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WEB ROLL SPEED CONTROL

Original Filed June 30, 1931 2 Sheets-Sheet 1

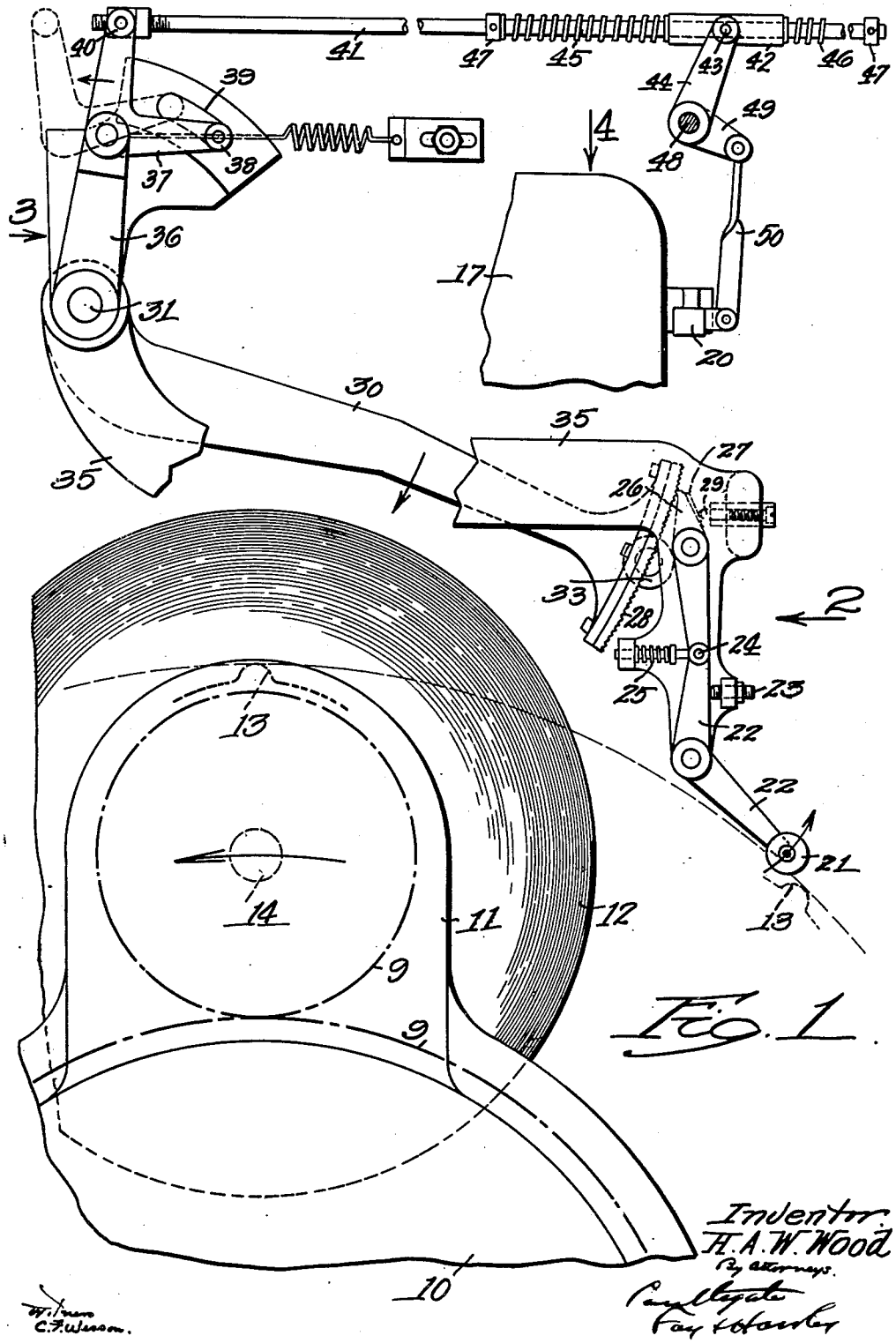


Fig. 1.

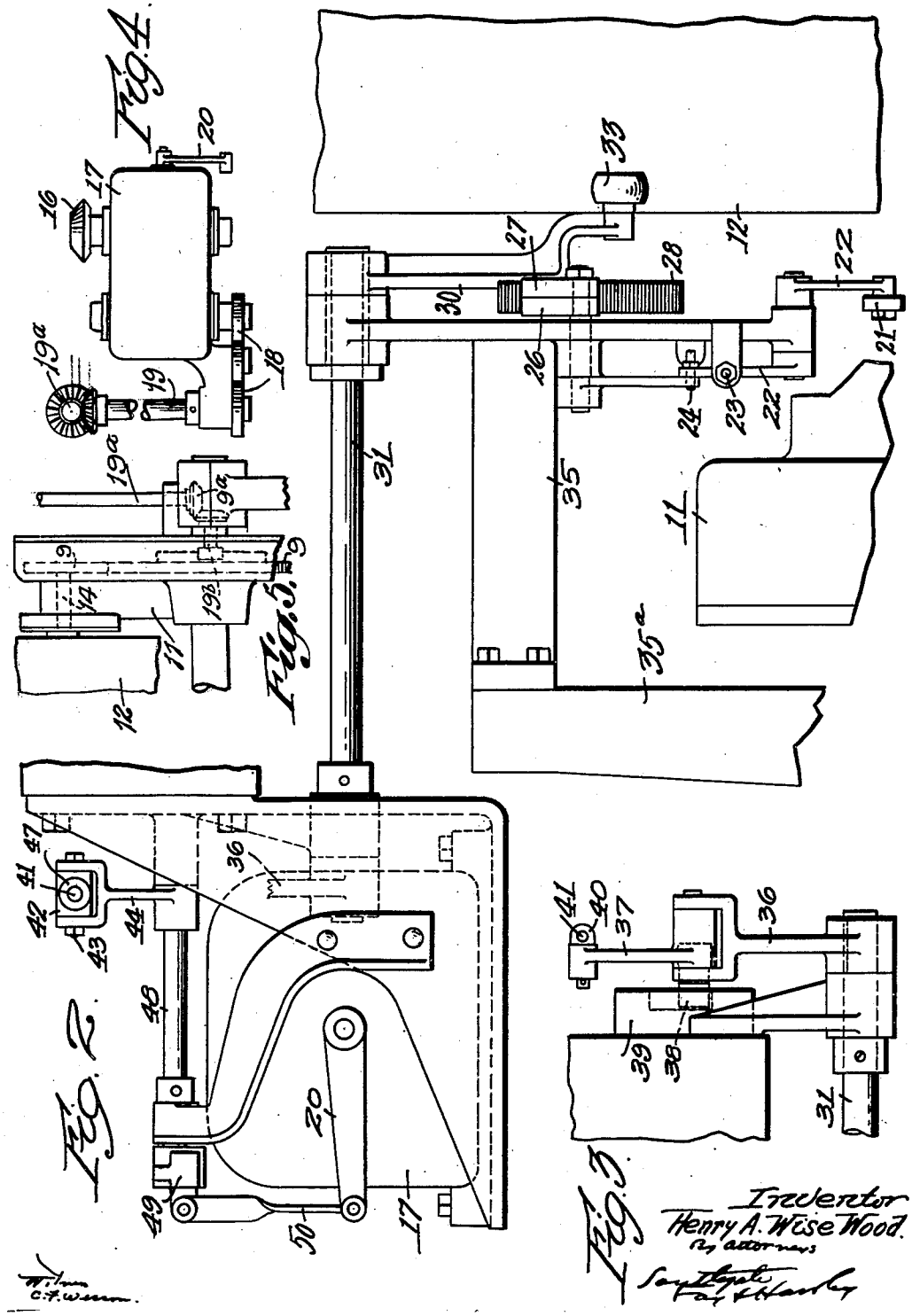
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WEB ROLL SPEED CONTROL

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18 Claims. (Cl. 242—58)

I have previously invented a means for bringing a web roll up to speed by power applied through the spindle of the roll for the purpose of getting the surface speed of the roll substantially equal to the web speed at the time of pasting. This invention relates to that idea.

The principal objects of this invention are to provide means, operated by the roll itself, for automatically controlling the rate of transmission of speed from the printing press to the spindle of the roll; to provide means for measuring the diameter of the new web roll when it comes to pasting position on the reel, said means acting to control the speed of rotation so that the surface speed of the web roll will be the same as that of the running web with varying sizes of web rolls; to provide means bearing against the surface of the new roll for automatically adjusting the speed ratio of the new roll preparatory to splicing; and to provide regulation by means bearing against the new web roll preparatory to pasting for controlling the speed of an adjustable gear ratio transmission for rotating the spindle of a new web roll from the press.

Other objects and advantages of the invention will appear hereinafter.

Reference is to be had to the accompanying drawings, in which

Fig. 1 is an end view of a part of a web roll supporting reel and associated parts constructed in accordance with this invention and shown in position for tripping the roll rotating mechanism to start it into operation;

Fig. 2 is a view of one end of the same looking in the direction of the arrow 2 in Fig. 1;

Fig. 3 is a view of the opposite end of the upper part of the same looking in the direction of the arrow 3 in Fig. 1;

Fig. 4 is a plan of the gear ratio transmission and associated parts, and Fig. 5 is a view showing the rotation of the web roll from the shaft of the speed change device.

The invention, of course, is shown as applied to a reel 10 having means not shown for rotating it in a counter-clockwise direction, as indicated by the arrow in Fig. 1. On this reel are spiders 11 carrying web rolls 12, only one being shown. On each of the arms of the spider, on one end, is a projection 13, the purpose of which will appear later.

It will be understood that this reel operates in the usual way, preferably by a motor, and when a new roll 12 is to be spliced to the running web, the reel is turned to bring the roll up from a low position at the right to the position shown in Fig. 1 and there it stops for the pasting operation to take place. It is through the spindle 14 of the roll 12 that power is applied to rotate this roll on its own axis up to web speed.

The power for rotating the spindle 14 is applied from some convenient point on the press so that its speed is always controlled by the speed of the press. In this case a miter gear 16, shown in Fig. 4, receives power from a corresponding gear driven by the press. This supplies the input of power to a variable transmission 17, the details of which are not shown. The details of this variable speed transmission are not a feature of this invention. I prefer to use one of the well known cone pulley constructions whereby the transmission motion of the half pulleys, contained therein, allows a V-belt or chain to ride at different pitch diameters and give adjustable gear ratios in infinitely small steps. Thus the speed can be regulated with a great degree of fineness and there are no sudden speed changes. The output of this transmission is shown as carried through spur gears 18 to a horizontal shaft 19. This horizontal shaft, through shafts 19^a and 19^b and a system of gearing 9 and 9^a, transmits power in through the center of the reel and eventually to the spindle 14 of the incoming roll in any desired manner. The large central gear 9 is on the shaft 19^b while the planetary gears 9 are on the spindles 14.

The transmission of power from the shaft 19 to the spindle 14 at a regulated speed dependent upon the operation of the variable speed transmission 17 through an arm 20 can be accomplished very easily. The purpose of this invention is to so operate this arm 20 that the size of the roll 12 will regulate its speed perfectly to bring it into synchronism with the speed of the web.

It will be understood, of course, that the reel 10 rotates the roll 12 from a position at the lower right hand side to the position shown in Fig. 1. During this rotation, at the position indicated in dotted lines at the right, the projection 13 comes into contact with, and pushes out, a roll 21. This roll is mounted on a lever 22 which backs up against a stop screw 23. The movement of the roll 21 outwardly swings in a pivot stud 24 on the end of this lever against a spring 25 and also moves out a pair of pawls 26 and 27 pivoted to the stud 24. These two pawls are set out of step with each other and engage a segmental rack 28. The two pawls are staggered slightly to increase the sensitivity

of the device. On being pushed out they release this rack. Each pawl is pressed by a spring-operated plunger 29 into engagement with the rack whenever the levers 26 and 27 are in such position as to allow it. Now, this rack, being released by the projection 13 during the motion of the roll upwardly and to the left, drops by the action of gravity. The rack is mounted on an arm 30 fixed to a shaft 31 on which arm is a roll 33.

The roll 33 comes into contact with the paper roll 12, which, as stated, is moving up and, by the upward motion of this roll, it is forced upwardly until the roll reaches its stationary position. The amount of rise of the roll 33 is determined by the diameter of the web roll 12. This roll 33 thus accurately measures the diameter of the incoming roll. As it moves up and the rack 38 also moves up, after the projection 13 passes the roll 21, the springs move the pawls back into engagement with the rack and they hold the rack in any position to which it may be lifted.

The shaft 31 is carried by a stationary bracket 35 which is secured to a vertical supporting bracket 35a. The arm 30 is not fixed to this shaft except by a sliding spline connection They have to turn together but relative sliding motion is possible. Any end motion of this bracket that may be demanded when shifting for side register, or in moving this end of the spider which carries the bracket to provide for fractional width rolls, is accommodated by moving the arm 30 along the shaft 31.

On the other end of the shaft 31 is an arm 36 oscillating, of course, with the shaft. The free end of this arm is bifurcated to pivotally receive a cam lever 37 shown in the form of a bell-crank. One end of this bell-crank 37 carries a cam roller 38 operating in a closed cam 39, which is fixed to the frame of the machine. The purpose of this cam is to correct all linkages and arm motions, that is, to insure that they all follow predetermined lines. Thus the final motion transmitted from the paper roll to the variable speed transmission, as will appear, provides a correct feed setting. The other end of the bell-crank 37 is connected by a poppet 40 with an operating rod 41.

The operating rod 41 is threadedly attached to the poppet 40 for adjustment. The other end passes through a sleeve 42 which is pivotally attached by a stud 43 to an arm 44. Springs 45 and 46 in co-operation with stop-collars 47 on opposite sides, hold the sleeve 42 in balanced condition. This allows the arm 30 to be moved up or down at any time to its final position to regulate the speed change mechanism through the balancing up of the springs 45 and 46 to bring the sleeve 42 to the proper location.

The arm 44 is secured to a shaft 48, and also an arm 49. The free end of the latter arm is pivotally attached to a link 50 whose other end is pivotally attached to the operating arm 20 of the variable speed transmission.

As each new roll 12 is brought up by the rotation of the reel, the pawls 26 and 27 are released and the measuring arm 30 drops all the way down. It is then pushed up by the roll to a position which is determined by the diameter of the roll 12. The pawls 26 and 27, meantime, swing back against the rack 28 and hold the parts in that position. The movement of the arm 30 upwardly by the roll sets the operating rod 41 in the proper position to regulate the variable speed transmission in the casing 17 to give the proper speed to the spindle of the roll 12.

It will be seen, therefore, that the speed ratio is adjusted preparatory to splicing in accordance with the diameter of the roll, and this is done entirely automatically without any attention on the part of the operator.

Although I have illustrated and described only a single form of the invention I am aware of the fact that changes can be made therein by any person skilled in the art without departing from the scope of the invention as expressed in the claims. Therefore I do not wish to be limited to the exact form shown, but what I do claim is;—

1. In a web roll speed control device, the combination with a speed change device operated by a printing press, and means operated by the speed change device for rotating the fresh web roll through its axis, of means controlled by the size of the web roll for controlling the speed of the speed change device, an arm connected and movable with the last named means, and means for allowing said arm to rise as the fresh web roll moves into position for pasting and holding said arm at the highest point to which it rises, whereby said speed change device will operate the web roll, but at a speed controlled by its size, throughout the pasting operation.

2. In a web roll rotating device, the combination with a shaft operated by a printing press, of a speed change device constantly operated by said shaft, means connected with the web roll for rotating it from said speed change device, connections to the speed change device for varying the speed of the roll, movable means adapted to engage the cylindrical surface of said roll to be moved thereby to a position determined by the diameter of the roll, a rod connected to be operated by said movable means, a slidable member on the rod, and means connected from said slidable member to said speed change device for controlling its action.

3. In a web roll rotating device, the combination with a shaft operated by a printing press at a speed proportional to the speed of the press, of a speed change device constantly operated by said shaft, means connected with the center of the web roll for rotating it from said speed change device, connections to the speed change device for varying the speed of the roll, movable means adapted to engage the cylindrical surface of said roll to be moved thereby to a position determined by the diameter of the roll, a rod connected to be operated by said movable means, a slidable member on the rod, means for holding said slidable member in balanced condition along the rod, and means connected from said slidable member to said speed change device for controlling its action.

4. In a web roll speed control device, the combination with a shaft operated by a printing press, a speed change device connected with said shaft to be operated thereby, means connected with the speed change device for controlling the speed, a shaft driven by the speed change device at controlled speeds, and means connected with said shaft for rotating a web roll on its own axis, of a member in position to be engaged by the fresh web roll and mounted to be moved by the fresh web roll into a position controlled by the diameter thereof, an operating rod, means for moving said operating rod in accordance with the position of said member, a balanced sleeve on the rod movable therewith, and means connected with the

balanced sleeve for controlling the position of said means for controlling the speed of the speed change device, whereby the speed of rotation of the fresh web roll is dependent upon its size.

5. The combination with a speed change device operated by a printing press and means connected therewith for rotating a fresh web roll through its axis, of a member, the position of which controls the speed of the speed change device, an operating rod, a sleeve in balanced position on the operating rod but movable therewith, means connected with the sleeve for operating said member, a lever connected with the rod for operating it and having means associated therewith for engaging sad fresh web roll and moving the lever to a position determined by the diameter of the web roll, yielding means for holding the lever in a position to maintain contact with the web roll, and means for adjusting the connection of the lever with the rod.

6. The combination with a speed change device operated by a printing press and means connected therewith for rotating a fresh web roll through its axis, of a member, the position of which controls the speed of the speed change device, an operating rod, a sleeve in balanced position on the operating rod but movable therewith, means connected with the sleeve for operating said member, a lever connected with the rod for operating it and having means associated therewith for engaging said fresh web roll and moving the lever to a position determined by the diameter of the web roll, and a stationary cam connected with said lever for preventing said elements from moving out of the proper position.

7. In a web roll speed control device, the combination with a speed change device operated from the printing press to which the roll is to deliver its web, a shaft operated by the speed change device, means connected with the shaft for rotating the fresh web roll on its axis, and a movable member for controlling the speed of the speed change device, of an operating rod, a pair of collars fixed on the rod, a slide on the rod between the collars, springs between each collar and the ends of the slide, means operated by the slide for controlling the position of said controlling member for the speed change device, a lever pivotally connected with the rod, a member on the lever adapted to be moved into contact with the fresh web roll, whereby the size of the web roll will determine the position of the operating rod and slide and therefore the speed of the web roll and means for holding the lever in the extreme position in which it is placed by contact with the web roll.

8. In a web roll speed control device, the combination with a speed change device operated from the printing press to which the roll is to deliver its web, a shaft operated by the speed change device, means connected with the shaft for rotating the fresh web roll on its axis, and a movable member for controlling the speed of the speed change device, of an operating rod, a pair of collars fixed on the rod, a slide on the rod between the collars, springs between each collar and the ends of the slide, means operated by the slide for controlling the position of said controller member for the speed change device, a bell crank connected with said rod, a fixed cam having a cam groove, a roll on the bell crank operating on the cam groove, a lever pivotally connected with the bell crank, yielding means connected with the lever for pulling it in one direction, a member on the lever adapted to be moved by said yielding means into contact with the fresh web roll, whereby the size of the web roll will determine the position of the operating rod and slide and therefore the speed of the web roll and means for holding the lever in the extreme position in which it is placed by contact with the web roll.

9. In a web roll speed control device, the combination of a movable reel for supporting the fresh web roll, said reel having a projection, of a speed change device operated by the press and operating the web roll through its axis, means contacting with the surface of the web roll when it comes to pasting position for controlling the operation of said speed change device, an arm connected and movable with the last named means, and means in position to be engaged by said projection as the reel moves into pasting position for releasing said cam, and allowing it to drop to enable the speed control operating means to come into contact with the web roll.

10. In a web roll speed control device, the combination of a movable reel for supporting the fresh web roll, said reel having a projection thereon, of a speed change device operated by the press and operating the web roll through its axis, means contacting with the surface of the web roll when it comes to pasting position for controlling the operation of said speed change device, an arm connected and movable with the last named means and having a ratchet thereon, a pivoted lever having means in position to be engaged by said projection as the reel moves into pasting position, and a pawl operated by said arm for engaging the ratchet and for holding the ratchet in the highest position to which it is elevated by the web roll, said lever being connected with the pawl to disengage it from the ratchet, and allow the pawl to drop to enable the speed control operating means to come into contact with the web roll, when said projection operates the lever.

11. In a web roll speed controlling device, the combination of a reel having a projection thereon and having means for supporting a fresh web roll, a lever in position to be swung on its pivot by the projection when it reaches a certain point, a pair of pawls connected with said lever slightly out of step with each other, a swinging ratchet which said pawls are adapted to engage, (yielding means for normally holding the pawls in engagement with the ratchet to maintain the ratchet at the highest point to which it moves, said lever being connected with the pawls) so that, when the projection operates the lever, the pawls will be disengaged from the ratchet and the ratchet allowed to drop, an arm movable with the ratchet and having means for engaging the fresh web roll so that the web roll will move the ratchet upwardly, and means connected with said arm for controlling the speed of rotation of the web roll.

12. In a web roll speed controlling device, the combination of a reel having a projection thereon and having means for supporting a fresh web roll, a lever in position to be swung on its pivot by the projection when it reaches a certain point, a pair of pawls connected with said lever slightly out of step with each other, a swinging ratchet which said pawls are adapted to engage, so that, when the projection operates the lever, the pawls will be disengaged from the ratchet and the ratchet allowed to drop, an arm movable with the ratchet and having means for engaging the fresh web roll so that the web roll will move

the ratchet upwardly, and means connected with said arm for controlling the speed of rotation of the web roll.

13. In a web splicing device, the combination with means for speeding up a bodily movable fresh roll preparatory to splicing by a driving force applied through the central axis of the roll and a variable ratio transmission operated by the press for supplying said driving force, of regulating means controlled by the diameter of the fresh roll for setting the variable ratio transmission and maintaining that setting after the regulating means has moved out of contact with the fresh roll.

14. In a web splicing device, the combination with means for speeding up a fresh web roll by a driving force applied through the central axis of the roll, of means controlled by the fresh roll for regulating the speed thereof, said last named means being out of contact with said fresh roll when the latter is speeded up.

15. In a web splicing device, the combination with means for speeding up a fresh roll by a driving force applied through the central axis thereof, of means operated by the fresh roll for establishing and holding a single setting for controlling the speed of the fresh roll throughout the splicing operation.

16. In a web splicing device, the combination with means for speeding up a fresh roll prior to splicing and a printing press, of means operated by the fresh roll for establishing and holding a single setting for controlling the speed ratio between the fresh roll and the printing press until the splice is made.

17. In a web splicing device, the combination with a rotatable web roll support and means for speeding up a fresh roll through its central axis, of means for regulating the speed of the speeding-up means, and means whereby said regulating means is set by the rotation of the web roll support.

18. In a web splicing device, the combination with a rotatable web roll support, and means for speeding up a fresh roll, of means for regulating the speed ratio of the speeding up means with respect to that of the running web, and means whereby the regulating means is set by the rotation of the web roll support.

HENRY A. WISE WOOD.