

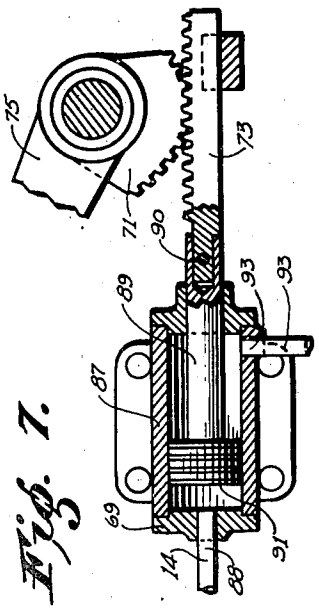

Fig. 7.

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WEB TENSIONING AND PRESSURE MECHANISM

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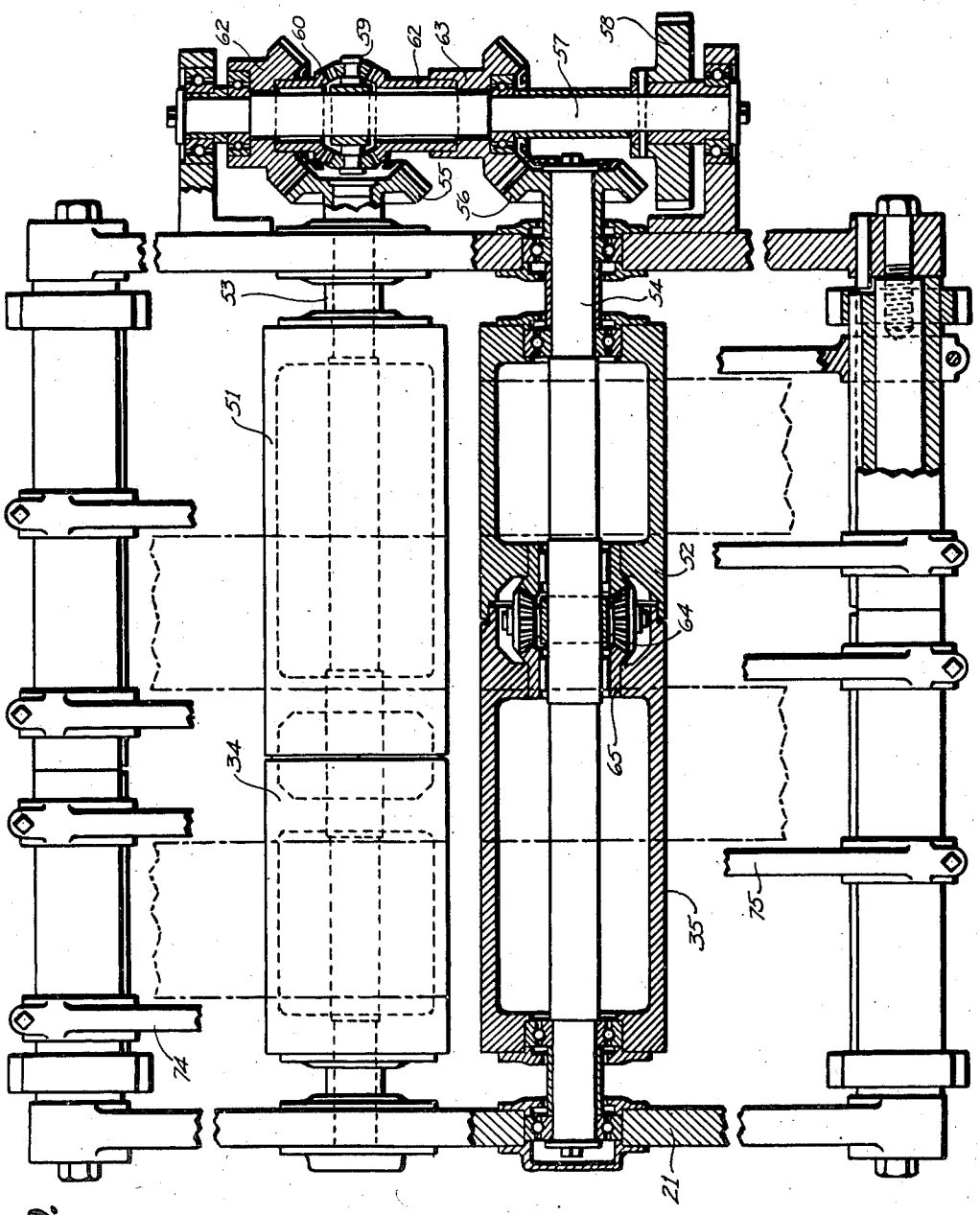

Fig. 9.

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UNITED STATES PATENT OFFICE

2,460,694

WEB TENSIONING AND PRESSURE MECHANISM

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Application August 8, 1945, Serial No. 609,638

16 Claims. (Cl. 242—75)

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This is a continuation-in-part of my copending application Serial No. 414,105, filed October 8, 1941, which application was abandoned after filing of the present application.

My invention relates to slitting and rewinding machines for continuous web material, and more particularly to the provision of means for such mechines for regulating the tension on the web from the supply roll and controlling the operation of the rewind rolls so as to obtain tight uniform rewinding of the web or slit portions thereof.

The control mechanism of this invention is adapted especially for use on paper slitting or rewinding machines but the invention may also be used on other forms of machines and in connection with rewinding or slitting of various other materials. Likewise, the hydraulic control system forming a part of this invention may be used solely for rewinding the paper or other sheet material for inspection purposes or it may perform the dual function of slitting the continuous sheet into two or more strips and winding of these strips on separate bobbins.

In the operation of slitting or rewinding machines it is of substantial importance to control accurately the tension on the paper or other web material and also the pressure on the rewind rolls so that the web will wind tightly and uniformly on the rewind rolls or bobbins. Unevenness in the pull of the web from the supply roll will cause non-uniform winding on the bobbins with irregular sides and even tearing or fracturing of the paper in some cases. Likewise, non-uniform pressure on the rewind rolls or bobbins gives similar adverse effects.

The tensioning means employed commercially heretofore comprise principally weights suspended from straps encircling or suspended over a segment of the supply roll and rewind roll mechanisms, so as to exert pressure on the rolls or resistance to rotation of the roll shafts. Such arrangements have proven inefficient and inadequate for meeting the varying pressure or braking requirements as the supply roll becomes smaller and the rewind rolls larger. Also, such an arrangement of weights does not provide means for automatically controlling tension when starting or stopping the machine. Changing the weights to meet varying conditions while the machine is running requires constant attention of the operator of the machine and at best is only an approximation that cannot provide uniform accurate control of tension and pressure.

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One of the features of my invention is that the hydraulic brake and pressure control system maintains automatically the proper pressure on the rewind rolls to obtain smooth even winding of the material thereon and likewise proper braking action on the supply roll to effect uniform tension on the paper web during the entire slitting and rewinding operation.

Another feature of my invention is a differential drive connection for the winding drums associated with the rewind rolls so that compensation for differences in tension on the slit portions of the web delivered after the slitting operation is automatically obtained. This arrangement obviates the difficulties involved in dealing with the slack edge effect commonly encountered in handling paper in roll form. Slack edges result from uneveness in expansion characteristics, which may develop during paper manufacture, and differences in degree of exposure to atmospheric condition of the edges in relation to the body of a paper web. As a result, a bobbin wound from a slit portion toward the side of a paper web is apt to be appreciably larger than one wound from a central slit portion. If adequate provision is not made for accommodating this difference in bobbin size, defective winding is obtained. The above mentioned differential feature of the present invention accommodates such differences in bobbin sizes in a particularly effective manner.

An illustrative but non-limiting embodiment of my invention as used on a commercial high speed slitting and rewinding machine is shown in the accompanying drawing in which:

Fig. 1 is a side view partially broken away of the slitting and rewinding machine adapted according to my invention;

Fig. 2 is an end view thereof;

Fig. 3 is a corresponding plan view;

Fig. 4 is a fragmentary detail view of the hydraulic braking system for the supply roll;

Figs. 5 and 6 are corresponding enlarged details partly in section;

Fig. 7 is a fragmentary detail of the pressure mechanism associated with the rewind rolls;

Fig. 8 is a fragmentary detail of the feed control roll forming a part of my invention; and

Fig. 9 is a plan view partly in section showing the differential drive connection for the winding drums associated with the rewind rolls.

Referring now to the several figures in the drawing and generally in the order in which they occur, the arrangement of parts and operation of the mechanism will be more fully understood

from the following detailed description. As shown in Fig. 1, the hydraulically controlled mechanism comprises a supply of fluid, such as oil, contained in a tank or the like as at 10, and a pump 11 for circulating the oil; an oil feed line 12 which is connected to a supply roll brake mechanism indicated at 13; an oil feed line 14 supplying fluid to four pressure cylinder mechanisms as indicated generally in Fig. 1 at 15 and 16. The oil supplied through conduit 12 controls the brake mechanism 13 on supply roll shaft 17 and thereby the tension on the paper web delivered from supply roll 18; while the oil supplied through the line 14 operates the pressure cylinder mechanisms as at 15 and 16, and they in turn control the pressure on the rewind rolls shown at 19 and 20, in Fig. 1. When the desired amount of hydraulic pressure has been applied to the supply roll 18 and to the rewind rolls 19 and 20, the machine may be operated under optimum tension conditions and the pressure will be automatically controlled such as to assure uniform winding of the slit paper on the rewind rolls.

The slitting machine shown in Fig. 1 comprises generally a stand or base 21 having an extension 22 for supporting the supply roll 18. Other operative parts of the machine which appear in this view include first an idler roll 23, a brake control roll 24 which forms the first paper loop 25, and a feed roll 26 and associated rubber pressure roller 27. A second paper loop, shown at 28, is formed by a feed control roll 29. This second loop is of advantage when slitting printed webs but may be omitted with plain paper webs or where extreme accuracy of side register or alignment of the web is not required. A guide for the paper is indicated at 30 and another pressure roll is shown at 31. The cutting or slitting devices include a knife cylinder 32 and five disk knives, one of which is shown at 33. Two of the winding drums for the slit paper are shown at 34 and 35 associated with two of the bobbins 19 and 20, mentioned above, which are formed from the slit paper.

The machine depicted generally in Fig. 1 and also illustrated from other view points in Figs. 2 and 3, is designed to form four strips or slit portions of paper out of the original single width of paper supplied from the supply roll 18. In the view of the machine shown in Fig. 1, only two of the bobbins and pressure cylinders are visible, but it will be appreciated from Figs. 2 and 3 that duplication of these and other parts are present in the machine to form and accommodate the four strips of paper produced by the slitting operation. It will also be understood that the machine may be adapted to slit and wind any other desired number of strips. The five disk knives are necessary for slitting the four strips and to trim the outside edges of the supply web to give a straight uniform edge to the finished slit paper.

Other details of the machine and particularly the operation thereof in accordance with the present invention will now be described. The power for operating the various power driven rolls is supplied from a motor indicated generally at 36. Preliminarily to starting the machine, the several hydraulically controlled parts of the machine are placed under a precise and accurately determined pressure. To do this a control valve 37 on the oil pump 11 is closed and the pump operated by the motor 36 so as to build up a pressure in the system to a desired predetermined figure which will vary with different types of material and machines. This pressure is maintained at the desired level by means of an adjustable relief valve 38. The oil is supplied from the oil tank 10 through an intake pipe 39 and by adjustment of the relief valve 38, the desired pressure is built up in the system and the excess oil returns to the tank through the relief valve.

Under this pressure the oil is caused to flow through the pipe 12 to the supply roll brake mechanism 13 so as to provide a braking effect on supply roll 18 which is controlled as described in detail below. The brake mechanism 13 may be of any suitable conventional type of drum or disk brake operated by hydraulically controlled cylinders and therefore illustration of the details of construction here is not necessary.

The machine is started by power supplied from the motor 36 through a belt drive 40 shown in Fig. 2, to the feed roller 26 and other driven elements of the machine as described more in detail below. The feed roller 26 accordingly begins to rotate and removes paper from the loop 25. This raises the brake control roll 24, which is located on an arm 41 pivotally mounted as at 42 (see Figs. 1, 4 and 5).

As paper is removed from the loop 25 in this manner and control roll 24 rises, a valve 43 (see Figs. 5 and 6) associated with the brake mechanism 13 opens which releases the pressure on the brake mechanism 13 and thereby allows the supply roll 18 to turn. When this condition is established, the control roll 24 will then assume the correct position according to its own weight such that the supply roll 18 will continue to rotate. If any extra resistance is offered to the rotation of the supply roll 18, the control roll 24 will again rise because of the lag of the supply roll and will function automatically in the manner just described to reduce the pressure on the brake mechanism 13 and thereby permit the roll 18 to rotate more freely.

If the reverse condition occurs, that is, if too much slack is presented in the paper loop 25, the control roll 24 will be lowered and this movement of the roll transmitted through the control arm 41 will effect partial closing of the valve 43 with the result that the pressure on the brake mechanism 13 will be increased, and the roll 18 will rotate less rapidly or freely until the desired equilibrium or proper tension is again obtained in the paper loop 25. When the control roll 24 is at the upper limit of its travel the valve 43 operates so as to apply minimum or no pressure to the supply roll brake mechanism 13; and when the control roll 24 is at its lower limit of travel maximum pressure is applied to the brake mechanism 13 sufficient to lock the roll against rotation. Intermediate positions of the roll 24 apply intermediate amounts of pressure to the brake mechanism 13.

The paper web passing over the feed roll 26 is held in close contact therewith by means of the rubber, pressure roller 27 which is spring loaded and which is connected to a pivoted arm 44 by a toggle 45 and link 46 as shown in Fig. 1. The paper then forms a loop indicated at 28. The low end of the loop is maintained by feed control roll 29 mounted on arm 44 which is pivotally supported at 47. The feed control roll 29 serves the function of keeping the loop 28 at a uniform size. If too much paper is fed to the loop 28, the feed control roll 29 drops lower and in so doing moves the rubber pressure roll 27, which

is eccentrically mounted as at 48, away from the feed roll 26 by actuating toggle 45 through link 46. This allows the paper to slip somewhat and feed at a slower rate over the feed roll 26. Arm 44 which carries feed control roll 29 extends beyond its pivoted mounting at 47 to receive a counterweight 49 which may be adjusted to balance the weight of roll 29 so that this roll does not stress the paper in loop 28 but merely maintains the loop 28 under proper control.

Under the reverse condition, that is, when less than the desired amount of paper is supplied to the loop 28, the feed control roll 29 will be raised so that pressure roll 27, which operates under spring tension, is allowed to press more tightly against the feed roll 26. This increased pressure between feed roll 26 and presure roll 27 will cause nipping of the paper so that it will be positively fed at a greater rate to the loop 28 until the desired loop size is again established. The feed roll 26 is of greater diameter than the winding drums 34 and 35 and therefore always tends to feed more paper into the loop 28 than the winding drums 34 and 35 can take up.

After leaving the loop 28 the paper next passes over the non-rotating drum 30 which is mounted between two adjustable side plates which act as guides for controlling lateral movement of the paper. One of the side guides for the drum 30 is indicated in Fig. 1 at 50. These side guide plates prevent or remove any weaving motion of the paper.

The paper from the drum 30 passes between the second spring loaded, eccentrically mounted, rubber pressure roll 31 and the knife cylinder 32. The cylinder 32 has several spaced slots or grooves formed in its peripheral surface, the side edges of which act as cutting surfaces for the paper. The other cooperating part of the cutting device comprises spring loaded disk knives, one of which is shown in Fig. 1 at 33. These knives 33 extend into the grooves in the knife cylinder 32 and are rotated thereby such that the paper is slit between the edge of these knives and the contacting edge of the grooves in the knife cylinder.

The several strips of paper which are formed on the knife cylinder 32 by the operation just described are then separated and pass onto separate winding drums two of which are shown at 34 and 35 in Fig. 1.

The knife cylinder 32 is slightly smaller in diameter than the winding drums 34 and 35 with the result that tension is imparted to the paper traveling between the knife cylinder and the winding drums. This tension wil vary generally in proportion to the difference in diameters of the knife cylinder and the winding drums. This arrangement again establishes tension in the paper web which had been lost in the loop 28.

As previously mentioned, the winding drums 34 and 35 and their counterparts 51 and 52 are provided with a differential drive connection (see Fig. 9), so that automatic compensation is obtained between these winding drums for differences in tension on the respective slit portions of the paper web delivered to them. The winding drums 34 and 51, and 35 and 52, are respectively carried on shafts 53 and 54 which are journalled in the machine frame 21. Both of the shafts extend beyond the frame 21 on one side to receive respective bevel gears 55 and 56 through which a driving connection is made with the motor 36. This driving connection comprises an auxiliary shaft 57 on which a spur gear 58 is mounted for association with any convenient

power take-off arrangement (not shown) from the motor 36. Power delivered to shaft 57 through spur gear 58 is transmitted to a set of spider gears 59 also carried on shaft 57. The spider gears 59 mesh with corresponding toothed surfaces formed on sleeves 60 and 61 which extend from fixed connections with bevel gears 62 and 63, respectively, freely mounted on shaft 57. The bevel gears 62 and 63 in turn mesh with the previously mentioned bevel gears 55 and 56 carried by winding drum shafts 53 and 54, so that this differential arrangement has the effect of dividing power delivered to auxiliary shaft 57 between shafts 53 and 54 in accordance with their respective load requirements.

The winding drums 34 and 51, and 35 and 52, are also differentially connected on their respective shafts 53 and 54 through spider gears arranged as at 64 in Fig. 9. The winding drums are rotatably mounted on shafts 53 and 54, and are each provided with internal sleeve portions (as at 65 in Fig. 9) formed with toothed surfaces which engage the spider gears 64. The power delivered to shafts 53 and 54 is accordingly again divided between the respective winding drums carried on these shafts. As a result of this arrangement winding drums 34 and 52 which wind the slit portions formed at the edges of the paper web will be driven faster than winding drums 35 and 51 whenever slack edge paper is encountered, so that each of the drums will effect even and smooth winding regardless of variations in tension between the slit portions of the paper web with respect to which they operate.

From the winding drums, as at 34 and 35 in Fig. 1, the paper strips are finally fed onto bobbin cores as at 66 and 27 and proper pressure of bobbins 66 and 67 on winding drums 34 and 35 during winding is controlled in accordance with this invention by means of pressure cylinders, as at 68 and 69 in Fig. 1, and associated quadrants 70 and 71, and racks 72 and 73, respectively. The desired pressure is established in the pressure cylinders 68 and 69 by means of the oil which is pumped through the pipe 14 to these cylinders. It is to be understood that a pressure cylinder is used for each bobbin shaft and any desired number of bobbins may be mounted on each shaft.

The operation of the cylinders as suggested by the drawing in Fig. 1 comprises longitudinal movement of the racks 72 and 73 under the oil pressure maintained in the cylinders 68 and 69, the details of which are shown in Fig. 7.

At the beginning of the slitting operation a predetermined pressure is applied through the cylinders 68 and 69 to arms 74 and 75 which position the bobbin cores 67 and 68, and in turn press them against the winding drums 34 and 35, respectively. At this stage the racks 72 and 73 are fully extended and engage the inner portion of the quadrants 70 and 71. As the bobbins 66 and 67 increase in diameter by winding of the slit paper strips thereon, the arms 74 and 75 are progressively pressed outward and cause the quadrants 70 and 71 to move arcuately thereby forcing the racks 72 and 73 toward the pressure cylinders 68 and 69 against the hydraulic pressure previously established in these cylinders.

This increase in back pressure on the cylinders is automatically compensated by the relief valve 38 which permits the oil displaced in the cylinders 68 and 69 to be returned to the oil

supply 10. Accordingly, the original pressure applied to the bobbins is maintained.

In cases where it is desired to vary the pressure on the bobbin arms 74 and 75 during operation (instead of maintaining a constant original pressure as above described) an adjustable pressure relief valve controlled by suitable mechanism associated with the machine, may be incorporated in the pressure line 14.

When the slitting and rewinding operation is complete, that is, when the bobbins have reached their maximum desired size or at any other desired time, the pressure maintained in the hydraulic system may be relieved by opening the control valve 37, which was first closed at the beginning of the operation. When this valve is opened the pump 11 by-passes oil from the intake 39 back into the tank 10.

Some of the constructional features of the slitting and rewinding machine adapted according to my invention which are not apparent in Fig. 1 are shown in Figs. 2 and 3 to which attention is now directed.

Referring to these figures duplicate parts for certain of those shown in Fig. 1 as well as additional operative parts of the machine will be noticed. In addition to the bobbins 66 and 67, shown in Fig. 1, the machine also has two other bobbins 76 and 77. These four bobbins are positioned in staggered relationship as illustrated in Fig. 3, which makes it possible to wind thereon the four separate strips of paper which are cut on the knife cylinder 32.

The mechanism for rotating the winding drums 34 and 35, the feed roll 26, and the knife cylinder 32, is shown in Figs. 2 and 3 and comprises the motor 36, belt drive 40, and pulley 78 which incorporates a conventional friction clutch (not shown). This clutch controls rotation of a main drive shaft shown at 79, and the above mentioned drums and rolls through suitable geared connections. A clutch control wheel for manual operation is shown at 80.

The pressure cylinders 68 and 69 shown in Fig. 1 are duplicated as shown at 81 and 82 in Fig. 3. Likewise the racks 72 and 73 and quadrants 70 and 71 are duplicated at 85 and 86 and 83 and 84, respectively, as shown in Fig. 3. These four pressure cylinders each with associated rack and quadrant control the pressure of the four bobbins 66, 67, 76 and 77 for proper winding of paper on each as described above.

The construction of the pressure cylinders is shown more in detail in Fig. 7. Referring thereto, the cylinder as shown comprises an outer housing or casing 87, having an inlet 88 for the oil or hydraulic fluid through line 14. Internally, the cylinder comprises a piston arm 89 to which is keyed, as shown at 90 the rack 73. The arm 89 has fastened at the opposite end a piston head 91, which may be fitted with piston rings to insure compression fitting.

The operation of the cylinder is as follows: When oil under pressure flows through the inlet 80, pressure is applied to piston head 91 which moves the piston arm 89 forward and that in turn advances the rack 73. An orifice 92 is provided for release of air and oil leakage from the cylinder during operation. The oil drain line which is connected to this orifice is indicated at 93 in Fig. 1. This drain line returns to oil supply 10. The cylinder is mounted on the machine frame 21 as shown in Fig. 1. In the operation of the pressure cylinder, as above described, the bobbin arm quadrants engaging the racks force the piston head back in the cylinder against the previously established oil pressure.

The valve 43 shown generally in Fig. 1, is illustrated more in detail in Figs. 5 and 6. The construction and operation thereof is as follows: It comprises a valve body 94, having a plug 95 with conical end 96 which is adapted to seal itself in an orifice 97. The orifice 97 is enlarged to form an annular chamber 98, which is connected to an oil exhaust line 99.

The other end of the orifice 97 connects with the oil supply line 12. Tapped into the side of the orifice 97 is an opening 100 which connects with an oil pressure line 101. The line 101 in turn is connected to the operating means (not shown) of the supply roll brake mechanism 13.

When the machine is ready to operate the plug 97 is in the position shown in Fig. 6 and thus seals off the oil from the exhaust line 99, forcing it to flow through the pressure line 101 and thereby applying pressure to the brake mechanism 13, which in turn prevents the supply roll 18 from rotating. When the machine starts operating and the roll 24 rises as previously described, the plug 95 is gradually withdrawn from the orifice 97 so that some of the oil can flow into the chamber 98 and out through the exhaust line 99, thereby relieving the pressure. When the plug 95 is in the position shown in Fig. 5 all of the oil escapes through the exhaust line 99 and no pressure is applied to the brake mechanism 13.

The tapered section 96 of the plug 95 may be ground to any desired contour to provide various degrees of control of the pressure. Such variation in contour would adapt the system for speedy or gradual pressure control.

The valve 43, as above described, is actuated during operation of the machine, by means of control arm 41, which is connected to a link 102. This link 102 is in turn connected to a rod 103 which is clamped to the plug 95 as at 104. A dash pot 105 is provided to assure smooth movement of the arm 103 and ultimately the control roll 24.

Various modifications and changes may be made in the above described machine and hydraulically controlled tensioning or pressure mechanism without departing from the scope of my invention, some of the novel features of which are defined in the appended claims.

I claim:

1. In a slitting or rewinding machine having a supply roll and at least one rewind roll and a winding drum to drive said roll, means for passing a continuous web from the supply roll and between the drum and said rewind roll, the combination of hydraulically controlled pressure mechanism for regulating the tension of the web running from the supply roll and for maintaining constant pressure between the rewind roll and said drum, the rewinding roll resting upon the winding drum and being maintained in positive pressure contact therewith by said hydraulically controlled mechanism, the pressure control mechanisms for regulating the tension of the web and for maintaining the pressure on the rewind roll being interconnected as component parts of a single hydraulic system.

2. In a slitting or rewinding machine having a supply roll and at least one rewind roll and winding drum for passing a continuous web therebetween, the combination of hydraulically controlled pressure mechanism for regulating the tension of the web from the supply roll and for maintaining constant pressure on the rewind roll, the rewinding roll resting upon the winding drum

and being maintained in positive pressure contact therewith by said hydraulically controlled mechanism comprising a pressure cylinder having a longitudinally adjustable rack, and a quadrant meshing with said rack and connected to said rewind roll so that movement of the rack will control the pressure on the rewind roll.

3. A slitting or rewinding machine for continuous web material comprising a supply roll, and at least one rewind roll, rotatable winding drum supporting said rewind roll and a movable hydraulically controlled pressure arm connected with said rewind roll and a hydraulic pressure cylinder connected with said arm for maintaining said rewind roll in positive, surface pressure contact with said winding drum, said pressure arm having fixedly associated therewith a toothed quadrant and said pressure cylinder having an elongated rack that meshes with said quadrant so that movement of the rack under hydraulic pressure causes arcuate movement of said quadrant and said pressure arm.

4. In a slitting or rewinding machine for continuous web material, a supply roll, an hydraulically controlled brake directly connected to said roll for regulating the tension on the web supplied from said supply roll, a rewind roll for rewinding said web, slitted or not, an hydraulically controlled means for regulating the pressure on said rewind roll so that the web will rewind tightly and evenly on said rewind roll, both of said hydraulically controlled means being interconnected as component parts of a single hydraulic system.

5. A slitting and rewinding machine comprising a supply roll of web material to be slit into a plurality of webs of narrower width, a plurality of winding drums for advancing the slit webs, a plurality of rewind rolls for winding individually thereon the several slit webs, said rewind rolls resting upon and rotated by said winding drums, supporting means for said rewind rolls, and an hydraulically controlled pressure means cooperatively associated with each of said supporting means for applying individually a fixed predetermined pressure between each of said associated pairs of rewind rolls and winding drums so that the separate slit webs are individually controlled and wound tightly and evenly on each of said rewind rolls.

6. In a slitting and rewinding machine for continuous web material, a supply roll, a hydraulically controlled brake connected to said roll for regulating the tension on the web supplied from said supply roll, a plurality of winding drums, a plurality of rewind rolls positioned in spaced, side by side relationship and resting on said winding drums to receive the several slit webs, and hydraulically controlled pressure means cooperatively associated with said rewind rolls to exert a positive, regulated pressure between said winding drums and said rewind rolls and thereby cause the plurality of slit webs to wind simultaneously and evenly and tightly on said plurality of rewind rolls.

7. In a slitting and rewinding machine for continuous web material, a supply roll, a plurality of rewind rolls separately positioned in at least two groups, the rolls of each group being in spaced side by side position and the rolls of one group being staggered with respect to the rolls of the other group, a plurality of winding drums supporting said rewind rolls and a plurality of hydraulically controlled pressure means cooperatively associated with said groups of rewind rolls, one each of said pressure means being individually connected with each of said rewind rolls to effect a positive pressure thereon and cause tight, even, individually controlled winding of the slit webs on said rewind rolls, and all of said hydraulically controlled pressure means be controlled by a common source of hydraulic pressure so that uniform pressure is applied to all of said rewind rolls.

8. A machine adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs, comprising a plurality of spaced side by side separate sets of rewinding rolls for receiving and simultaneously rewinding the slit webs into tight, evenly w ınd, separate rolls, a winding drum located beneath and in driving contact with each of said rewinding rolls, and an hydraulically controlled pressure means cooperatively associated with each of said rewinding rolls for applying a constant, equal, positive pressure to each of said rewinding rolls and thereby establishing a constant pressure between each of said rewind rolls and the underneath winding drum.

9. A machine as defined in claim 8 and in which the hydraulic pressure means comprise a pressure cylinder having a longitudinal adjustable rack, and a quadrant meshing with said rack and connected with said rewind roll so that movement of the rack under hydraulic pressure will control the pressure on the rewind roll.

10. A machine adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs, comprising a plurality of winding drums for advancing the slit webs, a plurality of rewind rolls for winding individually thereon the several slit webs, each of said rewind rolls resting upon and being rotated by said winding drums, each winding drum having sectioned portions for individually supporting the rewind rolls, and differential gearing connecting the sectioned portions of said rewind rolls whereby said sectioned portions are actuated differentially to compensate for differences in tension on the slit webs delivered to said rewind rolls.

11. A machine adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs, comprising a plurality of rewind rolls separately positioned in at least two groups, the rolls of each group being in spaced side by side position and the rolls of one group being staggered with respect to the rolls of the other group, a plurality of winding drums supporting said rewind rolls, a winding drum being provided for each group of rewind rolls and each winding drum having sectioned portions individually supporting the component rewind rolls in each group respectively, and differential gearing connecting the sectioned portions of said winding drums whereby said sectioned portions are actuated differentially to compensate for differences in tension on the slit webs delivered to said rewind rolls.

12. A machine adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs, comprising a plurality of rewind rolls separately positioned in at least two groups, a plurality of winding drums supporting said rewind rolls, a winding drum being provided for each group of rewind rolls and each winding drum having sectioned portions individually supporting the component rewind rolls in each group respectively, driving means for said winding drums, differential

gearing disposed intermediate said driving means and said winding drums whereby power delivered by said driving means is divided between said winding drums in accordance with their respective load requirements, and differential gearing connecting the sectioned portions of said winding drums and similarly actuating said sectioned portions.

13. A winding drum for machines adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs and in which a plurality of rewind rolls are arranged for receiving and rewinding the several slit webs, comprising a composite winding drum having sectioned portions for individually supporting said rewind rolls, and differential gearing connecting said sectioned portions whereby said sectioned portions are actuated differentially to compensate for differences in tension on the slit webs delivered to said rewind rolls.

14. A winding drum for machines adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the slit webs and in which a plurality of rewind rolls are arranged for receiving and rewinding the several slit webs, comprising a composite winding drum having sectioned portions for individually supporting said rewind rolls, and means for associating the sectioned portions of said composite winding drum whereby said sectioned portions are actuated differentially to compensate for differences in tension on the slit webs of paper delivered to said rewind rolls resulting from slack edges of the continuous web being slit.

15. In a slitting and rewinding machine, the combination with means for slitting a continuous web of material into a plurality of narrower webs, of a plurality of rewind rolls arranged for receiving and rewinding the several slit webs, and winding drums having sectioned portions for individually supporting said rewind rolls, each of said sectioned portions being actuated differentially whereby the several slit webs are wound at speeds proportioned to compensate for variations in tension on the several slit webs.

16. In a machine adapted for slitting a continuous web of material into a plurality of narrower webs and rewinding the several slit webs, a winding drum having sectioned portions, each of said sectioned portions providing an individual winding surface for one of said slit webs, and each of said sectioned portions being actuated differentially whereby the winding speeds of said sectioned portions are proportioned to compensate for variations in tension of said webs.

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