

July 28, 1936.

H. A. W. WOOD

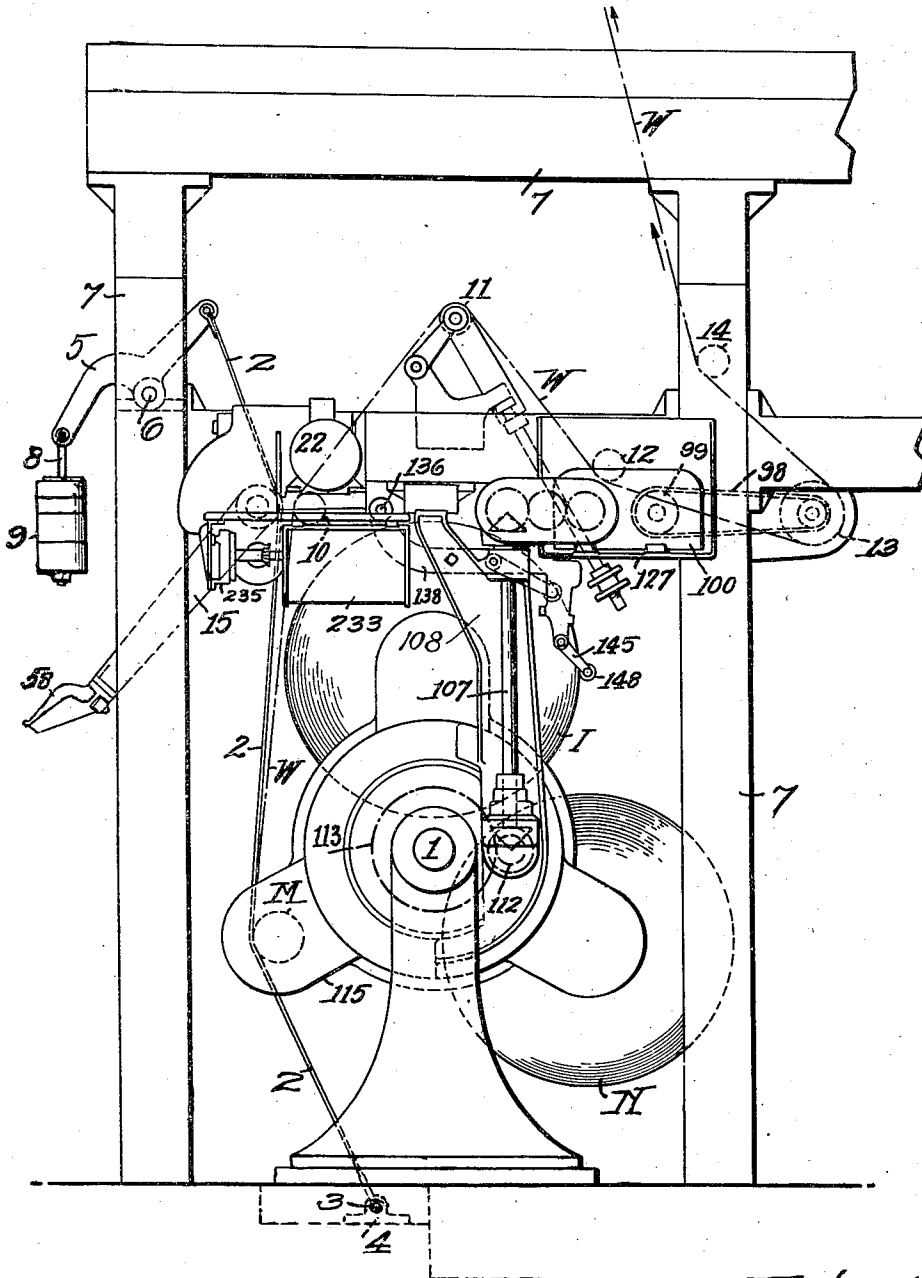
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AUTOMATIC WEB SPLICING MACHINE

Filed Feb. 5, 1932

18 Sheets-Sheet 1

*Fig. 1*



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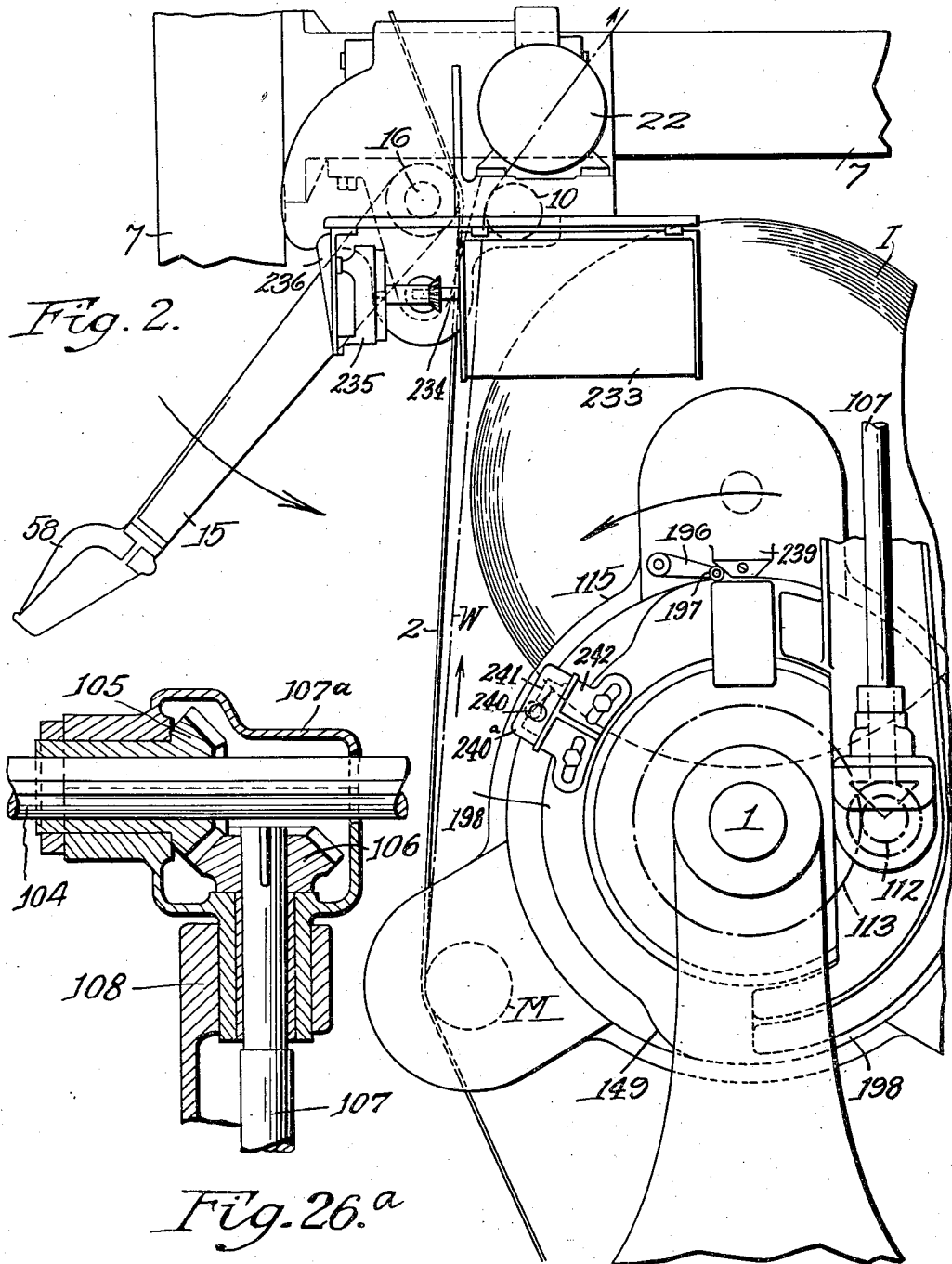
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 2



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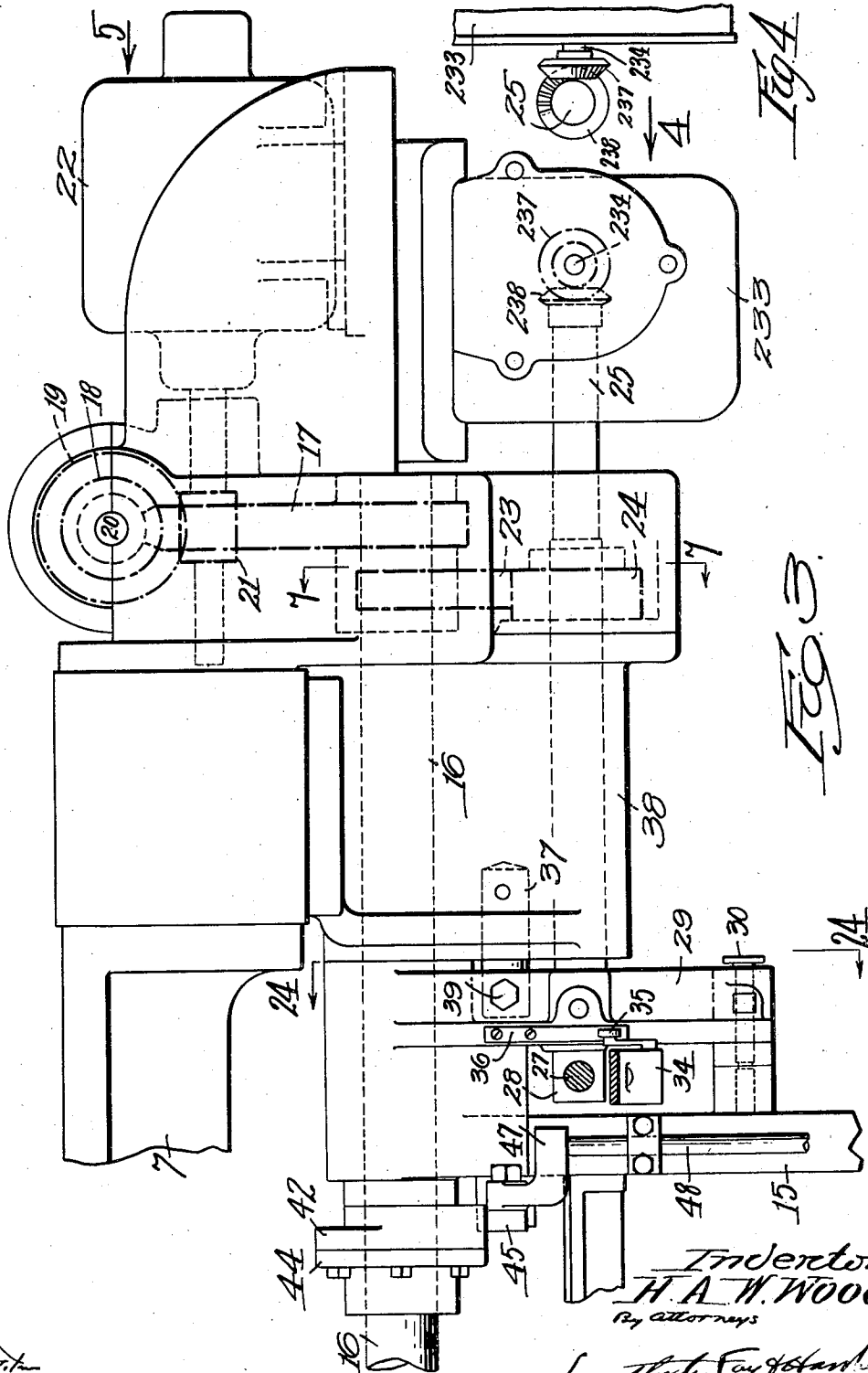
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 3



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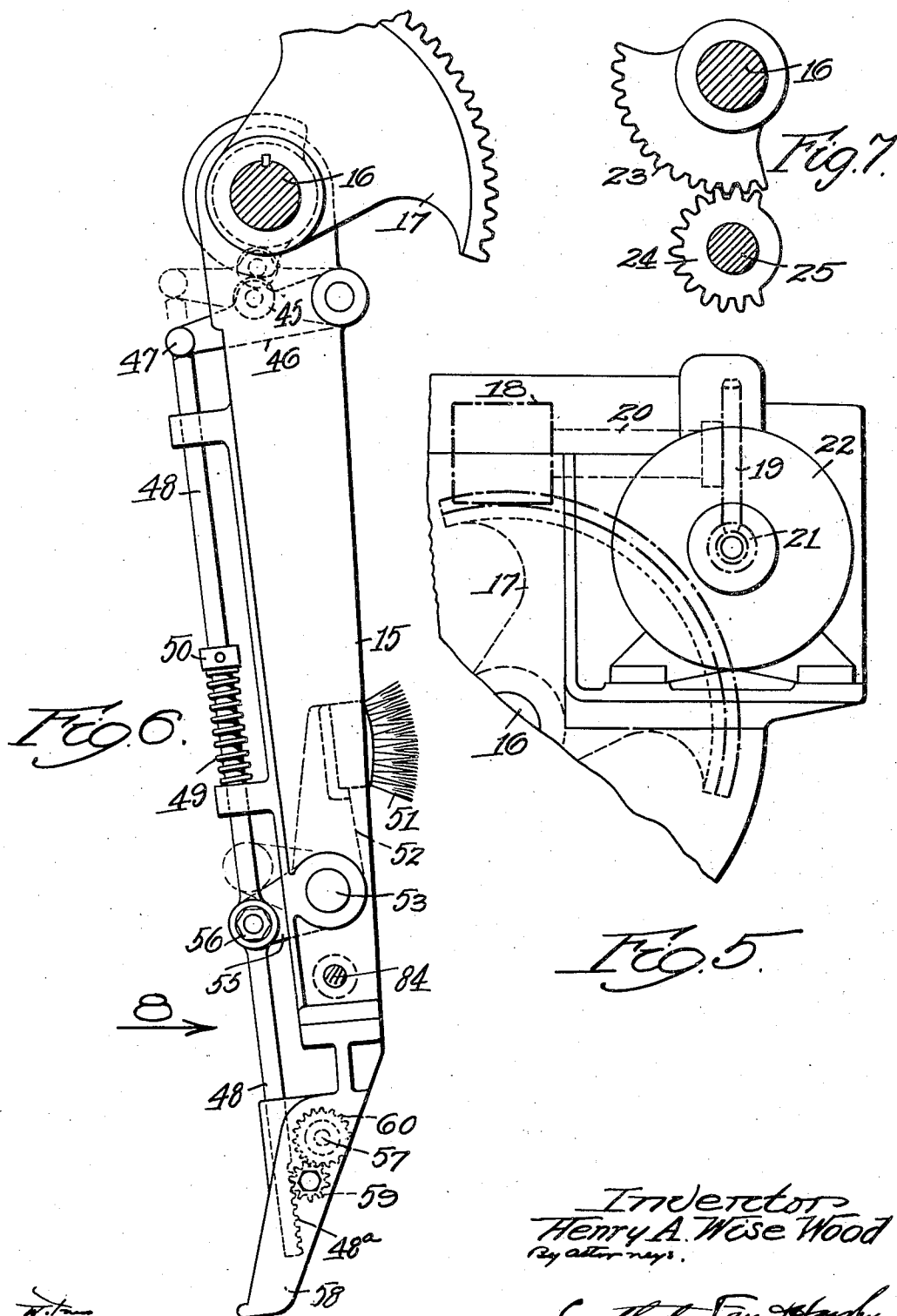
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 4



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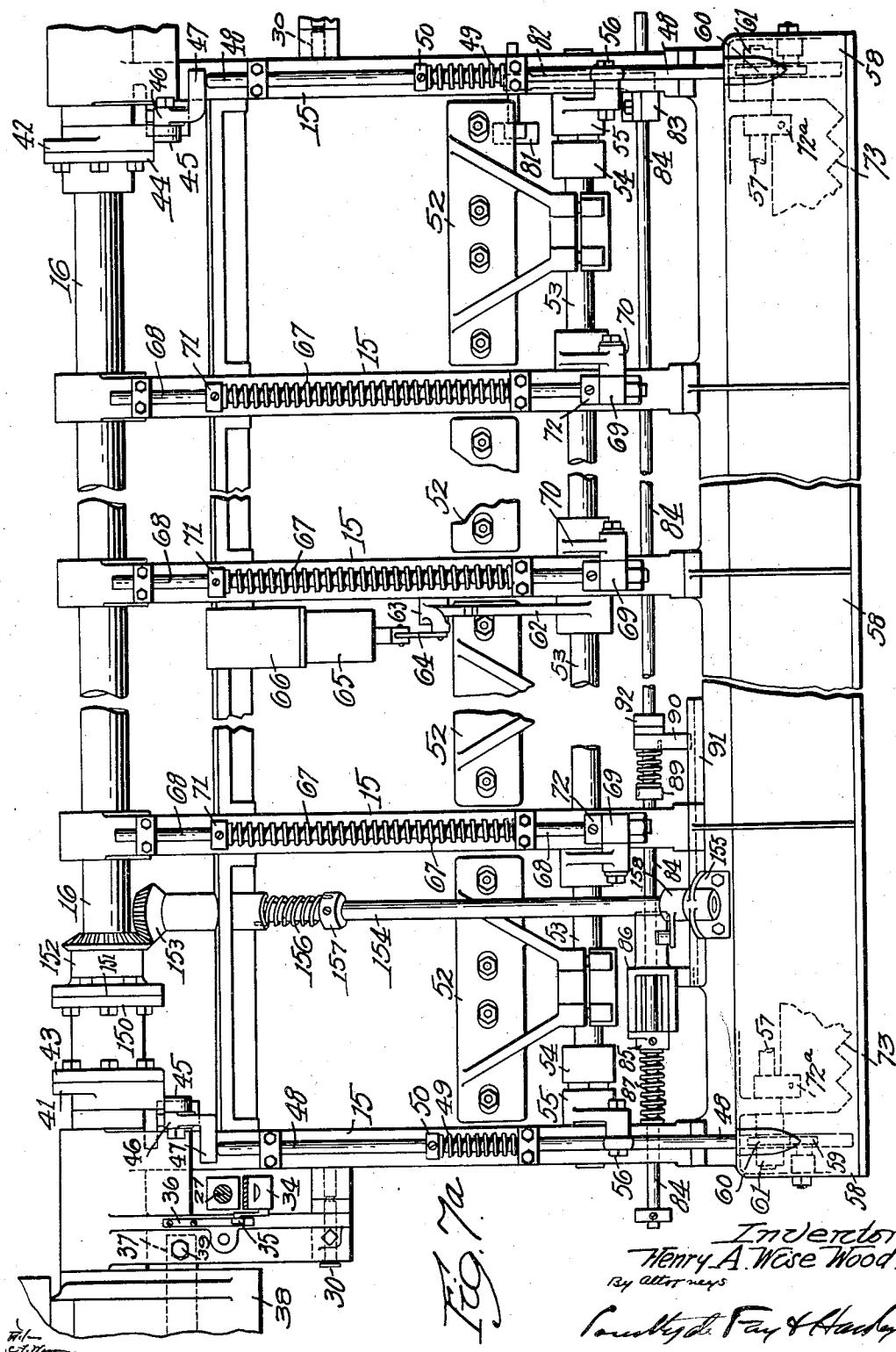
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 5





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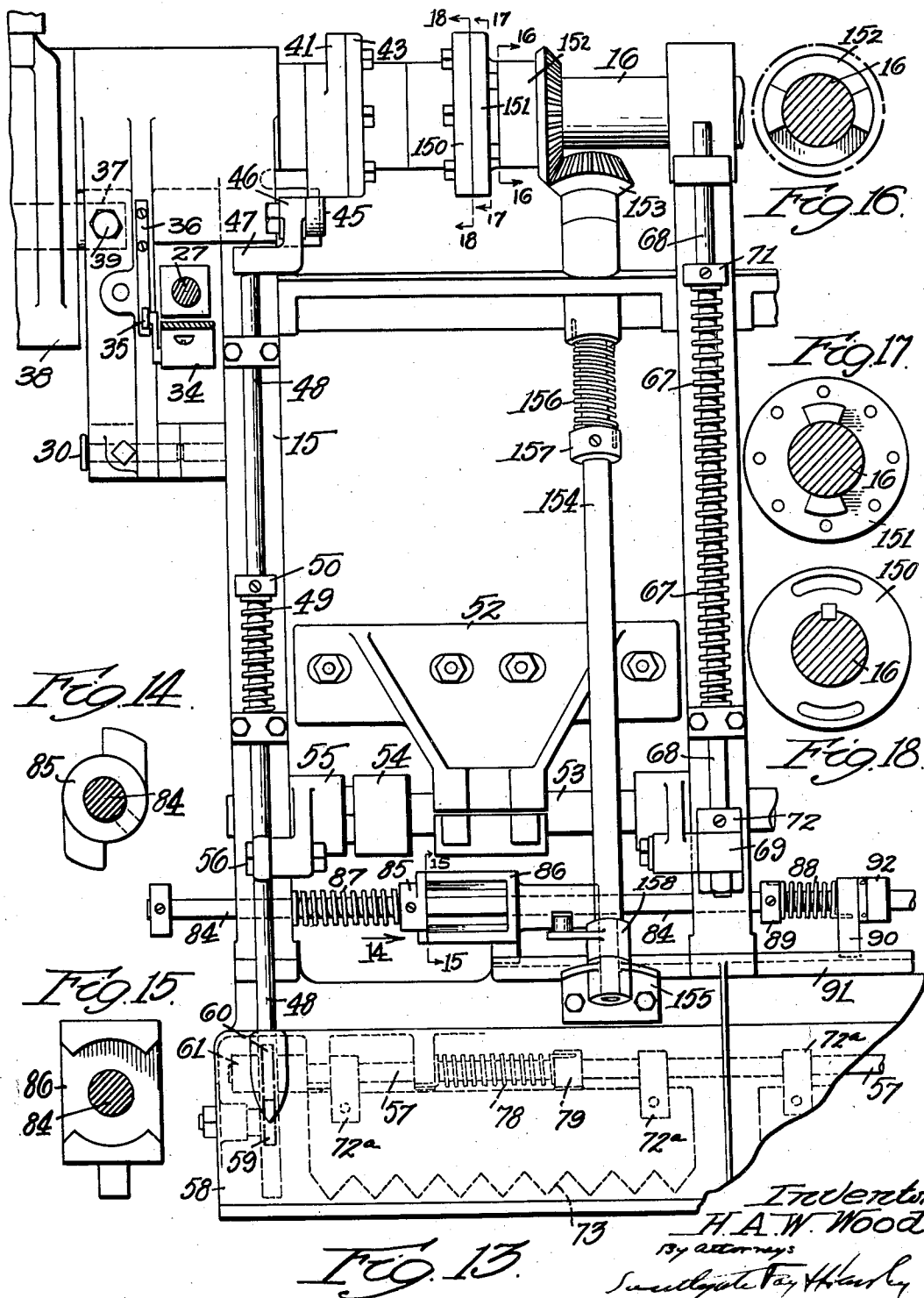
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AUTOMATIC WEB SPLICING MACHINE

Filed Feb. 5, 1932

18 Sheets-Sheet 7



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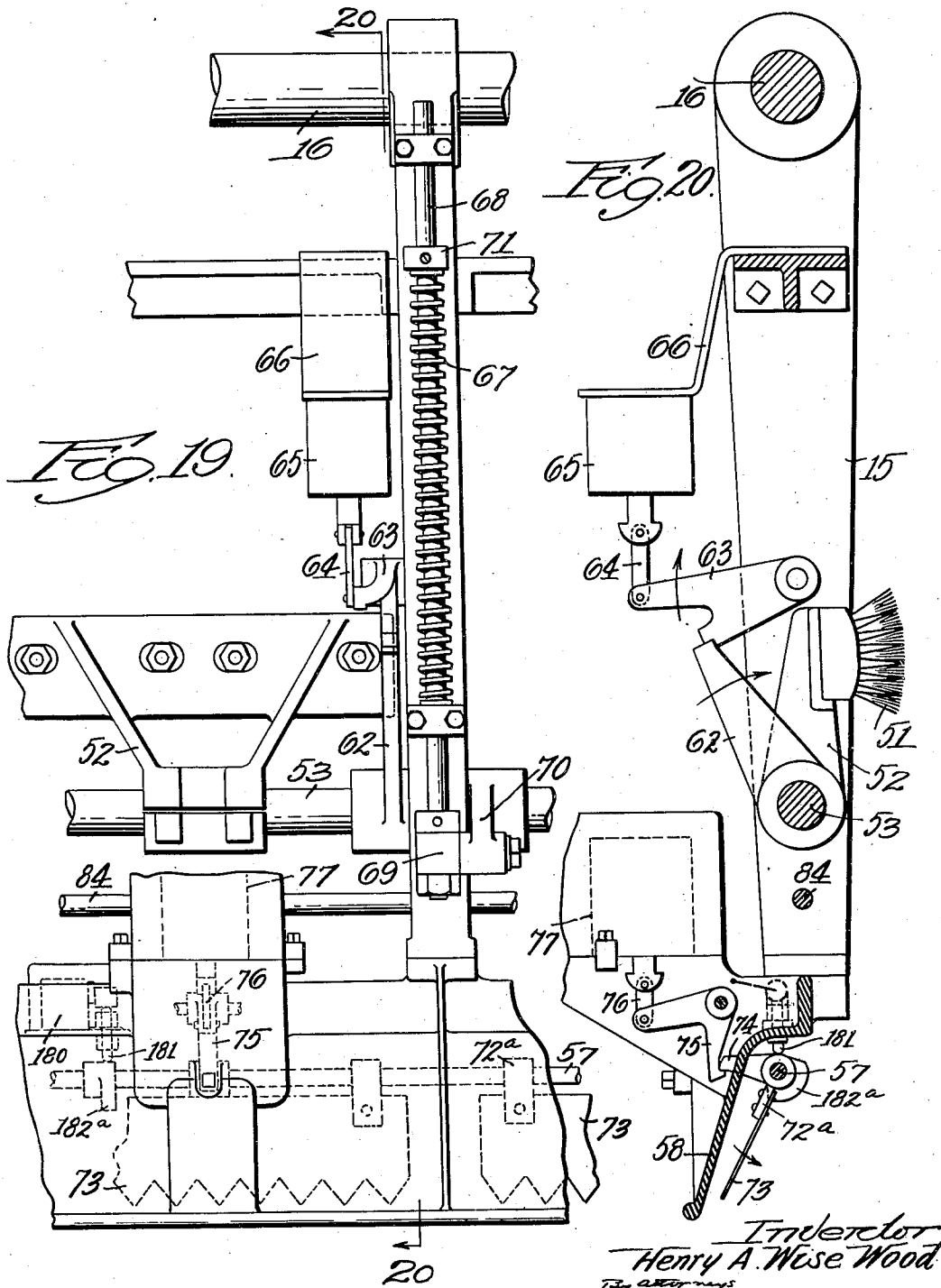
H. A. W. WOOD

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AUTOMATIC WEB SPLICING MACHINE

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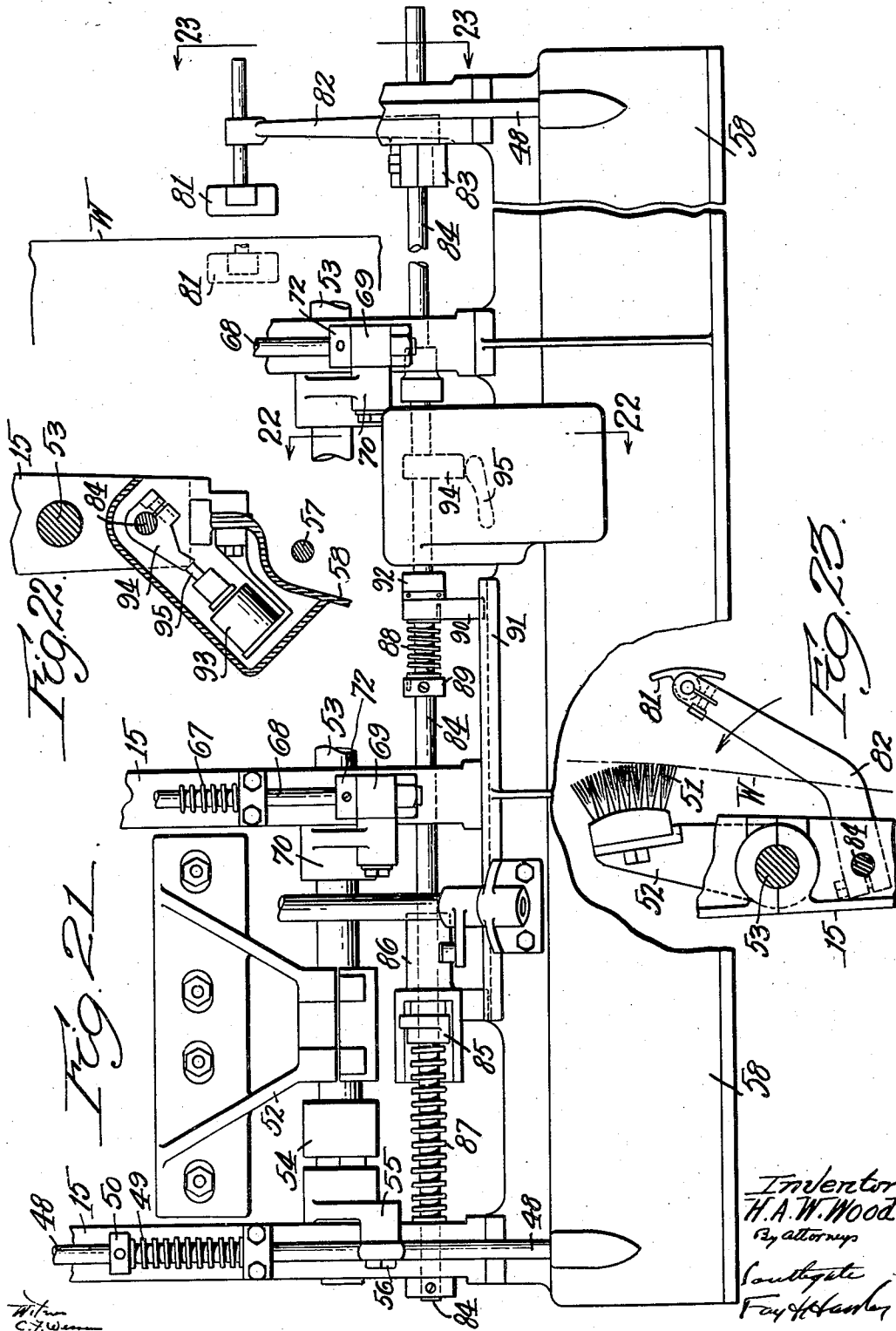
H. A. W. WOOD

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AUTOMATIC WEB SPLICING MACHINE

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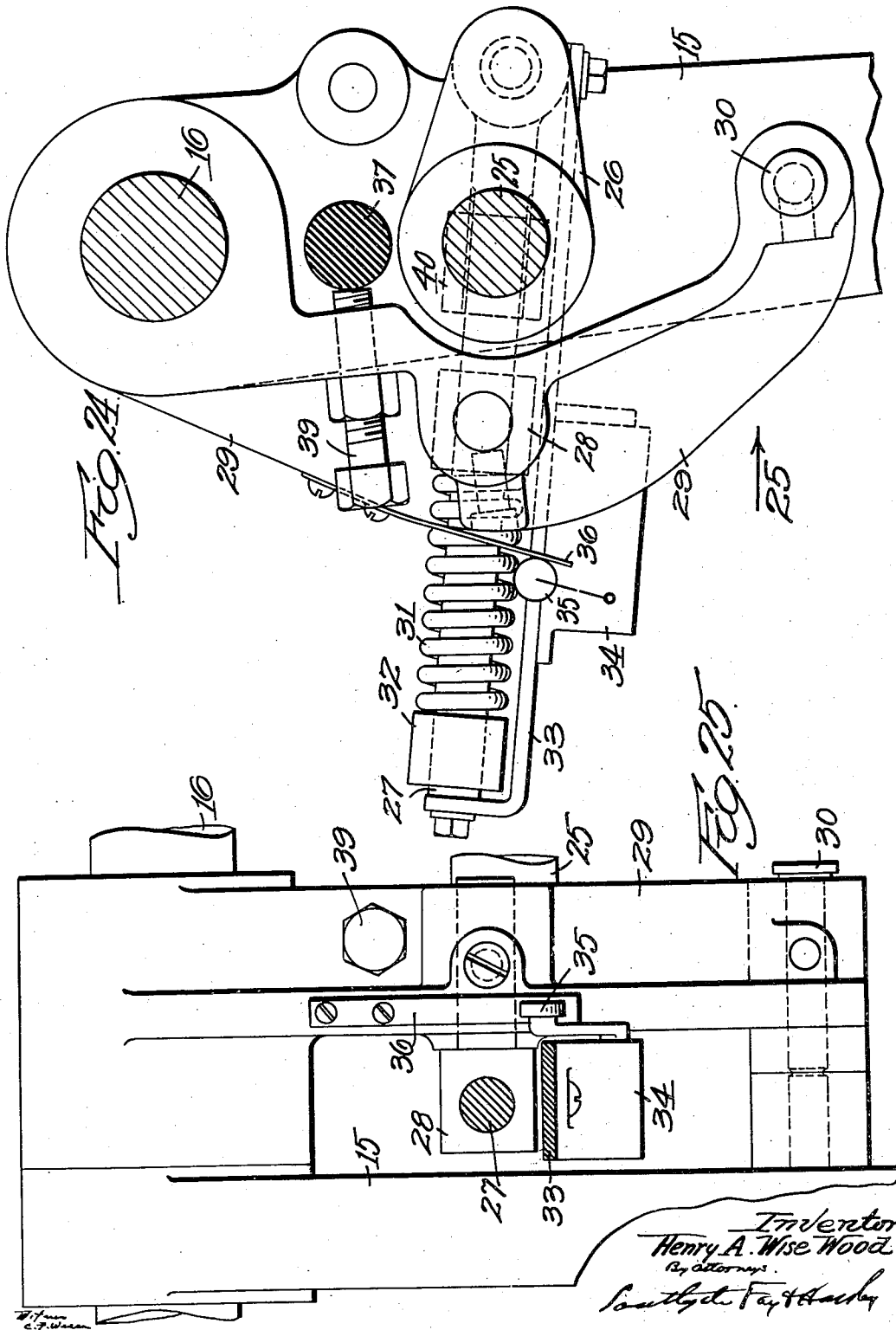
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AUTOMATIC WEB SPLICING MACHINE

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H. A. W. WOOD

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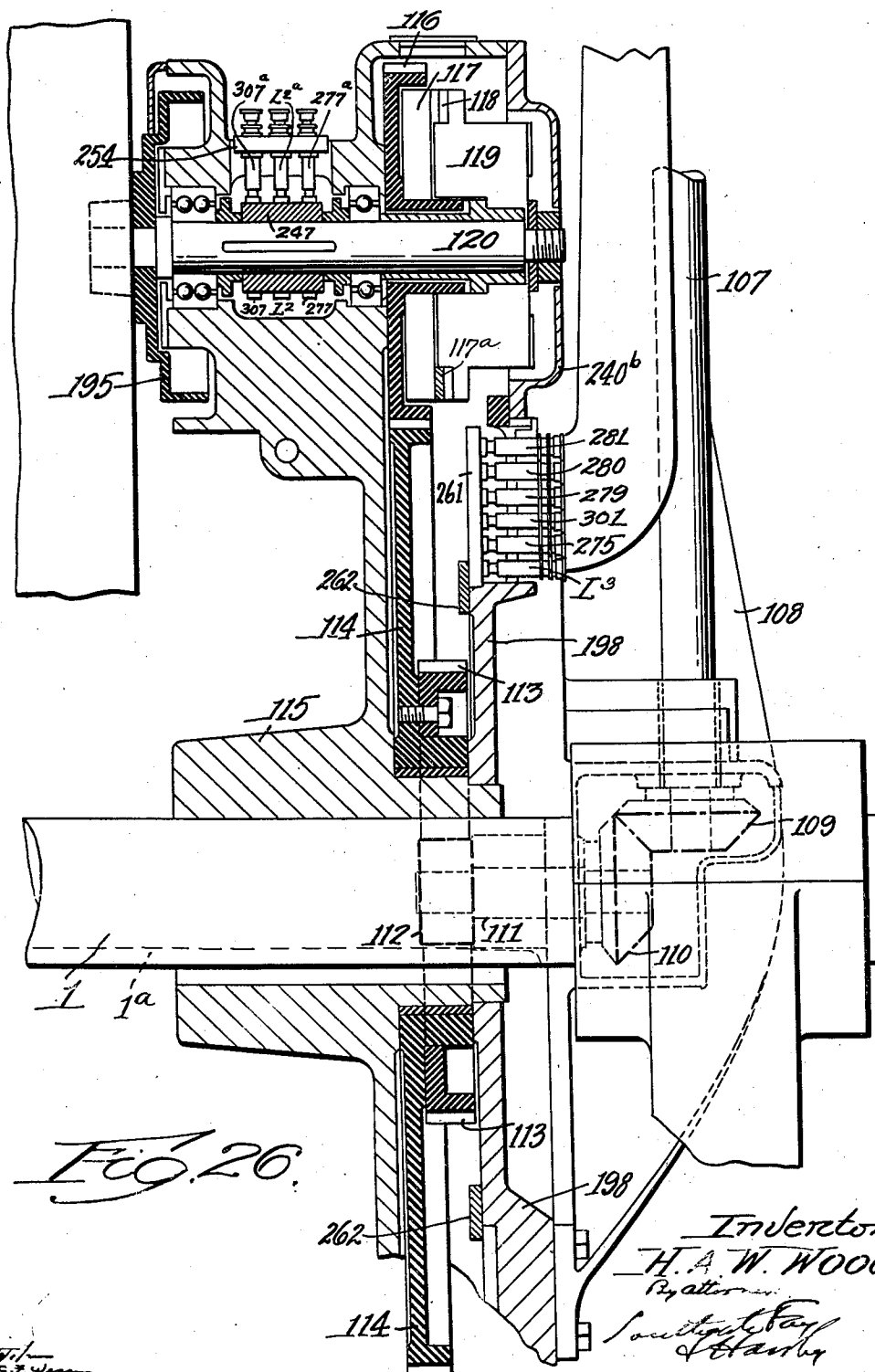


FIG. 26.

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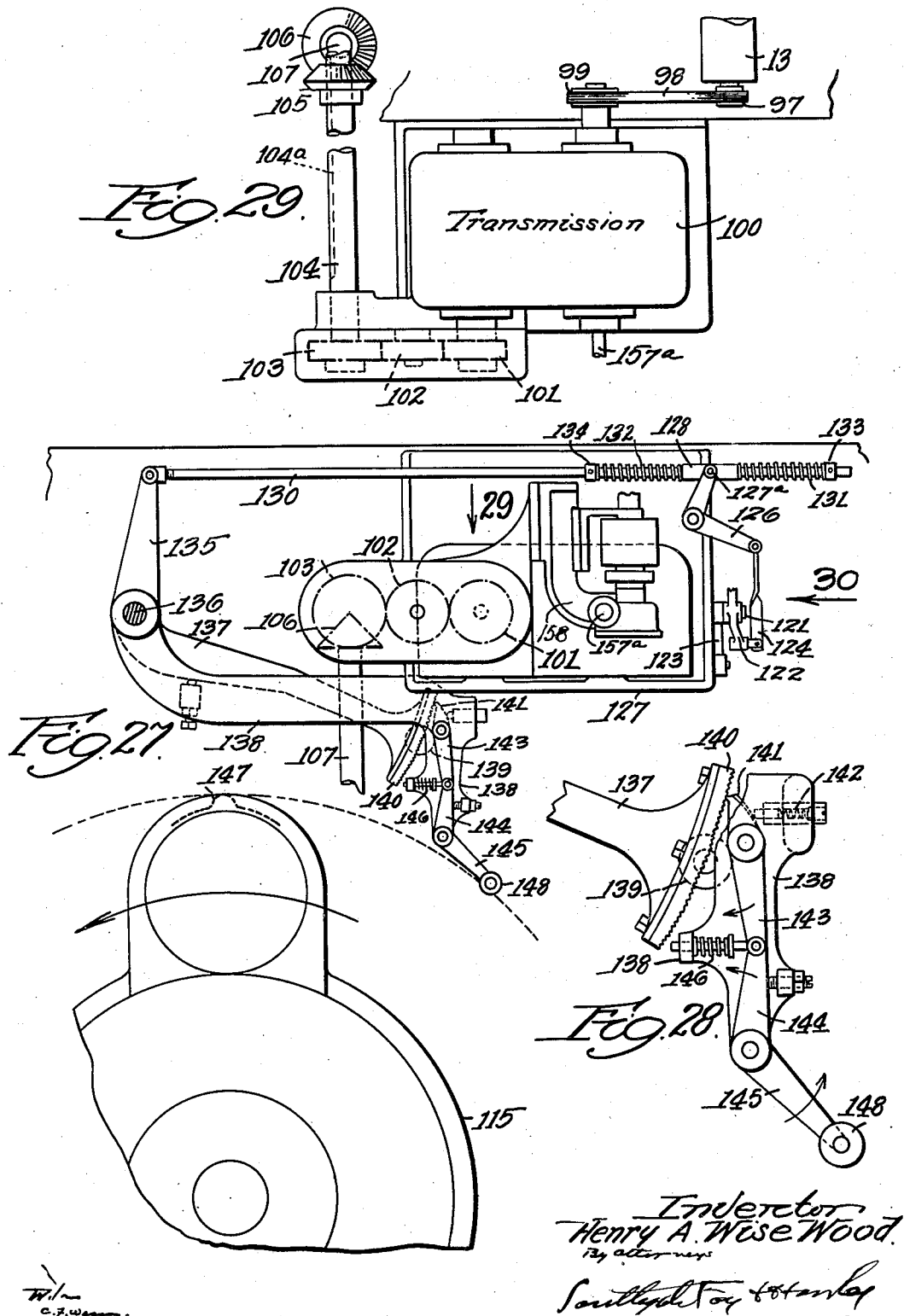
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 12



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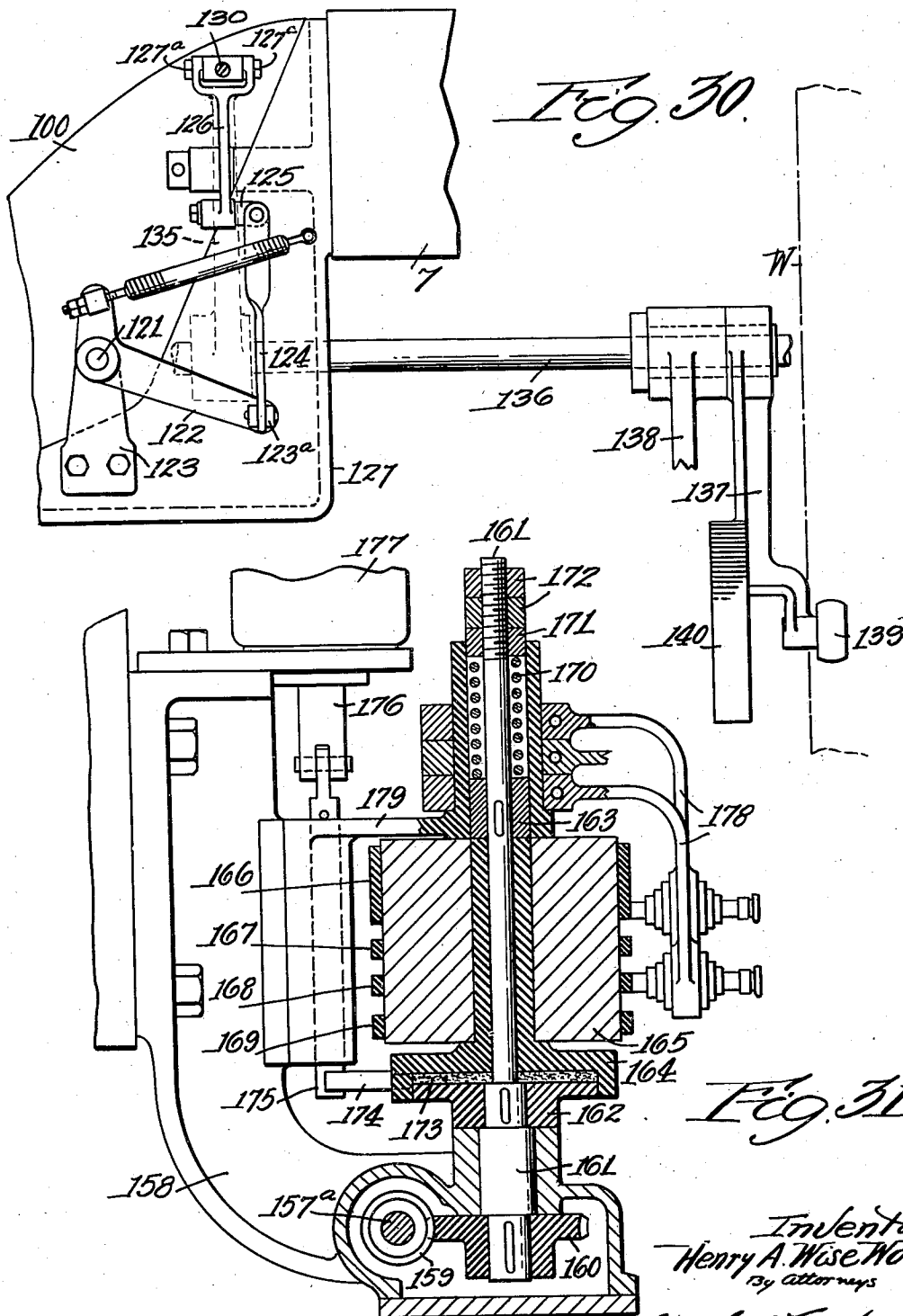
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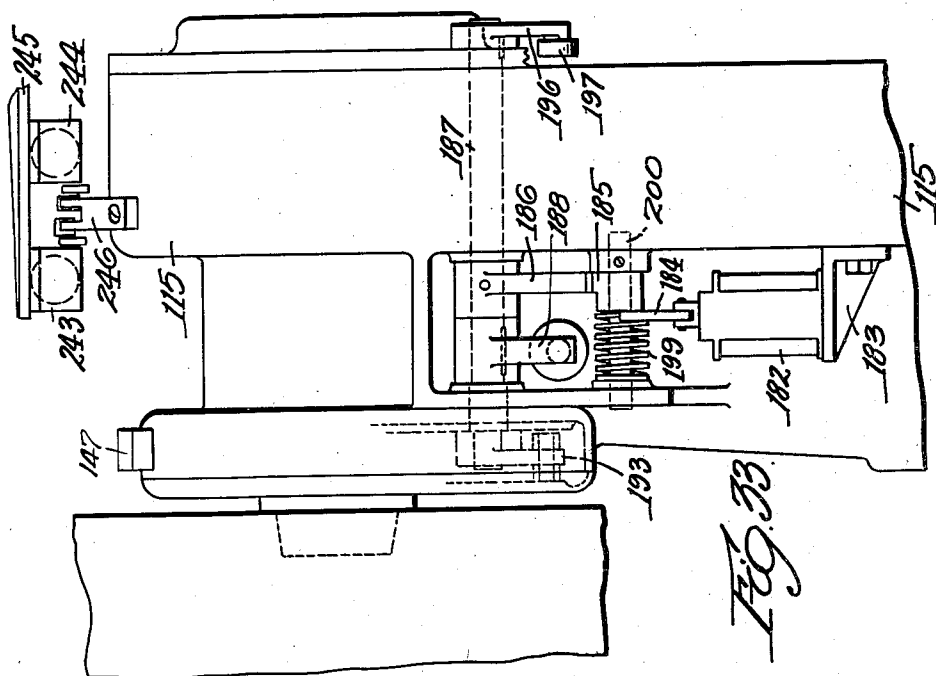


Fig. 33

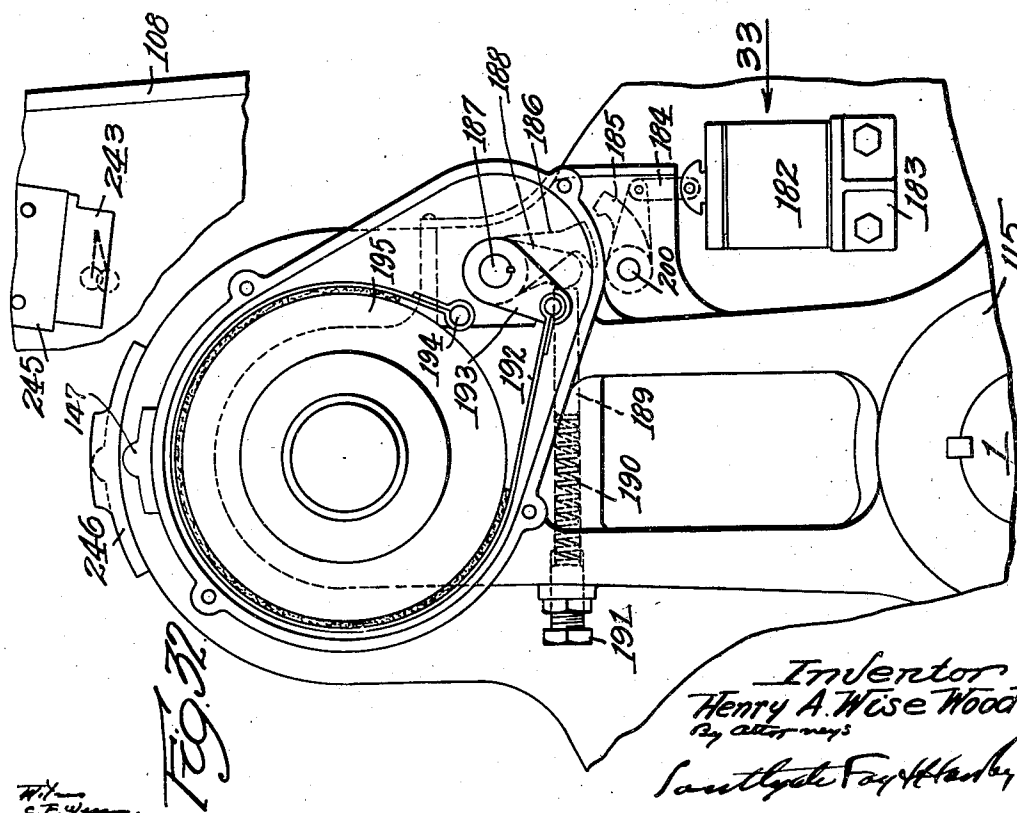


Fig. 32

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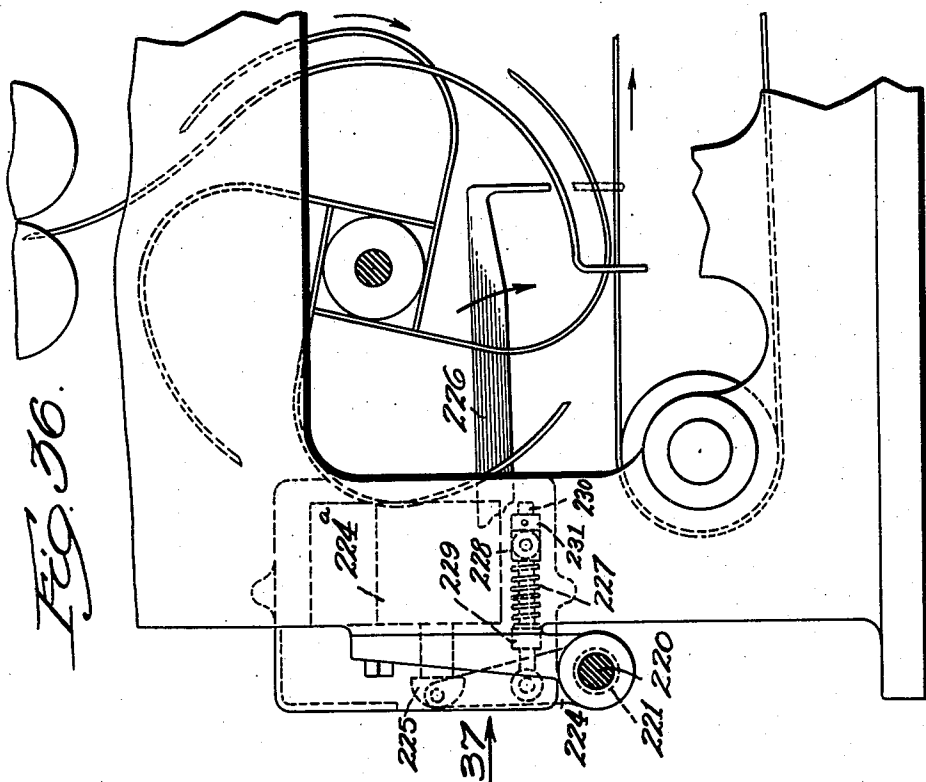
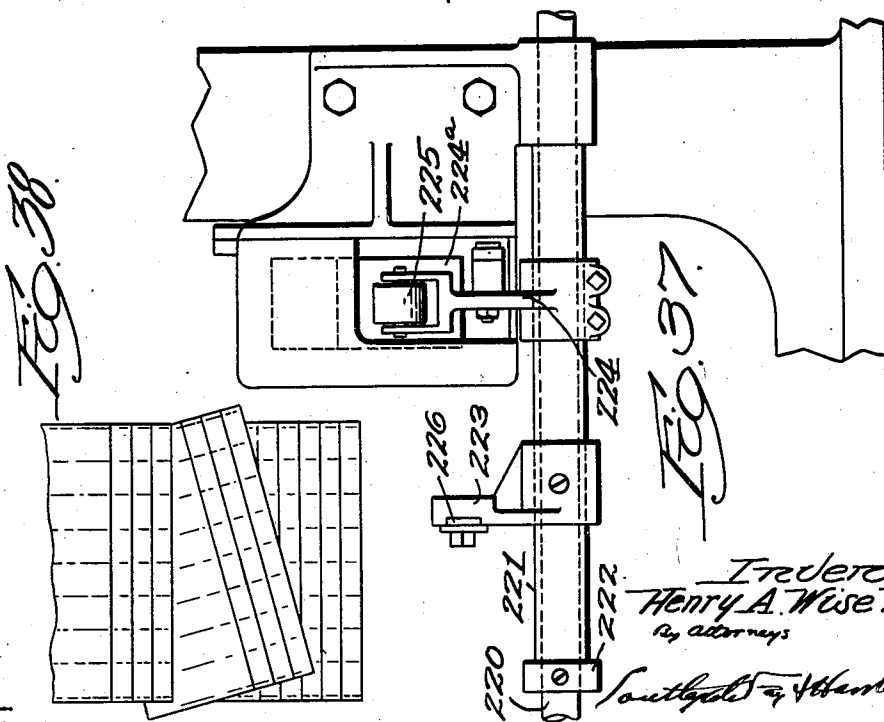
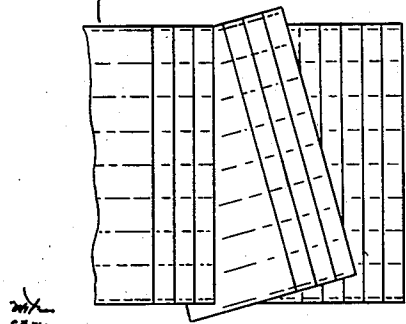
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AUTOMATIC WEB SPLICING MACHINE

Filed Feb. 5, 1932

18 Sheets-Sheet 16



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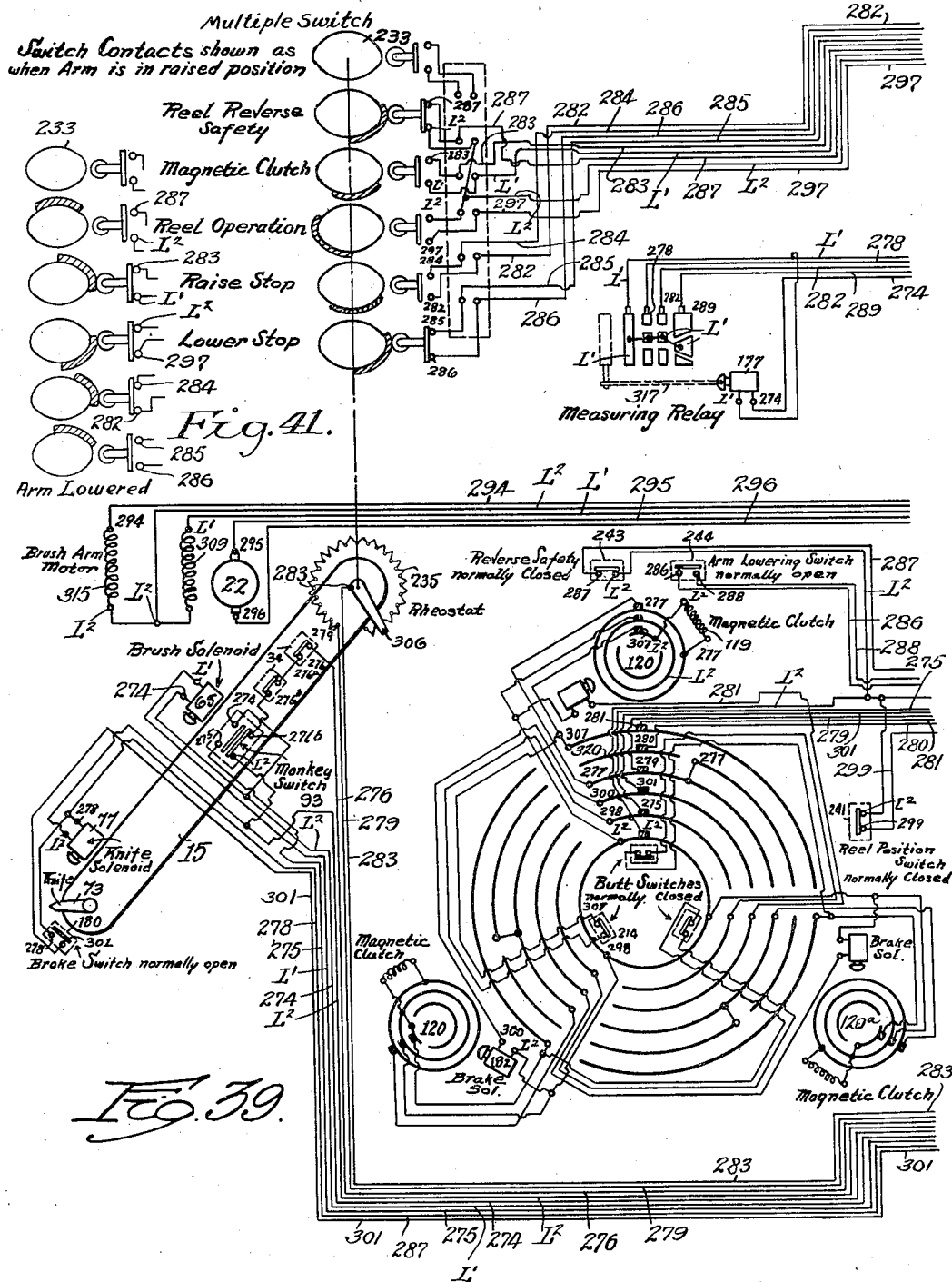
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AUTOMATIC WEB SPLICING MACHINE

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18 Sheets-Sheet 17



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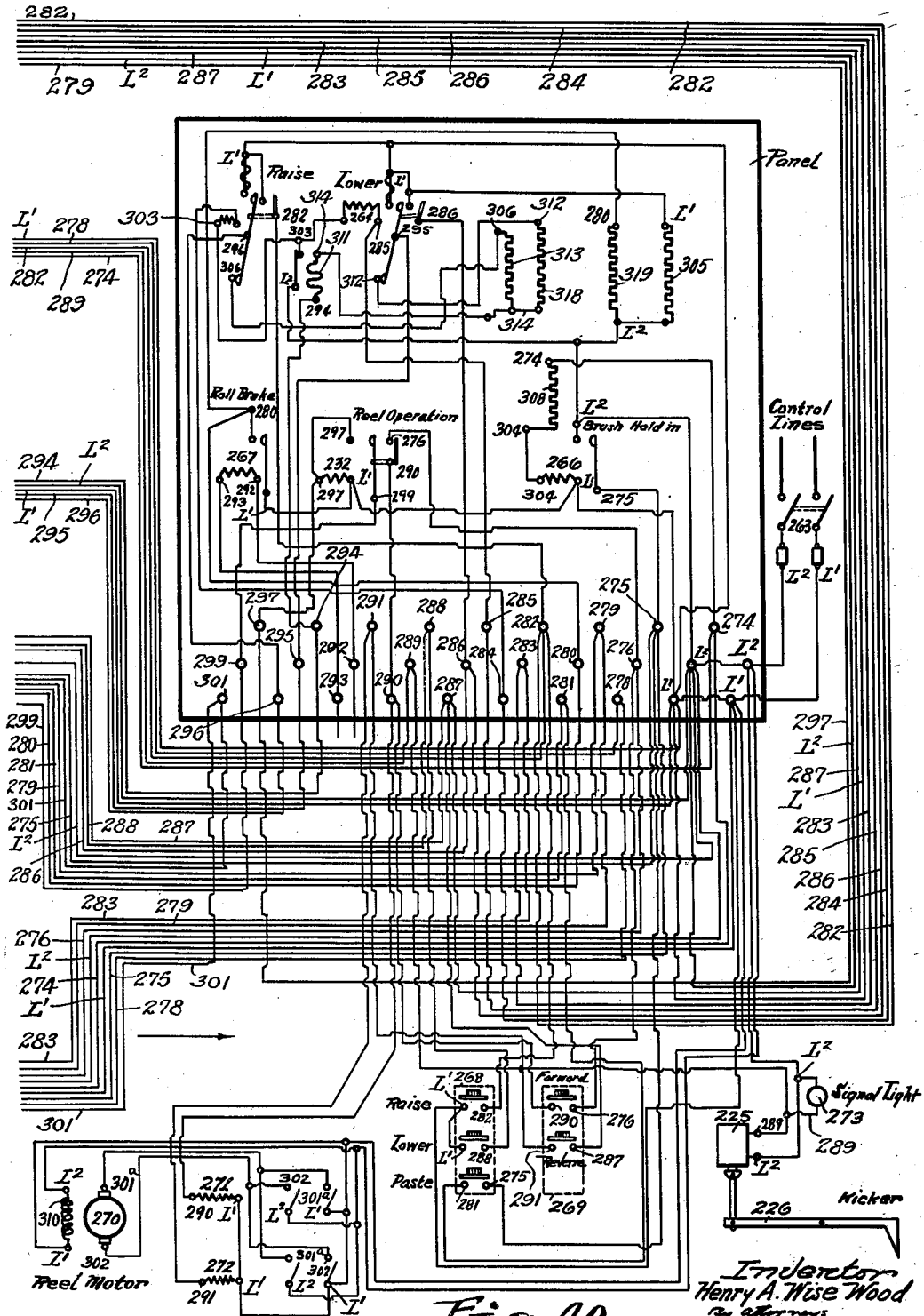
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AUTOMATIC WEB SPLICING MACHINE

Filed Feb. 5, 1932

18 Sheets-Sheet 18



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Per attorney

Henry A. Wise Wood  
By Effort

Wm. F. H. H. H.

Sanctuary Fee & Hardly

## UNITED STATES PATENT OFFICE

2,048,767

## AUTOMATIC WEB SPLICING MACHINE

Henry A. Wise Wood, New York, N. Y., assignor  
to Wood Newspaper Machinery Corporation,  
New York, N. Y., a corporation of Virginia

Application February 5, 1932, Serial No. 591,077

59 Claims. (Cl. 242—58)

The principal objects of this invention are to provide a practical and smoothly working machine for replenishing paper rolls without any diminution of speed whatsoever on the part of the press and in such a form as to require a minimum amount of attention on the part of the operator; to provide, cooperating therewith, means for bringing the new roll up to web speed at its surface; to provide manually initiated, automatic means for moving the roll-supporting device to bring the fresh roll to the proper position for splicing and thereafter to the running position; to provide improved means for moving the path of the web to contact with the pre-pasted points on the in-coming roll; to provide improved means for severing the old web; to provide improved means for moving the roll-supporting device; to provide means for locating the pasted papers on the delivery to bring the pasted roll into the tension straps in running position; to provide means for warning the operator that a splice is coming through; to provide an improved braking arrangement for emergency stops by which a combination of forces acting on the surface of the roll and through the center of the roll tend to retard the speed of the roll to keep it in its proper relation to the press speed; to provide for reducing the voltage on the magnetic clutch as the roll is carried into the tension belts; to provide means for taking care of normal changes which are expected in a roll-supporting device for carrying rolls of full or fractional width; to provide these features in combination with each other so related that they will synchronize perfectly at very high speeds, and to provide for the operation of all these mechanisms in a very expedient manner so that a minimum amount of energy is absorbed and a minimum amount of time employed in the whole operation.

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 preferred embodiment of the invention as applied to a three arm roll-supporting structure;

Fig. 2 is an enlarged end view showing the mechanism for lowering the brush arm and the adjustable switch bracket for determining the stopping of the reel rotation after splicing;

Fig. 3 is a side view of the drive for lowering and raising the brush arm;

Fig. 4 is a fragmentary view, taken as indicated by the arrow 4 in Fig. 3, showing the drive to the multiple switch;

Fig. 5 is a fragmentary view, taken as indicated by the arrow 5 in Fig. 3, of the lift motor showing the segment which raises and lowers the brush arm;

Fig. 6 is an edge view of the brush arm proper showing the brush and knife resetting mechanism with the brush arm in operating position but with the brush drawn back;

Fig. 7 is a detailed view in cross section on the line 7—7 of Fig. 3, of the two segments used in lowering the brush arm;

Fig. 7a is a complete elevation of the brush arm;

Fig. 8 is a partial elevation of the central part of the brush arm as indicated by the arrow 8 in Fig. 6;

Fig. 9 is a view of the brush resetting device in section on the line 9—9 of Fig. 8;

Fig. 10 is another view of the brush resetting device in section on the line 10—10 of Fig. 8;

Figs. 11 and 12 are detailed views of the gear and clutch collar used in resetting the knife.

Fig. 13 is a partial elevation of the brush arm on the left end carrying the operating device for the "monkey-switch", showing the shear pin arrangement on the brush arm;

Fig. 14 is a view looking in the direction indicated by the arrow 14 in Fig. 13, showing a double-ended latch arrangement for operation of the "monkey-switch" rod;

Fig. 15 is a sectional view of the same on the line 15—15 of Fig. 13;

Figs. 16, 17, and 18 are detailed views of the bevelled gear, operating clutch and flange used in setting in the "monkey-switch" toe, taken respectively in section on the lines 16—16, 17—17, and 18—18 of Fig. 13;

Fig. 19 is an elevation of a portion of the right end of the brush arm showing the brush and knife tripping mechanisms;

Fig. 20 is an end view of the same, partially in section on the line 20—20 of Fig. 19;

Fig. 21 is a view of the lower part of the brush arm including a complete view of the "monkey-switch" rod and its two positions with reference to the edge of the web;

Fig. 22 is a section taken on line 22—22 of Fig. 21 showing details of the "monkey-switch";

Fig. 23 is a section on line 23—23 of Fig. 21 showing an end view of the relation between the brush, the paper and the "monkey-switch" lever before the latter is tripped;

Fig. 24 is an intimate view in section on the line 24—24 of Fig. 3 of the safety arrangement carried on the end of the brush arm;

Fig. 25 is an elevation of the above as indicated by the arrow 25 in Fig. 24;

Fig. 26 is a diametrical section through the reel spider through which the drive of the new roll is obtained.

Fig. 26a is a detail view showing the upper portion broken away in Fig. 26.

Fig. 27 is an end view showing the speed-setting device used to compensate for different roll diameters;

Fig. 28 is a detailed view on enlarged scale of the ratchet and pawl arrangement for holding this speed setting once it is made;

Fig. 29 is a plan, as indicated by the arrow 29 in Fig. 27, of part of the drive to the incoming roll showing the manner in which the variable speed transmission is used.

Fig. 30 is an end view looking in the direction of arrow 30 in Fig. 27 showing the link motion used in transmitting the speed compensation for roll diameters.

Fig. 31 is a cross sectional view of the measuring relay;

Fig. 32 is an end view of one of the arms of the spider of the reel showing the band brake construction for stopping the butt after the old web is severed;

Fig. 33 is an elevation of the above, as indicated by the arrow 33 in Fig. 32, showing a view of the safety switches for preventing damage to the brush arm;

Fig. 34 is a side view showing the construction of the adjustable butt switch for varying the size of the expiring roll at which the splicing mechanism operates;

Fig. 35 is an end view of the same, as indicated by the arrow 35 in Fig. 34;

Fig. 36 is an end view of the kicker arrangement placed on the folder for locating the pasted papers;

Fig. 37 is an elevation as indicated by the arrow 37 in Fig. 36; Fig. 38 is a plan showing the manner in which the pasted papers are set askew on the delivery.

Figs. 39 and 40, together constitute a wiring diagram and

Fig. 41 is a fragmentary diagram showing the position of the elements of the multiple switch when the brush arm is lowered.

In the operation of newspaper presses, especially of the modern type where paper is fed from a roll, it is very important that the replenishing of a paper roll, when one has expired, be done in an expedient manner so that a minimum amount of energy and time is absorbed. This invention has for its purpose the replenishing of paper rolls without any diminution of speed whatsoever on the part of the press, and with a minimum amount of attention on the part of the operator. It performs the functions of bringing the roll up to proper speed, i. e., the same surface speed as that of the web, rotating the roll supporting device to the proper position for splicing, moving the path of the web to contact with the pre-pasted points on the incoming roll, severing the old web, moving the roll supporting device into the web tensioning belts to the running position, locating the pasted papers on the delivery, warning the operator that a splice is coming through, and providing for a braking arrangement for emergency stops wherein a combination of forces acting on the surface of the roll and through the center of the roll tend to retard the roll in its proper relation to the press.

Referring to Fig. 1, it will be seen that a shaft

1 is provided with a groove 1<sup>a</sup> is mounted in the well known pedestals at each end and carries attached thereto spiders for the proper mounting of the paper rolls L, M, and N. Straps 2 are attached, one end to a rod 3 carried in brackets 4, secured to the floor, the other end being attached to one end of a lever 5 which is pivoted at 6 on a bracket secured to the frame 7. The other end of the lever 5 carries a link 8 for the mounting of weights 9. This arrangement provides proper tension for the web W which passes over a bending roll 10, tension roll 11, bending roll 12, feeding roll 13, bending roll 14, and so on to the printing press, not shown.

Provisions are supplied as in the customary type of reel so that the reel may be rotated to bring the rolls successively from loading to pasting position and then to running positions and provisions are made for shifting the rolls endwise to maintain side register. The tension device and reel described above have no particular connection with the web splicing machine, it being realized that this reel and tension device could be used without employing the rest of the mechanism and that the invention can be applied to other roll supporting devices without departing from this invention. It will be understood that the particular form of reel and tensioning device described above is incidental to, but forms no part of, this invention.

One of the principal functions in uniting web rolls is bringing together the old web and the incoming roll. The present invention employs the method of bringing the incoming roll up to the same surface speed as that of the web and then pressing the two together.

The proper relationship between the web and the roll is accomplished by two motions. First, a brush arm 15 is lowered over which the web travels, contacting with an oscillatable brush 51. The reel then moves forward until the incoming web roll is a predetermined distance from the web, when by this combination of movements the proper set-up is accomplished. The brush arm carries not only the oscillatable brush for applying the old web to the new roll but a knife 73 for severing the old web and the mechanism for stopping the reel at the proper distance from the web.

In Fig. 6 is shown the brush arm frame 15 mounted free to swing upon a shaft 16 which is carried in brackets attached to the frame of the machine. This constitutes a web deflector. The shaft 16 is given an oscillating motion through a gear segment 17 secured thereto, meshing with a worm 18 which together with a worm wheel 19 is mounted on shaft 20. Another worm 21 is carrier on the armature shaft of a motor 22 and meshes with worm wheel 19 to impart an oscillating motion through this chain of gears, just described, to the shaft 16. At both ends of the shaft 16 are secured segments 23 for meshing respectively with two segments 24 mounted on two shafts 25. The inner end of each shaft 25 carries a crank arm 26 to which a spring rod 27 is pivotally attached. (See Figs. 24 and 25). The spring rod 27 pierces a poppet 28 which is pivotally carried on a shear pin arm 29, this latter arm being mounted loosely on the shaft 16 and held in proper relation with the brush arm frame 15 by a shear pin 30. The spring 31 abuts against the poppet 28 and is held in position by a lock-nut 32. Attached to the spring rod 27 is a strap 33 for the mounting of a safety switch 34, whose operating roller 35 is positioned

in close relation to a steel strip 36, the latter being carried on the shear pin arm 29. A stop 37 is provided which is mounted in a bracket 38 to operate against an adjustable stop screw 39 carried in the shear pin arm 29. The bracket 38 is one of two brackets which are used for mounting the shaft 16 and the two short shafts 25.

In Fig. 24 the arrangement is shown with the brush down, in which case the crank arm 26 extends to the right, the stop screw 39 abutting against the stop pin 37. It will be noted that the spring 31 is then in compression against the poppet 28, tending to hold the brush arm through the shear pin 30, yieldingly, in the lowered position. It will be understood that this mechanism is duplicated on the other end of the brush arm frame. It has a two-fold purpose, one that it offers a yielding adjustable force to the brush arm so that it may perform its function of applying the web under the most advantageous conditions and the other that it acts as a safety device should the "monkey-switch" fail to operate or for any reason the incoming roll continue to move towards the brush arm frame when it is in its lowered position.

If the crank 26 and spring rod 27 connected thereto are in a stationary position and the brush arm frame 15 is rotated to the left, as shown in Fig. 24, this motion will cause the steel strip 36 to operate against switch roll 35 opening up a control circuit in the reel motor, thereby stopping the forward motion of the reel. The stopping of the reel accomplishes the lowering of the brush arm, it being evident that by a clockwise rotation of the shaft 25 and its crank motion 26, the spring rod 27 will be moved to the left, as viewed in Fig. 24, until a stop collar 40 comes in contact with the poppet 28, thereby pushing forward that poppet and through the shear pins 30, one on each end, lifting the brush arm to the inoperative position.

As shown in Figs. 6, 7a, 8, and 13, cams 41 and 42 are adjustably secured to the shaft 16 through flanges 43 and 44 respectively by means of a bolt and slot connection. Each of these cams carries a high and low surface for bearing against cam rollers 45, rotatably carried on arms 46 which are pivoted by one end on the brush arm frame 15, the other end carrying an offset projection 47 for bearing against the top of a re-set rod 48. The re-set rod 48 is slidably mounted in brackets carried on the brush arm 15 and is normally held against the projection 47 of the arm 46 by a compression spring 49, abutting against one of the brackets on the arm 15 and a collar 50 which is secured to the rod 48. There is one such rod 48 on each end of the brush arm structure and they serve to reset the brush 51 and knife 73. In the position shown in Fig. 6 the reset rod 48 corresponds to the withdrawn position of the brush. This is the position of the brush arm frame at which the brush 51 is ready to be released from a holding latch. Each brush is mounted on an arm 52 which is secured to a shaft 53, which is pivotally carried on the brush arm frame 15. After the brush 51 has been tripped and then the knife 73, these are reset shortly after the shaft 16 begins to move in the direction to lift the brush arm frame 15 to the inoperative position.

A study of Figs. 6, 8, 9, 10, 11, and 12 will show the manner in which this resetting is done. A clutch collar 54 is secured to the shaft 53 which cooperates with a clutch arm 55, the free end of which carries a stud 56 for loosely fitting in the

reset rod 48. A pushing down of the reset rod 48 swings the brush arm 52 to the left as shown in Fig. 6, allowing its latch 63 (Fig. 20) to reset. A similar construction is used on the knife shaft 57 which is oscillatably mounted in a knife hanger 58 secured to the bottom of the brush arm frame 15. The lower end of reset rod 48 carries rack teeth 48<sup>a</sup> for meshing with a pinion 59. The pinion 59 in turn meshes with a clutch gear 60 which is carried free to rotate on the knife shaft 10 57. Clutch teeth on this gear 60 cooperate with similar teeth on a clutch collar 61 which is secured to the shaft 57. Thus a downward motion of the reset rod 48 rotates the knife shaft 57 to such a position that its latch 75 (Fig. 20) may 15 drop in. It should be understood that this resetting device, both brush and knife, are duplicated on each end of the brush arm frame. In the position shown in Fig. 6 the cams 41 and 42 have depressed the reset rod 48 against the op- 20 position of springs 49 thereby moving the clutch arm 55 and clutch gear 60 so that the reset projections 47 carried on the arms 46 are free from contact when the brush or knife is tripped.

Both the brush and knife are tripped or re- 25 leased electrically by the use of solenoids whose timing will be discussed later. By referring to Figs. 19 and 20 it will be seen that a latch arm 62 is secured to the shaft 53 to cooperate with a latch 63 which is pivotally carried on brush 30 arm frame 15. The lifting of the latch 63 is accomplished through a link 64 and solenoid 65 which is secured by a bracket 66 to the brush arm frame 15. The lifting of the latch 63 allows 35 the brush 51 to be forced forward by four springs 67 carried on spring rods 68 which are slidably mounted on the brush arm frame 15 and penetrate poppets 69 which are pivotally attached to arms 70 which latter are secured to the shaft 53. A spring 67, at its lower end, abuts against one 40 of the brackets of the brush arm frame 15 and presses against a collar 71 which is secured to the spring rod 68. A movable collar 72 is provided to abut against the poppet 69 when it is desired to have that particular spring exert its pressure 45 on the brush. These springs 67 are made long so that very nearly the same pressure will be exerted regardless of the distance between the roll and brush within limits.

In running fractional width rolls it is desirable 50 to have this spring pressure decreased. This is accomplished by the moving of one or more of the collars 72 from the position shown in Fig. 8 up until it abuts against the bottom of the bracket against which the spring 67 pushes. This pre- 55 vents that particular spring from exerting its pressure on that brush 51. The brush is made in sections, each a page width preferably. The brush at the ends comes a little short of the edge of the web. One spring is provided for each page 60 width so that the desired flexibility is obtainable, thus with a half width roll two springs would be used; three-quarter width three springs, and for a full roll all four springs. This gives an adjustable yielding means for applying the web to the 65 incoming roll so that proportional pressures are exerted on fractional width rolls.

The tripping of the knife 73 for severing the old web is accomplished in a manner similar to that of the brush, i. e., the knife is spring-pressed 70 and electrically tripped. The knife shaft 57 carries arms 72<sup>a</sup> securely attached thereto for the mounting of knives 73. A latch arm 74 secured to the shaft 57 cooperates with a latch lever 75 pivoted on the knife hanger 58 and connected by 75

a link 76 with the knife solenoid 77. Thus the lifting of the latch 75 by the knife solenoid 77 allows a torsion spring 78, one end of which is carried in the knife hanger 58 and the other in a spring collar 79 secured to the knife shaft 57, to throw the knife forward in a counter-clockwise direction as viewed in Fig. 20. The knives are so placed as to act in between the regular tension members 2.

The mechanism which regulates the distance between the brush over which the old web travels and the incoming roll is called the "monkey-switch" mechanism and is operated by a toe 81 (Figs. 8, 21, and 23) which is set in between the running web and the incoming roll at the time just after the brush arm is lowered. After the lowering of the brush arm the roll comes forward, by automatic rotation of the reel, until it contacts with this toe 81. The toe 81 carries a rod projection for clamping in a "monkey-switch" arm 82 which in turn is secured through an adjustable collar 83 to a rod 84. There are as many collars 83 as desired positions of the arm 82. To change the position of the arm 82 it is necessary only to move it from one collar 83 to another collar 83. This contact of the incoming roll against the toe 81 gives the rod 84 a twisting motion which permits a double-ended "monkey-switch" trip 85 (Figs. 13 and 14), which is secured to the rod 84, to slip off the end of its cooperating bifurcated sleeve 86 and pass inside it (Figs. 13 and 15) so that a compression spring 87 will move the rod 84 to the right as shown in Fig. 21. This removes the toe 81 from between the web and the new roll. The sleeve 86 is slidably keyed on the rod 84.

In order to be sure that the "monkey-switch" arm 82 is always held in its forward position, a torsion spring 88 is provided. One end of this spring fits in a collar 89 secured to the rod 84 and the other end into an arm 90 which is loosely carried on the rod 84 and which carries a projection for sliding in a keyway 91 carried in the brush arm frame 15. The arm 90 is provided with a stop collar 92 which prevents its working away from the spring 88. The motion of the rod 84 to the right has another function and that is the operation of the "monkey-switch" 93 (Fig. 22) on the frame 15. This is accomplished through an arm 94 clamped on the rod 84 so that when the rod 84 moves to the right it operates a pivoted arm 95 thereby working the "monkey-switch" 93. The working of this "monkey-switch" has two functions: one is to break a contact in the reel circuit so that the roll, and the reel, on which it is carried, stops in the proper position for pasting; the second function is the making of another contact which is necessary for the completion of a splice, namely to permit the reel to be again moved at the proper time to bring the fresh roll into its natural running position.

In order to make a splice, three conditions must be satisfied. First, the roll must be the proper distance from the brush over which the web travels and this is determined by the operation of the "monkey-switch". Second, the butt must be of the proper diameter to allow the butt switch to operate. (An alternative of this is a push button which may be pressed by the operator). The third and last condition is that the incoming roll must be in a certain angular relation with respect to the brush. This last is accomplished by a contact on the spindle of the incoming roll and will be discussed later.

When the brush arm frame 15 is lowered it is necessary to bring the frame all the way down against the stops 37 so that the web contacts with the brush 51 before the "monkey-switch" lever 82 and the shoe 81, attached thereto, are inserted between the web and the incoming roll. This is accomplished by a clutch arrangement operating from the shaft 16. Referring to Figs. 7a, 13, and 18a flange 150 is secured to the shaft 16 to which flange is secured by means of a bolt and slot connection a clutch 151 carrying teeth for cooperating with the clutch teeth on a bevel gear 152 which is mounted free to rotate on the shaft 16. The bevel gear 152 meshes with a bevel pinion 153 which is attached to one end of a shaft 154 mounted in the brush arm frame 15 and a bracket 155 secured to the brush arm frame 15. The shaft 154 is kept spring pressed in a counterclockwise direction, as viewed from the bottom and in Fig. 13, by a torsion spring 156 attached with one end each in a collar 157 and the brush arm frame 15. The lower end of the shaft 154 carries an operating arm 158, a projection on whose free end cooperates with a cam slot in the "monkey-switch" operating sleeve 86 to move it to and fro.

Fig. 13 shows the mechanism when the brush arm is lowered previous to the tripping of the "monkey-switch" mechanism at which time the gearing just described as coming down from the shaft 16 has turned to such position as to hold the "monkey-switch" operating sleeve 86 to the left through the arm 158. Thereby the "monkey-switch" rod 84 is held through "monkey-switch" trip 85 secured to rod 84 and bearing against the end of the "monkey-switch" operating sleeve 86. When the incoming roll comes forward to bear against the toe 81, the "monkey-switch" arm 82, which is secured to the "monkey-switch" rod 84 by an adjustable collar 83, is rotated in a counterclockwise direction as viewed in Fig. 23. Thus the "monkey-switch" trip 85 is operated so that its two projections are moved clear of the "monkey-switch" operating sleeve 86. This allows the compression spring 87 to move the "monkey-switch" rod 84 to the right to operate the "monkey-switch" 93 as described above. As the brush arm is lifted, the shaft 154, through the action of the torsion spring 156, turns and tends to move the operating sleeve 86 to the right on account of the shape of the cam slot in the sleeve 86 as viewed in Fig. 13. When the operating sleeve 86 reaches its right hand position the "monkey-switch" trip 85 then clears its open end and allows the "monkey-switch" rod 84 to rotate in a clockwise direction as viewed in Fig. 23, at which time the "monkey-switch" is reset by the slipping of the toe 94 off the arm 95. This allows a remaking of the contacts in the "monkey-switch" so that the forward rotation of the reel is resumed and the roll which is now spliced may be carried over to the running position against the tension straps 2. The operating sleeve 86 stays at its right hand end of motion until the brush arm is again lowered, at which time the cycle is repeated.

Referring to Figs. 26, 27, 28, 29, and 30 it will be seen that the drive for the incoming roll is obtained from the press through any convenient press driven member such as the roll 13 carrying a sprocket 97 which through a chain 98 and sprocket 99, the latter attached to the input end of the variable speed transmission 100, permits a drive which may be varied in gear ratio to compensate for the different diameters of the incom-

ing roll so that the driving force may be applied to the center of the incoming roll. From the output side of the variable speed transmission 100, a gear 101 meshes with an idler 102 which in turn cooperates with a gear 103. The gear 103 is secured to a cross shaft 104 provided with a groove 104<sup>a</sup> on which is also mounted a bevel gear 105 meshing with a bevel gear 106 attached to drive a vertical shaft 107. Bevel gears 105 and 106 are mounted in a slidable bracket 106<sup>a</sup> which permits horizontal shifting of the pair of gears and a limited vertical motion of the vertical shaft 107, without drawing the gears into misalignment. The vertical shaft 107 is carried in bearings mounted on an end bracket 108 and at its lower end carries a bevel gear 109 for meshing with a bevel gear 110 to drive a jack shaft 111 carried by the reel. The other end of this jack shaft carries a pinion 112 meshing with a gear 113 which is secured to and rotates with a large gear 114. The latter is mounted by an antifriction bearing on a hub of a spider 115. On each of the three spindles mounted in the spider 115, a gear 116 is rotatably mounted to mesh with the large gear 114. A magnetic clutch armature 117 is connected with the gear 116 to rotate therewith so that its friction surface may engage with an adjustable braking and driving disc 118 carried on a magnetic clutch 119 which is secured to rotate with a spindle 120. This provides a clutch arrangement between the drive and the spindle, whereby the energizing of the magnetic clutch 119 will connect the spindle 120 to the drive brought in through the variable speed transmission 100 from the press. An electrical selector is provided which will be described later so that the proper clutch may be brought into operation when it is desired to make a splice.

Figs. 27, 28, and 30 show the speed setting mechanism which insures the proper rotational ratio between the press and the incoming roll as the incoming roll is of one or another diameter. The variable speed transmission 100 has a regulating shaft 121 projecting therefrom to which is attached arm 122, the free end of the shaft 121 being supported by a bracket 123 to insure rigidity. The variable speed transmission 100 is so built that motion of the arm 122 in a clockwise direction, as viewed in Fig. 30, speeds up the revolutions of the spindle 120 with respect to the press while a counter-clockwise direction slows down the spindle 120 with respect to the press. The arm 122 is attached through an arm 123<sup>a</sup> to a link 124 whose other end is pivotally attached through another arm 125 to a bell crank 126 which is oscillatably mounted on a bracket 127. The latter provides a support for the variable speed transmission 100 and is secured to the frame 7 of the press. The upper arm of the bell crank 126 carries a bifurcated end through which pilot studs 127<sup>a</sup> attach it to movable sleeve 128. The movable sleeve 128 is mounted on an operating rod 130. Springs 131 and 132 are provided on alternate sides of the movable sleeve 128 and are backed up by collars 133 and 134 respectively so that at all times either one or the other or both of these springs tend to keep the movable sleeve 128 in the center. The new roll is set to run at slightly less than web speed to maintain a slight tension just after the splice is made.

This type of construction is advisable since the measuring arm 137, referred to later, may be moved in either direction while the press is at rest, thereby fixing a setting which is later completed when the movable sleeve 128 is allowed

to move over and, through the linkage connected with the variable speed transmission 100, make the proper setting for the desired gear ratio. The left hand end of the rod 130, as shown in Fig. 27, is pivotally attached by a poppet to an arm 135, the latter being keyed to a measuring shaft 136. The measuring arm 137 is mounted by a feather on the shaft 136 and carried by a hub-and-collar construction in a bracket 138. The latter is secured to the end bracket 108 so that with any motion of the bracket 108, either for side register or for different widths of paper roll, the measuring arm 137 moves in or out in the proper relation to the edge of the running paper. Thus at all times a measuring roller 139 which is rotatably mounted on the measuring arm 137 may contact with the incoming roll when it is reeled up to position in essentially the same relationship. Thus, when the motion of the measuring arm 137 is translated through the shaft 136 to the arm 135, the rod 130 thereby exerts a pressure to move the sleeve 128 to the desired position and through linkages attached thereto to set the transmission 100.

The measuring arm 137 carries attached thereto a ratchet segment 140 against which two pawls 141 are pressed by springs 142. These pawls were set in a differential method such that first one pawl and then the other operates against the ratchet teeth as the pawls move along them to give a sensitivity of half the tooth pitch. The pawls 141 are pivotally mounted on one end of the bracket 138 and are so connected with arms 143 and 144 that a rotation of an arm 145 in a counter-clockwise direction against the pressure of a spring 146 lifts the pawls 141 away from the ratchet 140, allowing measuring arm 137 to drop. The purpose of this is to bring the measuring arm 137 down so that a small roll following a larger roll will be properly measured. A projection 147, carried one on each arm of the spider 115, presses against a roller 148 which is rotatably mounted on the arm 145 as the reel is moved past it. This contact of the projection 147 and roller 148 for the dropping of the measuring arm 137 is accomplished just before the incoming roll is brought under the measuring roller 139. Thus as the reel is rotated to the position shown in Fig. 27 the incoming roll has passed underneath the roller 137 and, through the linkages described above, has properly set the variable speed transmission 100. The pawls 141 hold this setting until the next roll is brought up to position at which time the cycle is repeated.

A measuring relay is shown in Figs. 27 and 31, its purpose being to measure a certain predetermined distance after the brush is dropped, say for instance one revolution of the incoming roll, and then operate the knife for severing the old web. Another function performed by this is the raising of the brush arm just after the knife operates. A third and rather important duty is the measuring of the distance from the reel up through the press until the pasted points reach the folder, at which time a contact is made to throw down a kicker and set the sheets askew on the delivery which are spoiled by the splice. At the same time a signal light is illuminated to inform the operator that a splice is on the delivery.

This device must be driven in direct relation to the speed of the press so that at all speeds it will measure the same linear distances. This is accomplished by a drive attached to the press proper which in the particular form shown is taken from a shaft 157<sup>a</sup> which is the driving 75

shaft of the variable speed transmission 100. The shaft 157<sup>a</sup> is mounted in bearings in a relay bracket 158 which in turn is secured to the bracket 127 and forms a support for the relay and its solenoid 177. A worm 159 is secured to the shaft 157<sup>a</sup> and meshes with a worm wheel 160, the latter being keyed to a vertical shaft 161. This shaft 161 also carries a driving plate 162 and a spacing collar 163, the latter being free to move longitudinally on the shaft 161. A sleeve 164 is rotatably mounted on the vertical shaft 161 and carries an insulating drum 165 on which are mounted contact rings 166, 167, 168, and 169. Above the spacing collar 163, a spring 170 backed up by a washer 171 and jam nuts 172 forces the sleeve 164 down against a friction washer 173 which is placed between the sleeve 164 and the driving disc 162. This tends to rotate the sleeve 164 and the drum which is carried on it at a speed proportional to that of the press. The rotation of the drum 165 is prevented by a stop pin 174 bearing against a plunger rod 175 whose upper end is attached to the plunger 176 of the solenoid 177. The solenoid 177 is so connected in the electrical circuit that when the brush is dropped, this relay solenoid is energized to lift the plunger rod 175 and release the stop pin 174, thereby allowing the drum 165 to rotate in relation to the speed of the press.

When the drum 165 rotates certain predetermined distances it makes electrical contacts to perform the operations of throwing in the knife to sever the web, raising the brush arm and kicking out the pasted papers at the folder. These individual contacts are carried by contact arms 178 which are mounted on a sleeve bracket 179 such that they may be adjusted around the circumference of the drum to facilitate regulation. The upper contact 166, being the one which regulates the number of pasted papers kicked out at the folder, has a broad contact ring as shown in Fig. 39. The live part of the ring is such as shown at 166<sup>a</sup> that longitudinal regulations of its contact arm throws out more or less papers at the folder. This is provided in addition to the angular regulation which measures a greater or lesser distance from the reel to the folder, it being understood that angular regulation of the upper contact is available when, for any reason, the length of web lead is varied. Thus this measuring relay provides an intermittently operative or normally inactive device which, when once actuated, performs a cycle of operations in proportion to the speed of the press and becomes inactive until it is again actuated, when the cycle is repeated.

When the knife is operated to sever the old web (see Fig. 19) it in turn operates a contact carried in a switch 180 through a plunger 181, the top part of which operates against the switch roller and the bottom being pushed up by a cam 182<sup>a</sup> carried on the knife shaft 57. The making of this contact energizes a solenoid 182, Fig. 32, carried by a small bracket 183 attached to the spider 115. The action of this solenoid through a link 184 rotates a latch 185 in a clockwise direction to release a toe 186, the latter being pinned to a shaft 187. Also secured to the shaft 187 is a spring arm 188 which through a plunger 189 operating there-against and, pressed by a spring 190 and adjusting screw 191, creates pressure to tighten a brake band 192. One end of the brake band is secured to an arm 193 also attached to the shaft 187, the other being carried on a stud 194 screwed in the spider 115. The tightening of this

brake band creates a friction on a brake drum 195 which will be seen in Fig. 26 to be secured to the spindle shaft 120. In this manner a braking action is put on the butt after the old web has been severed, thereby eliminating its spinning and spewing out paper on the floor. A resetting arm 196 is secured to the right hand end of the shaft 187 as viewed in Fig. 33 whose roller 197 cooperates with a cam path 149 on an end plate 198, Fig. 2, as the reel is rotated, such that the shaft 187 is rotated in a clockwise direction as viewed in Fig. 32 allowing a torsion spring 199 to rotate a latch shaft 200, thereby relatching this braking device and freeing the drum 195.

Referring to Figs. 34 and 35, a butt switch bracket 201 will be seen to be secured to the spider 115 to provide a mounting for a shaft 202. The other bearing for the shaft 202 is in a web 203 of the spider 115. The outer end of the bracket 201 provides a mounting for a poppet 204 which is penetrated by an adjusting screw 205 which is held in fixed longitudinal relation to the poppet 204 by a collar 206 and knurled handwheel 207. The right hand end of the adjusting screw 205 is threadably attached to a poppet 208 carried in a pointer arm 209, the latter being secured to the shaft 202. An arm 210 is secured to the shaft 202 and carries a bifurcated free end for the mounting of a similarly bifurcated end of a movable switch bracket 211, the other side of which is held in position and guided by a slotted projection 212 cooperating with a locating pin 213 secured in the spider 115. A butt switch 214 is mounted on this bracket 211 having its roller 215 abut against the end of a switch arm 216 which is secured to a shaft 217, which ties together the arm 210 and the switch bracket 211. This shaft 217 is free to rotate and carries secured to it also a butt switch arm 218, the free end of which projects down close to the core of the paper roll and carries a spring-seated toe 219 which bears against the end of the paper roll. This toe 219 is guided by a pin and slot arrangement on the butt switch arm 218 to allow a limited end motion. Thus, when it operates against an eccentric butt, the liability of breaking the edge of the paper is minimized. These parts operate substantially as shown and described in my prior application, Serial No. 544,762, filed June 16, 1931. When the paper roll has diminished to the dotted line shown in Fig. 34 the end of the toe 219 then passes over the edge, rotating the shaft 217 and shaft arm 216 in a clockwise direction, allowing the switch roller 215 to pass off the end of the switch arm 216, thereby operating an electrical contact. This may be used for satisfying one of the conditions demanded before a splice is made. It will be seen that the adjusting screw 205 with its cooperating parts provides a regulation for setting the toe 219 nearer or farther away from the center of the roll, thereby governing the size of the butt at which this mechanism will operate. As will be described later, a push button is provided whereby an operator may short out the butt switch 214 at will so that a paster may be made at a time previous to the operation of the toe 219 when it is deemed wise by the operator.

As described under the measuring relay, when the pasted papers reach the folder a kicker is operated to set the papers askew on the delivery so that they may be easily removed. Fig. 38 shows the manner in which the papers appear on the delivery. Figs. 36 and 37 show views of the mechanism used for setting these papers askew. A shaft 220 is the regular kicker shaft used on

the printing press folder for locating regularly the count of the papers on the delivery. Mounted over this is a sleeve 221 held in longitudinal position by a stop collar 222 secured to the shaft 220. The sleeve 221 is mounted free to rotate and carries secured to it a kicker arm 223 and a solenoid arm 224 the latter of which is pivotally secured to a solenoid plunger 225, the former carrying a kicker 226 adjustably secured thereto, as for example, by a bolt connection with the bolts engaging slots in the adjusted part. When the kicker solenoid 224 is energized the plunger 225 moves to the right and rotates the sleeve 221 in a clockwise direction so that the kicker 226 is interposed in the path of one edge of the products being delivered. When a sufficient number of the papers have been set askew so that all spoiled papers are collected, as may be controlled by the adjustable contact on the measuring relay, the kicker solenoid is then de-energized. Through the action of a spring 227 against a poppet 228, secured to the folder frame, and a stop collar 229 secured to a spring rod 230, the latter of which is pivotally attached to solenoid arm 224, the solenoid arm 224, sleeve 221 and kicker 226 are thus rotated in a counter-clockwise direction until a stop collar 231 abuts against the poppet 228, placing the mechanism in the inoperative position shown in Fig. 36. The kicker then remains inoperative until the next paster is put through, when it repeats the cycle just described. This kicking out of the pasted papers may be done on either edge of the printed product but in this particular embodiment it is shown on the edge opposite that of the regular count kicker.

After the paster has been made and the measuring relay has started the motor 22 for the lifting of the brush arm frame, it is then desirable that the reel be moved in a counterclockwise direction as viewed in Fig. 2 so that the incoming roll L, which now becomes the running roll, will come in contact with the tension straps and thereby provide the necessary running tension. It is desirable that the lifting of the brush arm and the moving forward of the reel be interlocked so that, as soon as the brush arm clears the way, the roll may be moved into the tension straps. This is accomplished by making the forward motion of the reel dependent on the "monkey-switch" so that not until the "monkey-switch" is reset, during the raising operation of the brush arm, is it possible to rotate the reel forward or in a counterclockwise direction as viewed in Fig. 2. Means is provided for accomplishing this reel rotation automatically by a contactor 232 on the control board which is made operable by one of the contacts of a multiple switch 233. A shaft 234 of the multiple switch 233 is connected directly with the shaft of a rheostat 235. The latter is mounted on a bracket 236 attached to the bracket carrying the motor 22. A bevel gear connection, consisting of gears 237 and 238, connects the shaft 234 with a projection of the shaft 25 as will be seen in Fig. 3. Thus when the shafts 25 are rotated through the chain of gearing leading up to the motor 22, the shaft 234 is rotated to operate the several contacts in the multiple switch 233, whose functions will be described later, and the contact arm on the rheostat 235. When the brush arm frame 15 is lowered the gear segments 23 swing with the shaft 16 and turn the gears 24 which are fixed to the shaft 25. The shaft 234 is rotated accordingly and very near the end of the rotary motion

of the shaft 234 a contact is made in the multiple switch 233 which energizes the coil 232 so that a contact in the circuit controlling the forward rotation of the reel is established. This causes the reel to move toward the brush arm until the toe 81 contacts with the incoming roll and the "monkey-switch" is operated. The operation of the "monkey-switch" stops this forward rotation of the reel until after the paster has been made and the "monkey-switch" has been reset. The coil 232 has been energized throughout this time and, with the remaking of the contacts in the "monkey-switch", the reel then proceeds into the straps until a cam 239, one of which is carried on each of the covers 240<sup>b</sup> over the ends of the spindles, contacts with a switch roller 240 of a limit switch 241 which is carried by an angularly adjustable switch bracket 242 mounted on the end plate 198. This contacting of the cam 239 with the roller of the switch 241 opens a contact which de-energizes the coil 232. This action opens up the contact causing the forward rotation of the reel, thereby stopping the reel with the roll in the proper running position against the tension straps.

It must be remembered that the incoming roll L is driven up to web speed by a magnetic clutch as described above and that after the splice has been made this clutch is used to provide tension until the roll L, which then becomes the running roll, has been moved into the straps sufficiently to provide normal running tension. A study of this operation will show that the tension provided by the straps is put on gradually as the roll is moved against them. The function of the rheostat 235 is to reduce the voltage on the magnetic clutch 119 so that the tension created by the magnetic clutch is reduced in the same relation that the tension by the straps is increased. This provides interaction between the two tension devices such that no excessive strain is placed on the web as the roll is moved from pasting position to running position and changing from one tension device to another in a manner such that at all times the roll is under control.

Figs. 32 and 33 show a reverse safety switch 243 and a brush lowering safety switch 244 mounted on a switch bracket 245 which in turn is secured to the end bracket 108. The contacts in these switches are operated by a double surfaced cam 246 one each of which is secured to the outside surface of the three arms of the spider 115. The function of the brush lowering switch 244 is to prevent the lowering of the brush arm 15 except when the reel is in the proper position. Thus it is possible to lower the brush arm only when the switch roller of the switch 244 is riding on the surface of the cam 246, thereby preventing accidental injury to the mechanism. The switch 243 is provided so that, after the brush arm has been lowered, any reverse rotation of the reel, that is in a clockwise direction as viewed in Fig. 2, will be limited so that that the expiring butt may not be jammed up against the bottom of the brush arm and cause damage. This limitation is provided by a projection on the cam 246 which opens the contact in the reverse safety switch 243 before any damage is done. There is a contact in the switch 244 connected in parallel with this safety switch 243 such that when the brush is in the upper or inoperative position the opening of contacts in the switch 243 has no effect on the rotation of the reel, since it is necessary to have the reel rotate

forward and reverse without interruption when the brush arm is in the inoperative position.

Referring to Fig. 26, the spindle 120 carries mounted thereon an insulating commutator 247 which provides a mounting for contact rings 277, L2, and 307 the former two of which are used for conducting electrical energy to the magnetic clutch 119 and the latter providing a live segment for fulfilling the last condition demanded before the brush solenoid is operated. Pencil contacts 277<sup>a</sup>, L2<sup>a</sup> and 307<sup>a</sup> are mounted in an insulating block 254 for the respective contacts with the above mentioned contact rings. In a similar manner pencil contacts 281, 280, 279, 301, 275 and L3 are insulatedly mounted in the end plate 198 to operate against a series of correspondingly placed selector rings carried on the insulating plate 261 which is attached to and rotates with the spider 115, being held in longitudinal position by a clamping ring 262 attached to the end plate 198. Thus the pencil contacts 281 to L3 inclusive remain stationary while the selector rings against which they bear rotate with the spider. This provides a means for transmitting electrical currents from the stationary member to the rotating spider and a means for selecting the spindles that are to be used in splicing. The function of these several contacts will be discussed in an explanation of the wiring diagram.

The wiring diagram is shown in Figs. 39 and 40. In this description like numbers are used for contacts which are connected together at all times. Power is brought in through fused switch 263 to lines L1 and L2. Because of the large number of circuits being fed from these two line wires, duplicate binding posts for each are provided on the distributing panel. Fig. 39 shows the connections on the reel spider and the brush arm with the selector rings on the spider divided into three equal segments so that proper spindles may be selected in making a splice. Only one combination will be described since the other two operate in a similar manner. In this particular description the spindle 120 carries the incoming roll while a spindle 120<sup>a</sup> carries the expiring roll. Fig. 40 shows the distribution panel with a coil 264 for operating the motor 22 to lower the brush arm, a coil 265 for raising the brush arm, a coil 266 for holding in the brush operating contact once it is made, the coil 232 to provide automatic operation of the reel, and a coil 267 for the application of braking power to the running roll when an emergency stop is made.

In Fig. 40 a push button station 268 carries a "raise" button for lifting the brush arm. This is not used in normal operation since the measuring relay actuates the lifting mechanism but is provided for test and for use in case the brush arm is to be lifted without going through the pasting operations. In this same station the "lower" button is used for lowering the brush arm, this being done by the operator when, according to his judgment, the roll has diminished sufficiently in size to put the mechanism in motion. The "paste" button is used as an alternative to the butt switch so that at any time after the brush arm has been lowered and the "monkey-switch" tripped the pressing of the "paste" button in connection with the operation of a contact 307 on the incoming roll spindle 120 causes the brush solenoid to be tripped and the paster goes through the remaining cycle of its operation. A push button station 269 carries "forward" and "reverse" buttons for rotating the reel. A forward

rotation of the reel is described as that wherein the upper part of the reel moves toward the brush arm or in a counter-clockwise direction as viewed in Fig. 39, the reverse being the opposite rotation.

Fig. 39 shows several contact elements of the multiple switch 233. The top contact shown is a spare. The second contact is the reel reverse safety and has been described briefly above as a contact in parallel with the reverse safety switch 243 so that safety switch 243 is operable only when the brush arm is lowered. The third contact down is provided for throwing power on the magnetic clutch. This is done shortly after the brush arm starts down from its raised position, the magnetic clutch then staying on until the brush arm is raised to the corresponding position. The fourth contact down is the automatic reel operating contact and is made just before the motor 22 has stopped operating at the end of the lower stroke. This means that the brush arm is lowered, the "monkey-switch" toe 81 is pushed in between the incoming roll and the running web, after which the reel operating contact energizes the coil 232 so that the reel is moved forward until the "monkey-switch" is operated at which point it stops. This reel operating contact is a pick up circuit for the coil 232 which is thrown out when the reel position switch 241 is opened. It is not important as to when the reel operating contact in the multiple switch is open except that it should be done after the reel position switch is operated. The relative speeds of the brush arm motor and the reel motor are such that these contacts operate in the proper sequence. The fifth and sixth contacts down in the multiple switch 233 are the upper and lower stops respectively and act as limit switches to disconnect the motor 22 at the upper and lower limits of the brush arm.

Fig. 40 shows the motor 270 which is used to rotate the reel in connection with the coils 271 and 272 for operating the forward and reverse contactors respectively. Fig. 39 contains a diagram of the measuring relay showing the operating solenoid 177 and the insulating drum with the several contacts for operating the knife, lifting the brush arm, and kicking out the pasted papers of the folder. Fig. 40 shows the kicker arrangement with the kicker solenoid 225, kicker 226 and signal light 273.

Referring to the electrical diagram the operation of this machine may be traced in the following manner:

When the main switch 263 is closed electrical power is then connected to the main lines L1 and L2. This puts power on field coil 309 of motor 22 through lines L1 and L2 running thereto, on field coil 310 of reel motor 270 through lines L1 and L2, and on field discharge resistance 305 through lines L1 and L2. With the brush arm in its inoperative position, as shown in Fig. 39, power is used from the roll carried in spindle 120<sup>a</sup> until, in the opinion of the operator, it is time to lower the brush arm and set the pasting mechanism in readiness. This is done, when the running roll has decreased to some eight or ten inches in diameter, by the pressing of the "lower" button in station 268. This pressing of the "lower" button in station 268 connects the contact L1, which is one side of the power, with contact 288, which may be traced to terminal 288, thence to contact 288 in arm lowering switch 244, which, when the reel is in proper position for lowering the brush arm, is closed so that contact 288 is connected 75

with contact 286. Line 286 may be traced to terminal 286 and thence to contact 286 on the "lower stop" switch in multiple switch 233. With the arm in the raised position this "lower stop" switch is closed connecting contact 286 with contact 285. Contact 285 leads back through wire 285 to terminal 285 and from there to one side of lower coil 264, the other side of which is connected to wire 303 and through the contact of thermal relay 311, which is normally closed, to L<sup>2</sup>. This connection energizes coil 264 closing contacts L<sup>1</sup> and 295, L<sup>1</sup> and 286, and opens contacts 295 and 312. The closing of contacts L<sup>1</sup> and 286 establishes a hold-in circuit for lower coil 264 such that even though "lower" button in station 268 is released opening contacts L<sup>1</sup> and 288 connection to line L<sup>1</sup> is still established through L<sup>1</sup> to 286 of the lower contactor through line 286 to terminal 286 and from there to "lower stop" switch in multiple switch 233 where it connects with line 285, as has been described above. Contact 295 is connected to terminal 295 and from there by wire 295 to one brush of the armature of motor 22, thereby placing power on one brush of the motor. The other brush 296 may be traced through wire 296 to terminal 296 and from there to the center of the raise contactor, the lower end of which connects with contact 306 and through series resistance 313 to contact 314 and from there to one side of thermal relay coil 311, through thermal relay coil 311 to contact 294 and from there through terminal 294 to one side of series field 315 of motor 22, the other side of which is connected to L<sup>2</sup>. In this manner power is placed on the armature of motor 22 causing it to rotate in such a manner that the brush arm is lowered. During the process of lowering the brush arm multiple switch 233, which is geared thereto, is rotated so that the "magnetic clutch" contact closes connecting contact L<sup>1</sup> with contact 283. By tracing line 283 it will be seen to go to terminal 283 and thence to the center of rheostat arm 306. Connection is made through arm 306 and through the rheostat 235 to the outcoming wire 279 which returns to terminal 279 and thence to brush 279 bearing against selector ring 277 carried on the reel spider. Wire 277 is connected to a similarly numbered brush bearing against commutator ring 277 carried on the paper roll spindle 120. This commutator ring 277 is in turn connected to one side of magnetic clutch 119, the other side of which is connected to commutator ring L<sup>2</sup> whose connection to the line can be traced back through selector ring L<sup>2</sup>, brush L<sup>2</sup> bearing thereagainst and through to terminal L<sup>2</sup> on the control board.

It is apparent then that a reduced voltage is placed on magnetic clutch 119 such that, as the arm 306 of the rheostat 235 rotates in a counter-clockwise direction, as shown in the wiring diagram, resistance will be removed from this circuit until such time as arm 306 bears against contact 279, thereby placing full voltage on magnetic clutch 119. The energizing of clutch 119 through gearing described above brings the incoming roll up to speed. Just before the brush arm reaches its lower limit, i. e. before the motor 22 is stopped, the "reel operation" contact in multiple switch 233 closes contacts L<sup>2</sup> and 297, the latter of which may be traced to terminal 297, thence to one side of reel operation coil 232, the other side of which is connected to L<sup>1</sup>. This coil is thereby energized closing contacts 297 and 299, 276 and 290. The closing of contacts 297 and 299 establishes a cir-

cuit through line 299 to terminal 299 and from there through wire 299 to a similarly numbered contact in "reel position" switch 241 which is normally closed connecting 299 with L<sup>2</sup>. This serves as a hold-in circuit for reel operation coil 232. As will be described later, this contact in "reel position" switch 241 is held closed until after the splice has been made and the reel rotated to the proper position to give normal operating tension. Contact 290 may be traced to terminal 290 and from there to one side of coil 271, the other side of which is connected to L<sup>1</sup>. This coil is the forward operating coil of the reel motor 270. Contact 276 may be traced to terminal 276 thence to one side of the forward push button in station 269 and also to safety switches 34 where it is connected in turn to contacts 276<sup>a</sup> and 276<sup>b</sup> and from thence to contact 276<sup>b</sup> in monkey switch 93. Until monkey switch 93 is tripped contact 276<sup>b</sup> is closed with line L<sup>2</sup>. This series of connections establishes a contact to both sides of the line for coil 271 thereby energizing it, closing contacts L<sup>2</sup> and 302, and L<sup>1</sup> and 301.

It will be observed that contacts 301 and 302 feed reel motor 270 causing it to rotate in such a direction as to bring the incoming roll carried on spindle 120 toward the brush arm. This rotation of the reel continues until the surface of the roll presses against the monkey switch toe 81 so that this toe rotates the monkey switch rod 84 sufficiently to have the latch 85 disengage from the end of the operating sleeve 86 so that the monkey switch rod is moved longitudinally to operate the monkey switch 93. The operation of this monkey switch opens the contacts L<sup>2</sup> and 276<sup>b</sup> which, when traced through as above, shows that the power is disconnected from coil 271 and it is deenergized, opening contacts L<sup>1</sup> and 301, L<sup>2</sup> and 302 so that reel motor 270 stops its rotation. This locates the incoming roll in the proper position for splicing. The operation of the monkey switch 93 also closes contacts 274 and 275 and sets up one of the conditions demanded before a splice is made. That particular circuit will be traced later.

When the brush arm is up the reel reverse safety switch in multiple switch 233 is closed connecting contacts L<sup>2</sup> and 287 and with the arm down, contacts L<sup>2</sup> and 287 are not connected. By tracing line 287 it will be found to go to terminal 287 on the control board, thence to one side of the reverse button carried in station 269 and also to one side of reverse safety switch 243, the other side of which is connected to L<sup>2</sup>. The other contact of the reverse button in station 269 is connected with wire 291 to terminal 291 and thence to one side of coil 272, the other side of which is connected to L<sup>1</sup>. This coil 272 is the reverse coil for reel motor 270.

It is apparent that when the brush arm 15 is in the lowered or operative position with reel reverse safety contacts L<sup>2</sup> and 287 open in multiple switch 233, the opening of contacts L<sup>2</sup> and 287 in reverse safety switch 243 will make it impossible for coil 272 to be energized by the reverse button in station 269. This operates as a safety to prevent reversing the reel and damaging the mechanism by the butt carried in spindle 120 crashing against the lower end of brush arm 15. The operation of brush arm motor 22 in a direction to lower the brush arm ceases when the "lower stop" limit in multiple switch 233 opens the contacts 285 and 286. This is apparent since contact 285, as traced above, goes through line 285 to terminal 285 and thence to one side of lower contactor coil 264. Contact 286, through a similarly numbered

terminal, is connected through contact 286 and L<sup>1</sup> of the "lower" contactor operated by coil 264. Thus the opening of contacts 285 and 286 deenergizes coil 264 thereby opening contacts L<sup>1</sup> and 295, and L<sup>1</sup> and 286 and closing contacts 295 and 312. The opening of contact 295 and L<sup>1</sup> disconnects the power from motor 22 thereby ceasing its rotation. At this point the incoming roll is running at synchronous speed with the web, it is in the proper position with relation to the brush, and the brush arm is in its operative position. As the running roll diminishes in size until butt switch toe 219 passes over the edge a connection is thereby established between contacts 307 and 298 in butt switch 214. Contact 307 may be traced to selector ring 307 against which bears brush 281 which is in turn connected through wire 281 to terminal 281 and to a similarly numbered contact of the "paste" button in station 268. The other side of the "paste" button is contact 275 and may be traced to terminal 275 where it divides, one wire of which goes to one side of a normally opened contact operated by brush hold-in coil 266, another of which goes to contact 275 in monkey switch 93 which, as has been described above, is connected with contact 274. Line 274 runs from monkey switch 93 to one side of brush solenoid 65 the other side of which is connected to L<sup>1</sup>, and also back to terminal 274 on the control board. Still another wire 275 runs to brush 275 bearing against selector ring 298 which in turn is connected with contact 307 when the butt switch closes, as described above.

Thus it is apparent that a series of contacts is established from L<sup>1</sup> to brush solenoid 65, the other contact of which is 274 which is connected to contact 275 in monkey switch 93 and thence through wire 275 to terminal 275, thence to brush 275, selector ring 298 and from wire 298 to contact 307, in butt switch 214, which besides being connected to selector ring 307 is also connected to brush 307 which bears against a small commutator segment L<sup>2</sup> which is jumped across to commutator segment L<sup>2</sup> which, as previously described, is connected to the line. It is apparent then, as soon as the small segment L<sup>2</sup> contacts with commutator brush 307, that a line of connections is established to energize brush solenoid 65 thereby releasing the latch and permitting the brush to press the old web against the incoming roll. Through the small segment L<sup>2</sup> of the commutator on spindle 120 connection is also made through brush 307 to contact 307 in "butt switch" 214 to contact 298, from there to selector ring 298 which contacts with brush 275 and from there to terminal 275, thence to contact 275 in monkey switch 93, to contact 274, which through wire 274 leads to terminal 274 and from there to contact 274 on one side of resistance 308, the other side of which is contact 304 and directly connected to one side of hold-in coil 266, the other side of which is connected to L<sup>1</sup>. Thereby, brush hold-in coil 266 is energized and closes contact 275 and L<sup>2</sup>. In this manner a momentary contact of the small commutator segment L<sup>2</sup> and brush 307 energizes the brush hold-in coil 266 which is thereafter held in through contact L<sup>2</sup> and 275 to contact 274 in monkey switch 93 thereby keeping L<sup>2</sup> connected to contact 274 of brush solenoid 65 thus keeping it energized so long as the monkey switch contacts 274 and 275 remain closed.

Leading from terminal 274 is another wire 274 leading to measuring relay solenoid 177, the other side of which is connected with L<sup>1</sup>. It is apparent then that the instant brush solenoid 65

is energized measuring relay solenoid 177 will also be energized. The operation of measuring relay solenoid 177 withdraws a plunger rod allowing the drum of the measuring relay to rotate in direct proportion to the speed of the press. This occurs, of course, the instant the brush is dropped.

After a predetermined length of paper has been measured off; that is, sufficient for the pasted points of the incoming roll to be surely attached to the running web a live contact segment L<sup>1</sup> passes under the brush contact 278 of the measuring relay which may be found by tracing wire 278 to run to terminal 278 on the control board and from there to one side of knife solenoid 77, the other side of which is connected to L<sup>2</sup>. This energizes knife solenoid 77 thereby permitting knife 73 to be rotated in a counterclockwise direction to sever the web. The rotation of knife 73, through a cam described above, closes brake 20 switch 180 thereby connecting contact 278, which, as just described, is connected to L<sup>1</sup>, to contact 301. By tracing wire 301 it will be seen to go to terminal 301 on the control board and thence to brush 301 bearing against selector ring 300. Selector ring 300 is connected to one side of brake solenoid 182, the other side of which is connected to L<sup>2</sup>. This series of connections energizes brake solenoid 182 and, as described above, places a brake on spindle 120 which stops the butt and thereby prevents paying out of paper on the floor.

As the measuring relay continues to rotate another small live segment L<sup>1</sup> passes under brush 282 which may be traced by a similarly numbered wire to terminal 282 on the control board. From there it divides, one wire 282 running to a normally open movable contact 282 on the "raise" contactor. A second wire 282 may be traced to multiple switch 233 where it terminates in contact 282 of the "raise stop" limit. With the arm lowered this switch is closed connecting contact 282 with contact 284 which latter may be traced back through line 284 to terminal 284 on the control board and from there to one side of "raise" contactor coil 265, the other side of which is connected to contact 303 which, through the contact of thermal relay 311, is connected to L<sup>2</sup>. This series of connections energizes coil 265 closing contacts L<sup>1</sup> and 296, L<sup>1</sup> and 282, opening contacts 296 and 306. The closure of contacts L<sup>1</sup> and 282 acts as a hold-in circuit for the coil 316 which may be traced to terminal 282 through wire 282 to "raise stop" limit in the multiple switch 233 where it connects with wire 284 which returns to terminal 284 and from there to one side of contactor coil 265. Thus once the contact is made through brush 282 on the measuring relay 317 it is held in as described. The connection of L<sup>1</sup> to 296 may be traced through terminal 296 to one side of motor 22. The other side of the motor, contact 295, may be traced to terminal 295, thence to the middle of lower contactor where it connects with contact 312 which connects to one side of resistance coil 318, the other side of which is connected to 314 and from there to thermal relay coil 311, the other side of which is connected to 294 which runs to terminal 294 and thence to one side of series field 315 of the brush arm motor, the other side of which is connected to L<sup>2</sup>. This establishes a circuit which causes motor 22 to revolve in such a direction that the brush arm is moved from operative to inoperative position.

It will be noticed that in station 268 an alter-

nate means for raising the brush arm is provided by a "raise" button whereby the pressing of a push button will connect L<sup>1</sup> with contact 282 which runs to terminal 282 and in the same manner as described above will energize coil 265 to cause motor 22 to rotate and raise the brush arm. As the brush arm is raised monkey switch 93 is reset as described above thereby disconnecting contacts 274 and 275 and remaking contacts 276<sup>b</sup> and L<sup>2</sup>. The disconnection of contacts 274 and 275 in monkey switch 93 opens the hold-in circuit for brush solenoid 65, measuring relay solenoid 177 and brush hold-in coil 266. This is quite apparent since contact 274 connects with one side of brush solenoid 65, one side of measuring relay solenoid 177 and one side of resistance 308 which is directly connected by wire 304 to one side of brush hold-in coil 266, the other side of each of these coils being connected to L<sup>1</sup>. By tracing line 275 from the monkey switch 93 it will be seen to go to terminal 275 on the control board and from there to a contact 275 which is closed with line L<sup>2</sup> by the brush hold-in coil 266. Thus these two solenoids and one coil are all deenergized by the disconnection of contacts 274 and 275 in monkey switch 93. The re-making of contacts L<sup>2</sup> and 276<sup>b</sup> in monkey switch 93 may be traced through safety switches 34 to contact 276<sup>a</sup>, 276 and from there to terminal 276 on the control board and from there to contact 276 which is closed with contact 290 by reel operation coil 232. Line 290 goes to terminal 290 on the control board and from there to one side of forward coil 271 of the reel motor and the other side of which is connected to L<sup>1</sup>. This energizes forward coil 271 closing contacts L<sup>2</sup> and 302, L<sup>1</sup> and 301<sup>a</sup>, thereby rotating reel motor 270 to carry the reel in a counterclockwise direction as viewed in the wiring diagram. The rotation of the reel continues until "reel position" switch 241 is opened by a cam, as described above, thereby disconnecting contacts L<sup>2</sup> and 299, the latter of which may be traced to terminal 299 on the control board and from there to contact 299 which is closed with contact 297 by reel operation coil 232 to one side of which contact 297 is connected, the other being connected to L<sup>1</sup>. This deenergizes reel operation coil 232, since as the arm was being raised contact 297 which goes from terminal 297 to one side of the "reel operation" switch in multiple switch 233 has been previously disconnected from line L<sup>2</sup>. From the consequent opening of contacts 276 and 290, the latter of which goes to one side of coil 271 and the former through terminal 276 through limit switches 34 to 276<sup>a</sup> and 276<sup>b</sup> and from there through monkey switch 93 to L<sup>2</sup>, it is apparent that the forward rotation of the reel will be stopped by the deenergizing of coil 271. As the brush arm raises contact arm 306 of rheostat 235 rotates in a counterclockwise direction and reduces the voltage on magnetic clutch 119 until such time as in the raising of the brush arm "magnetic clutch" switch in multiple switch 233 opens contacts L<sup>1</sup> and 283. This deenergizes magnetic clutch 119 as is apparent by tracing line 283 from the magnetic clutch switch to terminal 283 on the control board and from there to contact 283 of contact arm 306 through rheostat 235 to contact 279 and from there to terminal 279 on the control board from where it goes to brush 279 contacting selector ring 277 which connects to brush 277 bearing against commutator ring 277 and from there to one side of magnetic clutch 119, the other side of which is connected to L<sup>2</sup>. This, therefore, discontinues control of

the roll by magnetic clutch 119 which has already passed into contact with the straps which thereafter provide normal running tension. Brush arm motor 22 continues to rotate raising brush arm 15 until such time as "raise stop" switch in multiple switch 233 breaks contacts 282 and 284, the former of which may be traced to terminal 282 and from there to contact L<sup>1</sup> of the "raise" contactor, the latter of which may be traced to terminal 284 and from there to one side of "raise" contactor coil 265. The deenergizing of this coil opens contact L<sup>1</sup> and 296 and through the series of connections to motor 22 previously described removes power from that motor, ceasing its rotation. It will be understood, of course, that when the arm reaches this position "reel reverse safety" switch in multiple switch 233 has remade contacts L<sup>2</sup> and 287 to permit forward or reverse rotation of the reel motor by "forward" and "reverse" push buttons in station 269 and that "lower stop" switch in multiple switch 233 has remade contacts 285 and 286 such that at the proper time the cycle of pasting may be repeated.

As the drum of the measuring relay continues to rotate a V-shaped live segment L<sup>1</sup> passes under brush 289 connecting it therewith which latter connection may be traced to terminal 289 on the control board and from there to one side of "kicker" solenoid 225 the other side of which is connected to L<sup>2</sup>. This causes kicker 226 to operate as described above to displace the spoiled papers on the delivery. Connected in parallel with the kicker solenoid 225 is signal light 273 which is illuminated at the time that the kicker operates to notify the operator at the delivery that a paster has been made. As described above, the tapered live segment L<sup>1</sup> permits an adjustment of the number of pasted papers kicked out and when this live segment passes from underneath brush 289 kicker solenoid 225 is deenergized and signal light 273 goes out. In making a splice an alternative is supplied for the second condition before the splice is made, i. e., a "paste" button is supplied which may be used to anticipate the operation of butt switch 214. This "paste" button in station 268 provides for the connection of contacts 281 and 275, the former of which may be traced to terminal 281 and from there to brush 281 bearing against selector ring 307 and from there to one side of butt switch 214. The other contact 275 may be traced to terminal 275 from there to brush 275 bearing against selector ring 298 which is connected to the other side of butt switch 214. It is therefore evident that this "paste" button is in parallel with butt switch 214 and may be used to perform its function any time before the butt switch operates.

The function of "roll brake" solenoid 267 is to throw power on magnetic clutch 119 in case of an emergency stop. The contacts 292 and 293 of coil 267 are connected in parallel with the cylinder brakes (not shown) used on the press, it being understood that in case of emergency stops the cylinder brakes, through the main printing press control board, are energized. The energizing of these cylinder brakes causes coil 267 to be energized closing contacts L<sup>1</sup> and 280. Contact 280 runs to one side of magnetic clutch discharge resistance 319 the other side of which is connected to L<sup>2</sup> and thereby absorbs part of the electrical discharge when the magnetic clutch circuit is opened. Contact 280 also runs to terminal 280 and from there to brush 280 which bears against a short disconnected selector ring 75

320. Thus it will be seen that no power would be transmitted to magnetic clutch 119 with the reel in the position shown. This is desirable since the running roll carried in spindle 120<sup>a</sup> is of such small diameter that any energizing of the magnetic clutch would create too much tension. When, however, the reel is rotated slightly in a counterclockwise direction from that shown in the wiring diagram so that the new roll is properly positioned against the straps brush 280 then bears against short selector ring 277 which connects through wire 277 to brush 277 bearing against commutator ring 277 carried on spindle 120. This is directly connected to one side of magnetic clutch 119, the other side of which is connected to L<sup>2</sup>. Thus with the energizing of roll brake coil 267 magnetic clutch 119 is energized to assist in retarding a large size roll on an emergency stop since it tends to slow the roll down in proportion to the manner in which the press is slowed down. The embodiment shown carries three spindles and it may be observed that these are symmetrically wired so that as each roll is used up and a new one brought into service by the rotation of the reel the several functions of splicing will be transmitted to the rotatable reel spindles in a similar manner.

This invention, therefore, is a device whose operation is started manually but thereafter operates automatically to lower the brush arm, bring the incoming roll up to speed, rotate the reel to pasting position, move the web against the incoming roll at the proper time, sever the web, lift the brush arm, rotate the reel to running position, insure a smooth transition from one form of tension to the other, and dislocate the pasted papers on the delivery. It provides means for doing these operations on all width rolls and has the added feature of putting additional retarding force on large rolls during emergency stops.

Certain features shown herein are the same as or improvements on matter shown and claimed in my prior applications: Serial No. 443,083, filed April 10th, 1930, now Patent No. 1,891,965; Serial No. 471,461, filed July 29th, 1930, now Patent No. 1,912,506; Serial No. 513,119, filed February 3rd, 1931; Serial No. 518,044, filed February 25th, 1931; Serial No. 542,183, filed June 4th, 1931; Serial No. 542,865, filed June 8th, 1931; Serial No. 544,762, filed June 16th, 1931; Serial No. 547,858, filed June 30th, 1931, now Patent No. 2,029,045; and Serial No. 556,388, filed August 11th, 1931, now Patent No. 2,032,244, Reissue No. 19,996.

Although I have illustrated and described only one form of the invention I am aware of the fact that modifications 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 in this respect, otherwise than as set forth in the claims, but what I do claim is:—

1. In a web splicing mechanism, the combination of a roll supporting reel, a frame, web pressing means carried by the frame, a shaft driven by a printing press, a variable speed transmission connected with the shaft to be driven thereby, a shaft driven by the transmission, spindles for web rolls mounted on said reel, a gear loose on each spindle, a gear driven by the transmission driven shaft, and meshing with all of the spindle gears, and means for clutching each spindle gear to its spindle to drive its roll at its center when that roll is brought by the rotation of the reel into position nearly ready for splicing and the

frame is moved to bring the web pressing means into operative position.

2. In a web splicing mechanism, the combination of a roll supporting reel, a frame, web pressing means on the frame, an electric motor connected for operating the frame, manual means for starting the motor to move the frame to operative position, a variable speed transmission constantly operated from a printing press, means operated by the transmission for rotating the fresh roll from its center up to web speed, means cooperating with the surface of the fresh roll for varying the speed transmitted by said transmission to cause said roll to rotate on its axis at web speed, and means controlled by the location of said frame for automatically connecting the spindle of said roll with the transmission.

3. In a web splicing mechanism, the combination of a roll supporting reel, an electric motor connected for operating the reel, a movable frame, web pressing means carried by said frame, a variable speed transmission constantly operated from a printing press, means operated by the transmission for rotating the fresh roll from its center up to web speed, means cooperating with the surface of the fresh roll for varying the speed transmitted by said transmission to cause said roll to rotate on its axis at web speed, means controlled by the location of said movable frame for connecting the spindle of said roll with the transmission, and means for automatically controlling said motor to drive the reel to bring said fresh roll up to splicing position, stop the reel, and, after splicing, turn the reel to bring the said roll, freshly spliced, to running position.

4. In a web splicing mechanism, the combination of a roll supporting reel, an electric motor connected for operating the reel, a movable frame, web pressing means carried by said frame, a variable speed transmission constantly operated from a printing press, means operated by the transmission for rotating the fresh roll from its center up to web speed, means cooperating with the surface of the fresh roll for varying the speed transmitted by said transmission to cause said roll to rotate on its axis at web speed, means controlled by the location of said movable frame for automatically connecting the spindle of said roll with the transmission, means for controlling said motor to drive the reel to bring said fresh roll up to splicing position, stop the reel, and, after splicing, turn the reel to bring the said roll, freshly spliced, to running position, means whereby the means for rotating said roll on its own axis will automatically act to apply a tension to it after splicing, and means for gradually reducing this tension as the spliced roll moves to running position.

5. In a web splicing mechanism, the combination of a roll supporting reel, an electric motor connected for operating the reel, a movable frame, web pressing means carried by said frame, a variable speed transmission constantly operated from a printing press, means operated by the transmission for rotating the fresh roll from its center up to web speed, means cooperating with the surface of the fresh roll for varying the speed transmitted by said transmission to cause said roll to rotate on its axis at web speed, means controlled by the location of said movable frame for automatically connecting the spindle of said roll with the transmission, means for controlling said motor to drive the reel to bring said fresh roll up to splicing position, stop the reel, and, after splicing, turn the reel to bring the said roll, freshly

spliced, to running position, means whereby the means for rotating said roll on its own axis will automatically act to apply a tension to it after splicing, means for gradually reducing this tension as the spliced roll moves to running position, and tension straps into which said roll moves as it approaches running position which gradually increase their tension on said roll as the first named tension means decreases its activity.

10 6. In a web splicing mechanism, the combination with a reel and a fresh web roll supported thereon, of a movable frame, manually started means for bringing the movable frame into operative position, means for rotating the fresh roll  
15 on its own axis up to web speed, means for moving the web against the fresh web roll to make the splice while said roll is in predetermined position and moving said frame away after the splice is made, means for severing the web, means  
20 for thereafter moving the reel to bring said roll to running position, means for applying tension to said roll while still in splicing position and reducing that tension as the roll moves toward running position, and means for applying gradually increasing tension to the surface of said roll  
25 as it moves into running position, thus compensating for the loss of tension from the first named tension means.

7. In a web splicing mechanism, the combination with a reel and a fresh web roll supported thereon, of a movable frame pivoted above and to one side of the fresh web roll, a device on the frame for engaging a web running to a printing press and pressing it against the pasted rotating  
35 fresh roll, manually started means for bringing the movable frame into operative position to press the web against the fresh web roll, means for rotating the fresh roll through its own axis up to web speed, means for moving said frame away  
40 after the splice is made, means on said frame for severing the web from the fresh web roll, means for thereafter moving the reel to bring said roll to running position, and means for applying tension to the surface of said roll as it moves into  
45 running position.

8. In a web splicing mechanism, the combination with a reel and a fresh web roll supported thereon, of a movable frame, manually started means for bringing the movable frame into operative position, means for rotating the fresh roll  
50 on its own axis up to web speed, means for moving the web against the fresh web roll to make the splice while said roll is in predetermined position and moving said frame away after the splice  
55 is made, means for severing the web, means for thereafter moving the reel to bring said roll to running position, means for applying tension to the surface of said roll as it moves into running position, and means for dislocating, during delivery, the papers produced by the printing press  
60 from the part of the web along which the splice was made.

9. In a web splicing mechanism, the combination with a web roll supporting reel, means  
65 for operating it, a printing press to which the roll is adapted to deliver the web, and means for splicing a fresh roll on said supporting means to the running web, of a variable speed transmission, means for operating the transmission  
70 from the press, a measuring relay comprising a drum, means for driving the drum from the transmission, a set of contacts carried by the drum, a product delivery comprising a kicker, a solenoid connected with the kicker to operate it  
75 to dislocate papers delivered from the press by

the delivery, said contacts being set on the drum in such location that when the papers that include the pasted part of the web reach the delivery, said contacts will be closed to render the kicker operative, and a power circuit from said  
5 contacts to said solenoid.

10. In a web splicing mechanism, the combination with a web roll supporting reel, means for operating it, a printing press to which the roll is adapted to deliver the web, and means for  
10 splicing a fresh roll on said supporting means to the running web, of a variable speed transmission and means for operating the transmission from the press, a measuring relay comprising a drum, a shaft on which said drum is mounted, rotatable  
15 means for driving the shaft from the transmission, a set of contacts carried by the drum, a delivery for the products comprising a kicker, a solenoid connected with the kicker to operate it, said contacts being set on the drum in such location  
20 that when the papers that include the pasted part of the web reach the delivery, said contacts will be closed, a circuit from said contacts to said solenoid, whereby the kicker will operate to dislocate those particular papers, and a spring normally  
25 in condition for moving the kicker back out of operative position, whereby when the kicker solenoid is deenergized the kicker will automatically stop operating.

11. In a web splicing mechanism, the combination with a web roll supporting reel and means  
30 for operating it, of a printing press to which the roll is adapted to deliver the web, a variable speed transmission, means for operating the transmission from the press, a measuring relay comprising a drum, a shaft on which said drum is  
35 mounted, rotatable means for driving the shaft from the transmission, a set of contacts carried by the drum, a product delivery comprising a kicker, a solenoid connected with the kicker to  
40 operate it to dislocate papers delivered from the press by the delivery, said contacts being set on the drum in such location that when the papers that include the pasted part of the web reach the delivery, said contacts will be closed, a power  
45 circuit from said contacts to said solenoid, a relay solenoid having means for stopping the operation of the drum when the last named solenoid is deenergized and releasing the drum to allow it to rotate when that solenoid is energized, and  
50 means for keeping said solenoid deenergized ordinarily and for automatically energizing it when a splice is being made.

12. In a web splicing mechanism, the combination with a web roll supporting reel and means  
55 for operating it, of a printing press to which the roll is adapted to deliver the web, a variable speed transmission, means for operating the transmission from the press, a measuring relay comprising a rotatable drum, rotatable means  
60 for driving the drum from the transmission, a set of contacts carried by the drum, a product delivery comprising a kicker, a solenoid for operating the kicker, said contacts being adjusted angularly on the drum so that when the papers  
65 that include any desired length of the pasted part of the web reach the delivery, said contacts will be closed, and a power circuit from said contacts to said solenoid will be completed for energizing it.

13. In a web splicing mechanism, the combination of a measuring relay comprising a drum,  
70 a shaft on which said drum is mounted, rotatable means for driving the shaft, a set of contacts carried by the drum, a solenoid, a movable  
75

stop pin for preventing the rotation of the drum, the plunger of the solenoid being connected to the pin to draw it back when the solenoid is energized and thus allow the drum to rotate, means  
5 for energizing the solenoid, and a spring which, when the solenoid is deenergized, will automatically restore the solenoid.

14. In a web splicing mechanism, the combination with a movable frame having means  
10 for pressing the running web against the fresh web roll and means for kicking out the pasted papers, of a variable speed transmission, a drum shaft driven by the transmission, a drum having electric contacts thereon, frictionally driven by  
15 said shaft, means for delivering the products of the machine, electrical means controlled by the motion of said contacts for controlling the kicking out of the pasted papers from said delivering means, a solenoid, means for energizing the solenoid when the web pressing means operates, and  
20 a plunger carried by the solenoid having means for stopping the rotation of said drum when the solenoid is deenergized and freeing the drum when the solenoid is energized to allow the drum  
25 to rotate with its shaft.

15. In a web splicing mechanism, the combination with a web roll supporting device, a printing press to which a roll on said device is adapted to deliver the web, said press having a folder, a  
30 movable frame having means for pressing the running web against the fresh web roll and means for kicking out the pasted papers at the folder, of a variable speed transmission, means for operating the transmission from and in proportion  
35 to the speed of the press, a drum shaft driven by the transmission and therefore operating in proportion to the speed of the press, a drum having electric contacts thereon, frictionally driven by said shaft, electrical means controlled by the motion  
40 of said contacts for controlling the raising of the said frame and the kicking out of the pasted papers, a solenoid, means for energizing the solenoid when the web pressing means operates, and a plunger carried by the solenoid having means  
45 for stopping the rotation of said drum when the solenoid is deenergized and freeing the drum when the solenoid is energized to allow the drum to rotate with its shaft.

16. In a web splicing mechanism, the combination with a web roll supporting device, a printing  
50 press to which a roll on said device is adapted to deliver the web, a swinging arm having means for pressing the running web against the fresh web roll, and a severing knife carried by said arm, of a drum shaft operating in proportion to the  
55 speed of the press, a drum having electric contacts thereon and frictionally driven by said shaft, electrical means controlled by the motion of said contacts for controlling the throwing-in of the severing knife and the raising of the  
60 said arm, a solenoid, means for energizing the solenoid when the web pressing means operates, and a plunger carried by the solenoid which stops the rotation of said drum when the solenoid is deenergized and frees the drum when the solenoid  
65 is energized.

17. In a web splicing mechanism, the combination with a stationary frame, a reel thereon, a  
70 motor for rotating the reel, means on the reel for supporting a fresh web roll and a running roll, a swinging frame having means thereon for pressing the running web against the fresh web roll for splicing the same, a switch located on the stationary frame of the reel in the circuit of  
75 the reel motor for limiting the reverse rotation of

the reel to prevent the expiring roll or butt being jammed against the bottom of said frame, and means for opening the switch when the reel rotates reversely to a predetermined point.

18. In a web splicing mechanism, the combination with a stationary frame, a reel thereon, electrical means for rotating the reel, means on the  
5 reel for supporting a fresh web roll and a running roll, a swinging arm having means thereon for pressing the running web against the fresh web roll for splicing the same, a switch located on the stationary frame of the reel in the circuit of said  
10 electrical means for limiting the reverse rotation of the reel to prevent the expiring roll or butt being jammed against the bottom of said arm, and electrical means whereby when the said arm is in  
15 inoperative position the opening of the contacts in said switch will have no effect on the rotation of the reel.

19. In a web splicing mechanism, the combination with a rotatable reel for carrying a fresh web  
20 roll and a running roll, means for operating the reel, a swinging arm having means for pressing the running web against the fresh web roll for splicing, a motor for operating the said arm, a switch in the motor circuit, and means whereby  
25 whenever the reel is not in proper position for making a splice, the said switch will be open so that the said arm cannot be lowered.

20. In a web splicing mechanism, the combination with a web roll supporting reel and means  
30 for operating it, of an arm adapted to swing on an axis and having means for engaging the running web and pressing it against the pasted fresh web roll for splicing, means for operating the arm, a delivery located in position for receiving and  
35 delivering the product of the machine, means at the delivery for throwing out the papers printed from the pasted part of the web, a measuring relay controlling the last named means, and means whereby the measuring relay starts the  
40 arm operating means to move said arm out of operating position.

21. In a web splicing mechanism, the combination of a movable frame, a severing knife carried  
45 by the frame, a device on said frame for moving the running web against the fresh web roll, a motor for operating said frame, a measuring relay for controlling the motor, and means for operating the relay so that after a predetermined amount of web has been fed off, subsequent  
50 to the moving of the web to operative position, the knife will be brought into position to sever the web, and when the pasted part of the web has reached a point for delivery of a printed  
55 paper the papers printed from the pasted part of the web will be dislocated, and the said frame will be moved out of operative position just after the knife operates.

22. In a web splicing mechanism, the combination of a reel for supporting a fresh roll and  
60 a running roll, means for rotating the reel, a swinging frame, means on the swinging frame for pressing the running web against the fresh web roll for splicing, means for automatically releasing said frame whenever the fresh roll  
65 continues to move toward the frame when the frame is in its operative position in the path of the roll, to avoid injury of the parts.

23. In a web splicing mechanism, the combination with a roll support, a roll spindle carried  
70 thereby, a magnetic clutch for said spindle, and means whereby when an emergency stop is made, when the running roll is large, said clutch will be energized to assist in bringing the rotation of the  
75

roll down with the reduction of the speed of the press, but, when the running roll is small, the magnetic clutch is disconnected from the power.

24. In a web splicing mechanism, the combination with means for making the splice, of a splice initiating device comprising spring seated toe for engaging the running roll at its end, and a pin and slot means for guiding the toe, whereby, when the toe acts against an eccentric butt, the liability of breaking the margin of the paper is minimized.

25. The combination, in a web splicing mechanism, of a reel, means on the reel for carrying web rolls, a motor for operating the reel, a monkey switch in the motor circuit, a frame mounted to move, a web moving device carried by said frame for accomplishing the splice, means actuated by the forward motion of the fresh web roll on the reel for opening the monkey switch and stopping the reel motor, and means for closing the monkey switch and therefore starting the reel forward, when the splice has been made.

26. The combination, in a web splicing mechanism, of a reel, means on the reel for carrying web rolls, a motor for operating the reel, a monkey switch in the motor circuit, a frame mounted to move, a web moving device carried by said frame for accomplishing the splice, means actuated by the forward motion of the fresh web roll on the reel for opening the monkey switch and stopping the reel motor, means for closing the monkey switch and therefore starting the reel forward, when the splice has been made, and means for releasing said frame.

27. The combination, in a web splicing mechanism, of a reel, means on the reel for carrying web rolls, a motor for operating the reel, a monkey switch in the motor circuit, a frame mounted to move, a web moving device carried by said frame for accomplishing the splice, means actuated by the forward motion of the fresh web roll on the reel for opening the monkey switch and stopping the reel motor, means for closing the monkey switch and therefore starting the reel forward, when the splice has been made, a crank connected with said frame but movable independently thereof, and a switch connected with the reel motor circuit for stopping the reel motor if the frame starts to move out of splicing position when said crank is in stationary position.

28. In a web splicing device, the combination with a movable frame and a web severing knife, of yielding means for pressing the knife into operative position, a latch for holding the knife in inoperative position, and a solenoid for holding the latch when the solenoid is deenergized.

29. In a web splicing device, the combination with a movable frame and a web severing knife, of yielding means for pressing the knife into operative position, a latch for holding the knife in inoperative position, a brake for slowing down the stub after the web is severed from it, means operated by the motion of the knife for controlling the operation of the brake, and a solenoid for holding the latch when the solenoid is deenergized.

30. In a web splicing device, the combination with a movable frame and a web severing knife, of yielding means for pressing the knife into operative position, a latch for holding the knife in inoperative position, a solenoid for holding the latch when the solenoid is deenergized, and means for relatching the knife in inoperative position.

31. In a web splicing device, the combination with a movable frame and a web severing knife,

of yielding means for pressing the knife into operative position, a latch for holding the knife in inoperative position, a brake for slowing down the stub after the web is severed from it, means for releasing the drum of the brake, means operated by the motion of the knife for controlling the operation of the brake, and a solenoid for holding the latch when the solenoid is deenergized.

32. In a device for forcing a running web against a fresh web roll for splicing, the combination of a brush made up in sections, and releasable springs for each section, whereby, when fractional width webs are being run through, some of the springs can be thrown out to relieve the total pressure on the web.

33. In a device for forcing a running web against a fresh web roll for splicing, the combination of a swinging frame, a web pressing member carried by said frame, a stationary stop, an arm pivoted on the same axis as the frame, an adjustable stop screw on said arm adapted to engage said stop in limiting position, a shear pin carried by the swinging frame and secured to the free end of said arm, a shaft supported in stationary bearings and having a crank, a rod pivoted to the crank, and a spring on said rod constantly pressing against the arm, whereby the frame is yieldingly pressed toward operating position.

34. The combination with a rotatable roll, of two tension devices therefor, one in position to progressively act on the roll with increasing tension as it moves to a predetermined position, and means whereby the other gradually decreases in effectiveness as the roll moves toward said position.

35. In a web splicing device, the combination with a movable frame and a web severing knife, a brake for slowing down the stub after the web is severed, means operated by the motion of the knife for controlling operation of the brake, a rotatable reel for supporting the fresh roll, and means controlled by the rotation of the reel for releasing the brake.

36. In a web-splicing device adapted to splice webs of different widths, the combination of a movable frame and a brush made up in sections extending across the frame nearly continuously certain sections capable of being rendered inoperative so that the effective length of the composite brush can be made shorter than the width of the employed web.

37. In a web-splicing device, the combination of a movable frame and a rotatable reel, means for lowering the movable frame to operative position, and means controlled by the location of the reel for preventing the first named means from operating.

38. In a web splicing device for a printing press, the combination of a movable reel for supporting the fresh web roll, a movable frame adjacent thereto, a web pressing device carried by the movable frame and adapted to press the web against the fresh web roll, a motor for moving said reel to bring the fresh web roll up to web pasting position, and means operated by the motion of said frame from inoperative to operative position for starting the motor into operation.

39. In a web splicing machine, the combination of a loose shaft, a brush arm fixed to said shaft, a tension device, and mechanical means for turning the shaft and lowering the brush arm into operative position prior to splicing for the

purpose of getting increased wrap of the tension device around the butt of the running roll.

40. In a web splicing machine, the combination with an arm, a shaft thereon, web pressing devices carried by the shaft, a clutch section on the shaft, a reset rod pivotally mounted on said shaft, a complementary clutch section pivoted on the shaft and connected with the reset rod, there being sufficient play between the teeth of the two clutch sections to permit the shaft and pressing device to swing forward when the arm is in operative position.

41. In a web splicing machine, the combination of a freely mounted shaft, an arm for supporting a web pressing means fixed to said shaft, an arm loosely connected with said shaft, a shear pin connecting the fixed arm with the loose arm, means for oscillating the loose arm, a spring having means on it for engaging the loose arm to hold the first named arm in operative position, whereby, if any undue strain is exerted on the first named arm, the shear pin will break to permit the first named arm to swing free with the first named shaft.

42. In a web splicing machine, the combination with means for supporting a fresh web roll and the running web roll, of a swinging brush arm, brushes on the arm for pressing the running web against the fresh web roll for splicing, a pivotally mounted severing knife, a cam surface connected with the knife, a solenoid, and a rod operated by the solenoid for engaging said cam surface and holding the severing knife in inoperative position.

43. In a web splicing mechanism, the combination with a reel and a fresh web roll supported thereon, of a movable frame pivoted above and to one side of the fresh web roll, a device on the frame for engaging a web running to a printing press and pressing it against the previously pasted rotating fresh roll, manually started means for bringing the movable frame into operative position to press the web against the fresh web roll, means for rotating the fresh roll, means for moving said frame away after the splice is made, and means on the frame for severing the web from the expiring roll.

44. In a web splicing mechanism, the combination with a pivoted frame movable from inoperative to operative position, web pressing and web severing means carried by said frame, power-operated means for moving said frame, a rotatable reel for carrying a running roll and a fresh roll, and a motor for rotating the reel, of means for stopping the reel at a position where the fresh roll will be within operating range of the web-pressing means for pressing the running web against the fresh roll.

45. A web supply means comprising supporting means for a plurality of rotatable web rolls capable of movement to carry the web rolls successively into and out of feeding position, driving means to successively rotate the web rolls, means for regulating the rotation of each web roll with respect to its diameter, and means governed by movement of the supporting means to selectively connect the driving means with the web roll.

46. In a web splicing mechanism, the combination with a reel, a motor for rotating the reel, means on the reel for supporting a fresh web roll and a running roll, a swinging frame movable into the path of a roll mounted in said reel, of means in the circuit of the reel motor for preventing reverse rotation of the reel which would damage said frame.

47. In a web splicing device for splicing full width, three-quarter width and one-half width webs, the combination with web-pressing means and yielding means for operating the web-pressing means, of means for regulating the force of the yielding means in proportion to the width of the web being spliced.

48. In a web splicing device for splicing webs of varying width, the combination with a backing member for pressing the running web and the fresh roll together to make a splice, of yielding means operating on the backing member and means for adjusting the yielding means in proportion to the width of the web being spliced.

49. In a web splicing device for splicing webs of four-page, three-page, two-page and one-page widths, the combination with web pressing means for pressing the running web and fresh roll together to make a splice, of a plurality of springs cooperating with the web pressing means and means for rendering these springs effective in relation to the width of web being spliced.

50. In a web splicing device, the combination with a running web and a fresh web roll, of web pressing means for pressing the running web and the fresh roll together to make a splice, four springs providing pressure for the web-pressing means when a full width web is spliced, and means for rendering one spring ineffective when a three-quarter width web is spliced, two springs ineffective when a one-half width web is spliced, and three springs ineffective when a one-quarter width web is spliced.

51. In a web splicing device, the combination with a web pressing arm, means on the arm for backing up a running web, and means for holding said arm in a predetermined position to splice the web, of a movable support for a fresh web roll, means on the support for rotatably supporting the fresh web roll thereon, means for rotating the fresh roll through its axis, and means whereby the rate of rotation will be dependent upon the diameter of the fresh web roll.

52. In a web splicing device, the combination with a web pressing arm, means on the arm for backing up a running web, means for holding said arm in a predetermined position to splice the web, of a movable support for a fresh web roll, means on the support for rotatably supporting the fresh web roll thereon, a variable speed means for rotating the fresh roll through its axis, and means whereby the rate of rotation will be dependent upon the diameter of the fresh web roll.

53. In a web supply device, the combination of means for moving a fresh web roll in a curved path, means for rotating said web roll on its own axis, a freely movable member adapted, when free, to rest against the surface of the fresh web roll, whereby, as the roll moves in its path, it will move said member, means for holding said member in its extreme position, means connected with said member for regulating the rate of rotation of said web roll to bring its peripheral speed substantially to the speed of the web, and means whereby the bodily motion of the roll will be stopped at a definite point, determined by the diameter of the web roll, to leave the surface of the web roll at the time of splicing at a predetermined distance from the web.

54. In a web splicing device, the combination with a press, a web roll and a support for moving the web roll, of means adapted to engage the surface of the roll and to be moved by the motion of the roll a distance from the center of the roll equal to its radius, variable speed means oper-

ated by the press, means connected with the variable speed means for rotating said roll through its axis, and means controlled by the extreme position of the first named means for controlling the output speed of the variable speed means.

5 55. In a web splicing mechanism the combination of a rotatable magazine reel for supporting a plurality of web rolls, including a fresh roll and a running roll, web splicing means, said reel including a spider capable of rotation with and 10 movable longitudinally along the reel shaft, means for speeding up the fresh roll through its axis including driving means carried by the spider, a non-rotatable member movable longitudinally 15 along the reel shaft in cooperation with said spider, with electrical contacts carried by the non-rotatable member and cooperating with electrical contacts carried by the spider for controlling operation of the web splicing means.

20 56. In a web splicing mechanism, the combination of a rotatable magazine reel for supporting a plurality of web rolls including a fresh roll and a running roll, web splicing means, web severing means, said reel including a spider capable of 25 rotation with and movable longitudinally along the reel shaft, means for speeding up the fresh roll through its axis including driving means carried by the spider, a non-rotatable member movable longitudinally along the reel shaft in cooperation with said spider, with electrical contacts carried by the non-rotatable member and 30 cooperating with electrical contacts carried by the spider for controlling operation of the web splicing means and web severing means.

57. In a web splicing mechanism, the combination of a rotatable magazine reel for supporting a plurality of web rolls, including a fresh roll and a running roll, web splicing means, said reel including a spider capable of rotation with and 5 movable longitudinally along the reel shaft, means for speeding up the fresh roll through its axis including driving means carried by the spider, a non-rotatable member movable longitudinally 10 along the reel shaft in cooperation with said spider with electrical contacts carried by the non-rotatable member and cooperating with electrical contacts carried by the spider for controlling the driving means carried by the spider.

58. In a web splicing device, the combination 15 with a web roll supporting mechanism comprising a spider longitudinally movable for side register and for accommodating webs of different widths, of a roll driving mechanism carried by said spider and movable therewith for rotating 20 the fresh web roll.

59. In a web splicing mechanism, the combination of a reel having spiders provided with means for supporting a plurality of web rolls, a shaft for said reel, said spiders being movable 25 along the reel shaft for the purpose described, mechanism carried by one of said spiders and movable with it for driving the fresh web roll through its center, and a printing press to which the web is fed provided with means for supplying 30 power to said roll driving mechanism.

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# **DISCLAIMER**

2,048,767.—*Henry A. Wise Wood*, New York, N. Y. AUTOMATIC WEB SPLICING MACHINE. Patent dated July 28, 1936. Disclaimer filed August 12, 1936, by the assignee, *Wood Newspaper Machinery Corp.*

Hereby enters this disclaimer of claim 34 of said Letters Patent.

[*Official Gazette September 1, 1936.*]