Nov. 16, 1943. C. S. CAFFREY 2,334,160

WEB SPLICING DEVICE

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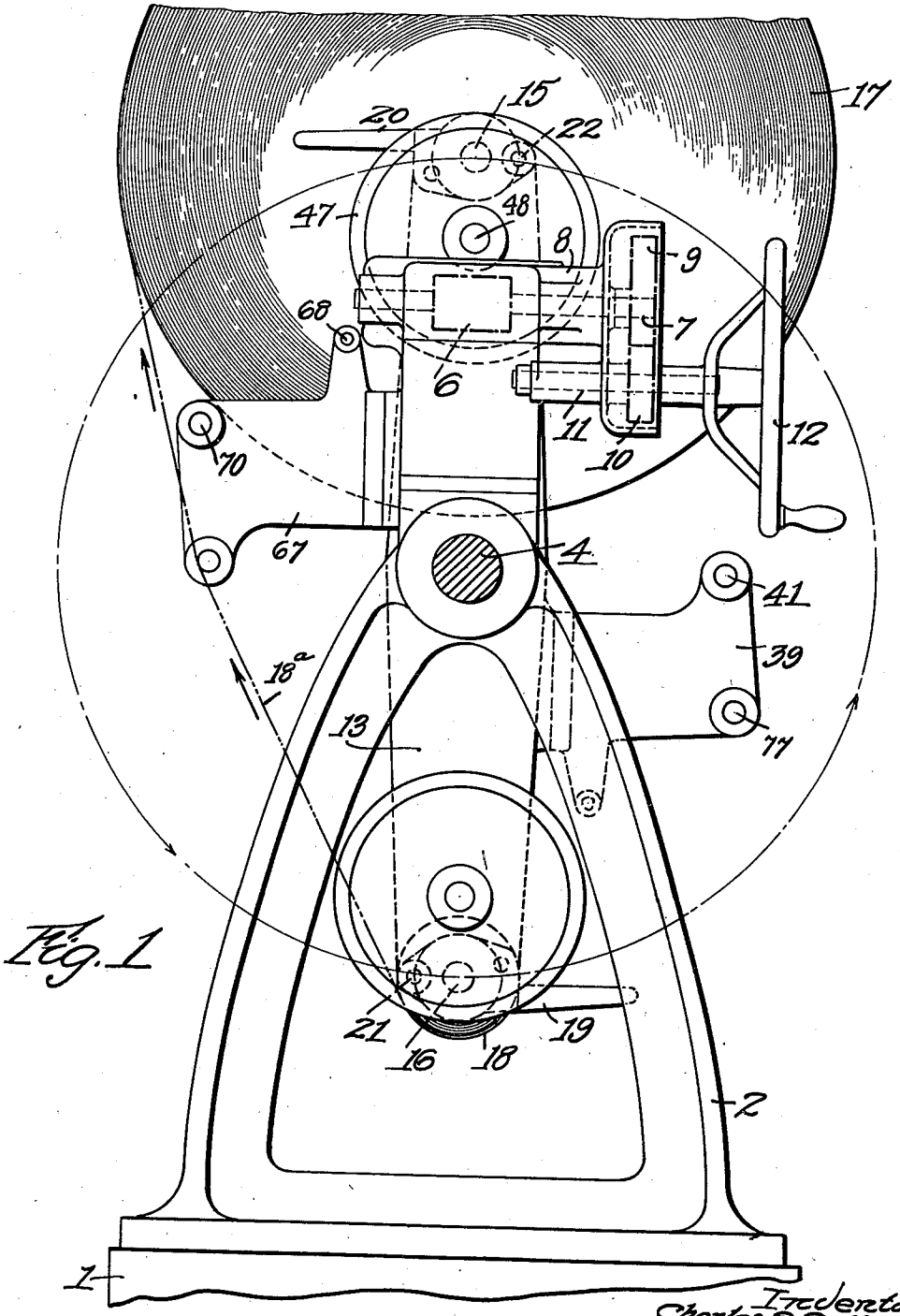


Fig. 1

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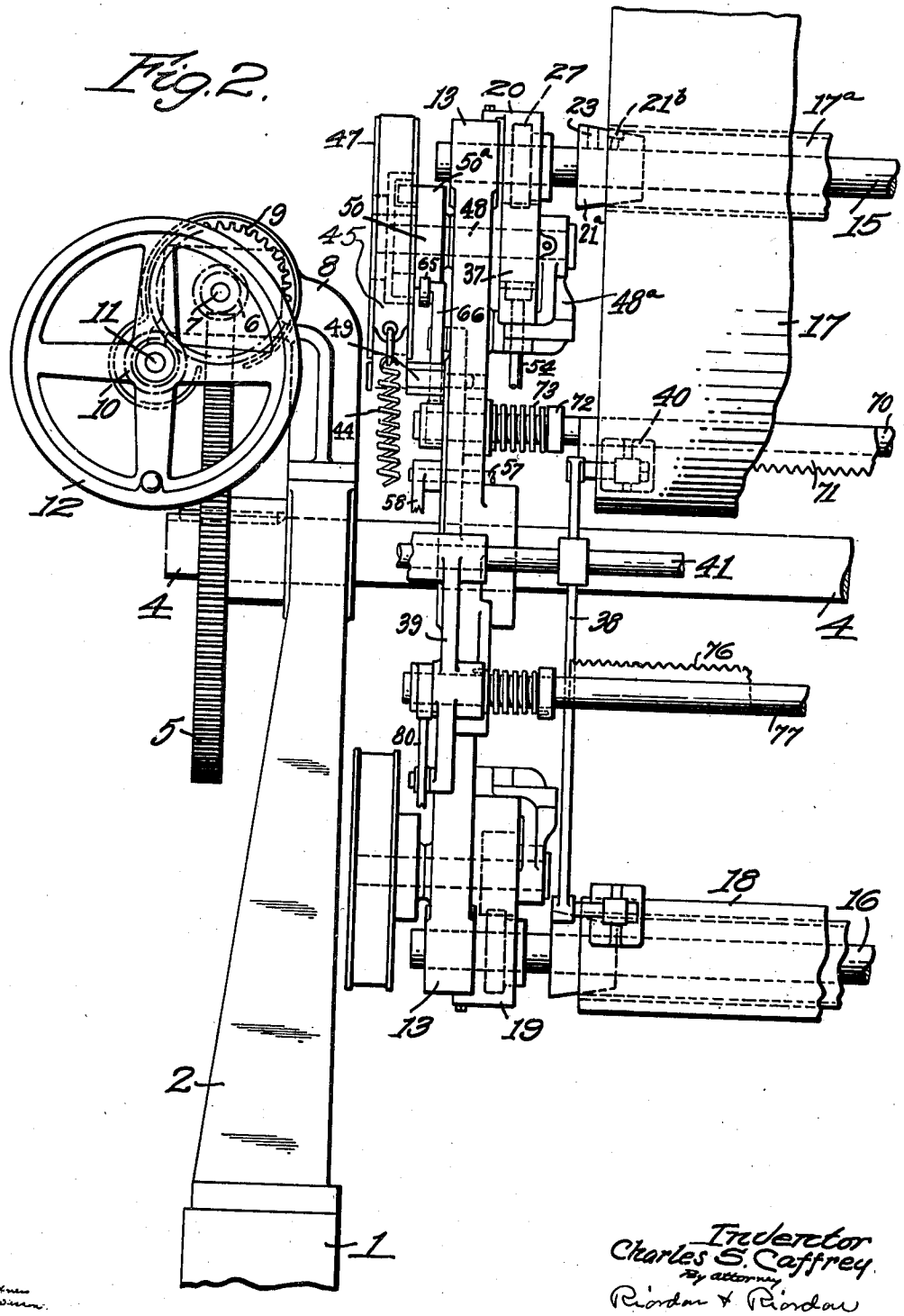
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WEB SPLICING DEVICE

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Fig. 2.



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WEB SPLICING DEVICE

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Fig. 3.

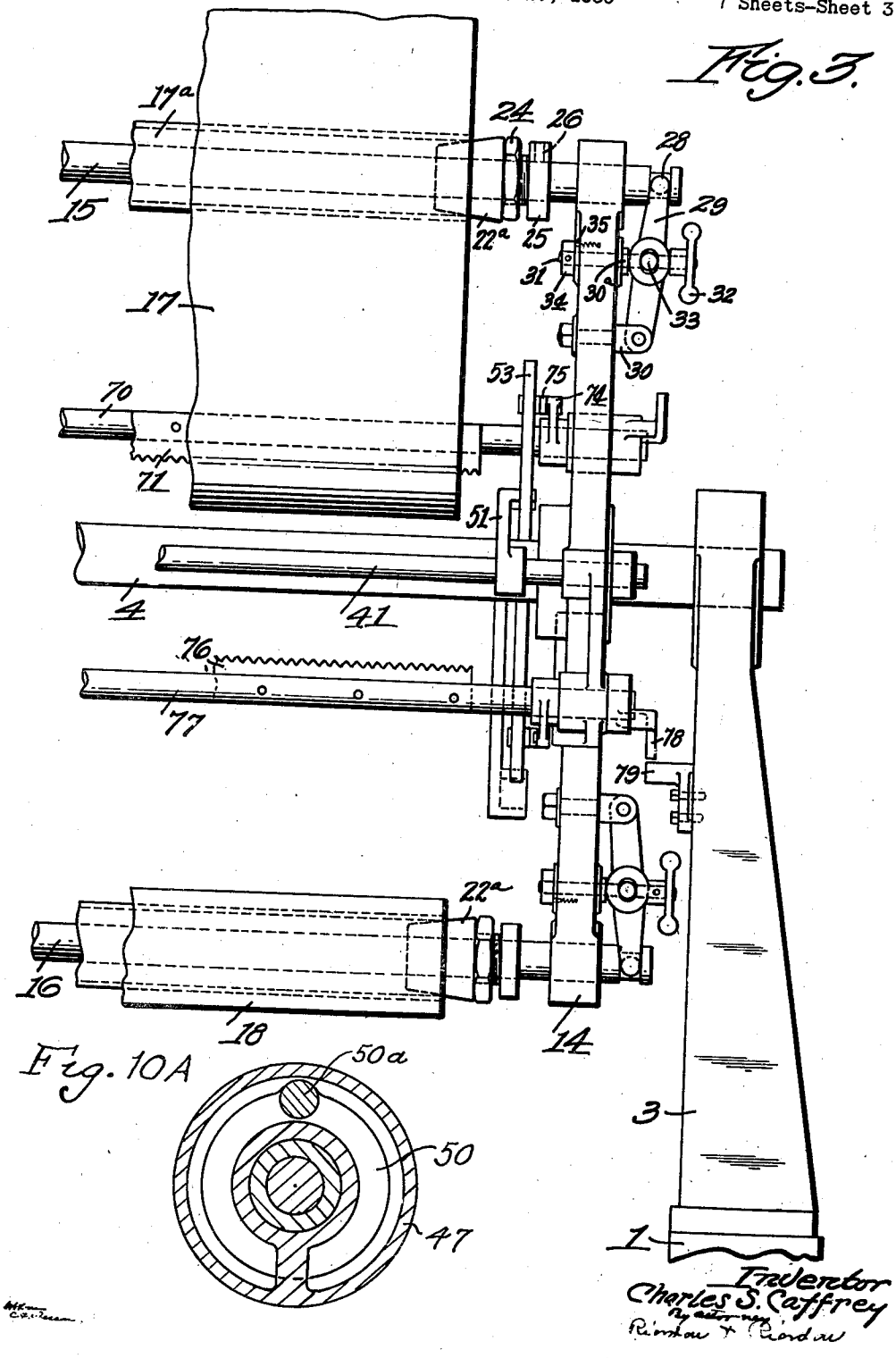


Fig. 10A

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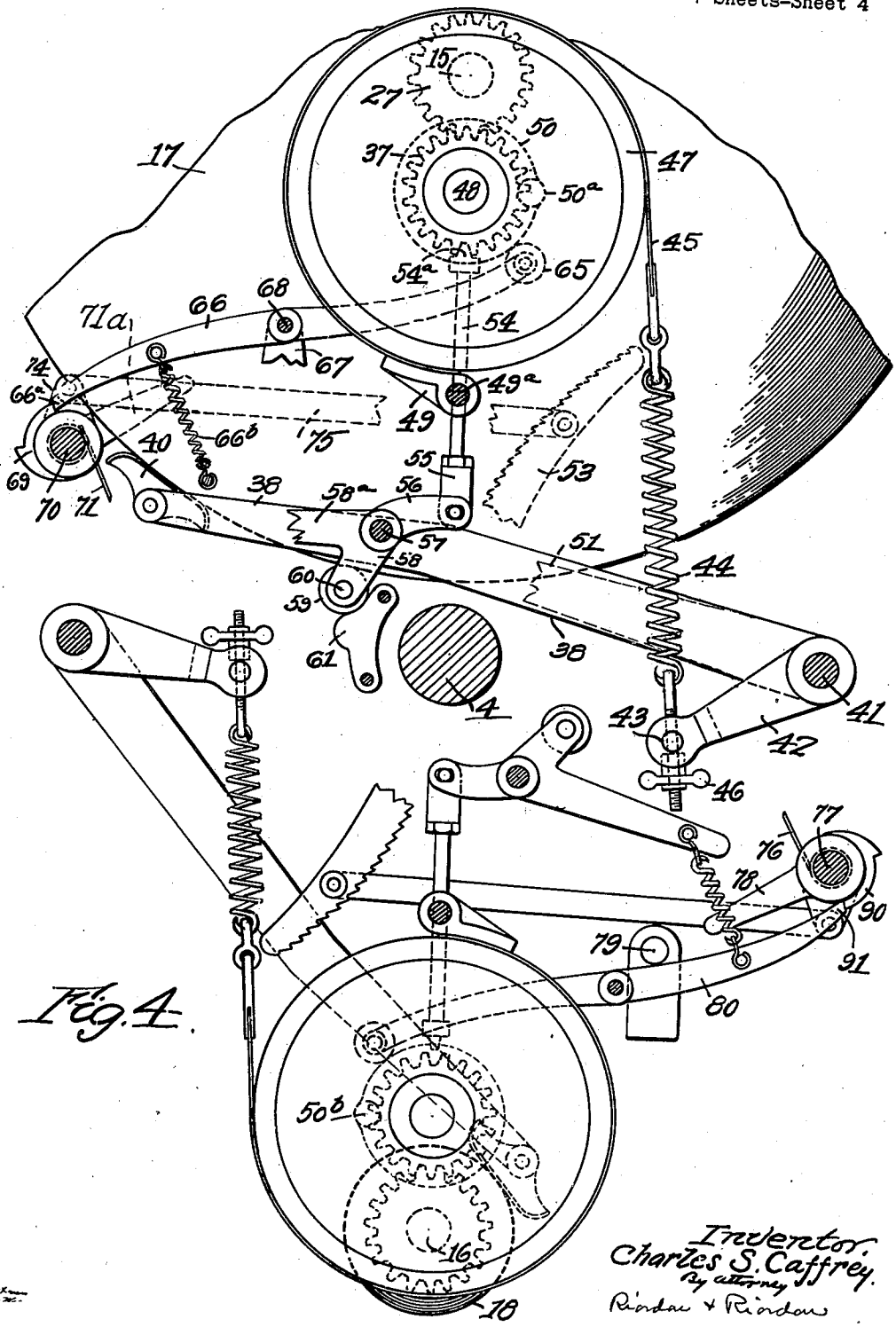


Fig. 4.

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WEB SPLICING DEVICE

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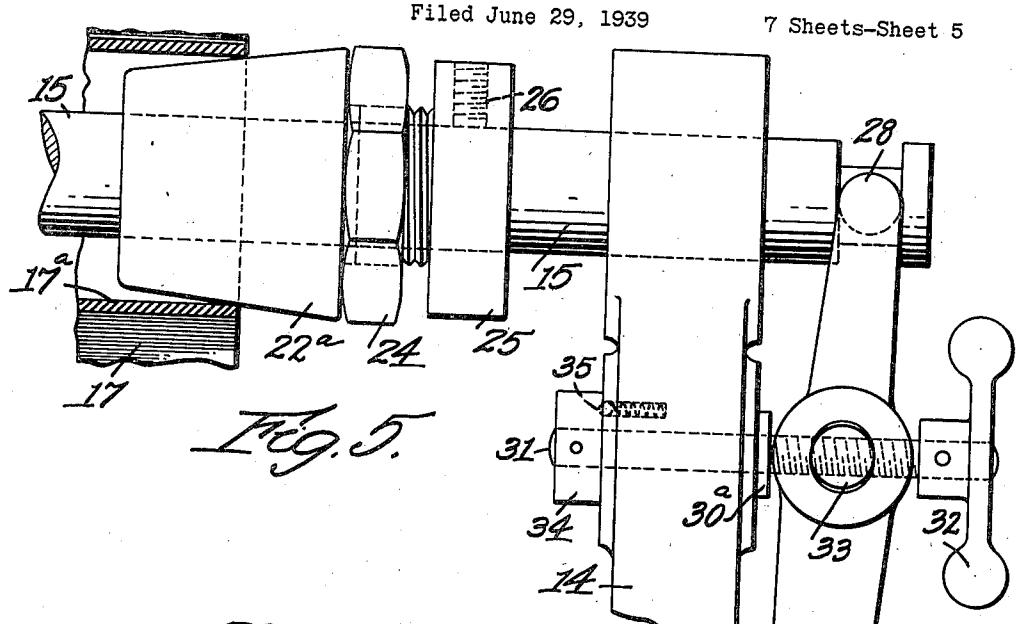


Fig. 5.

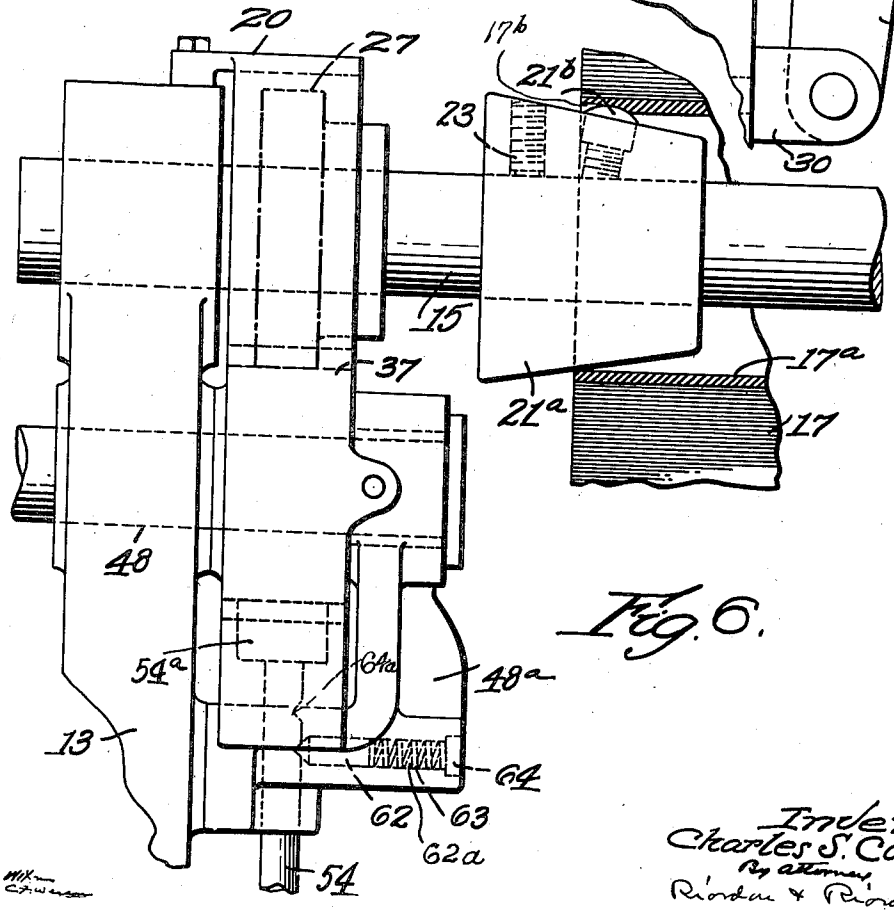


Fig. 6.

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WEB SPLICING DEVICE

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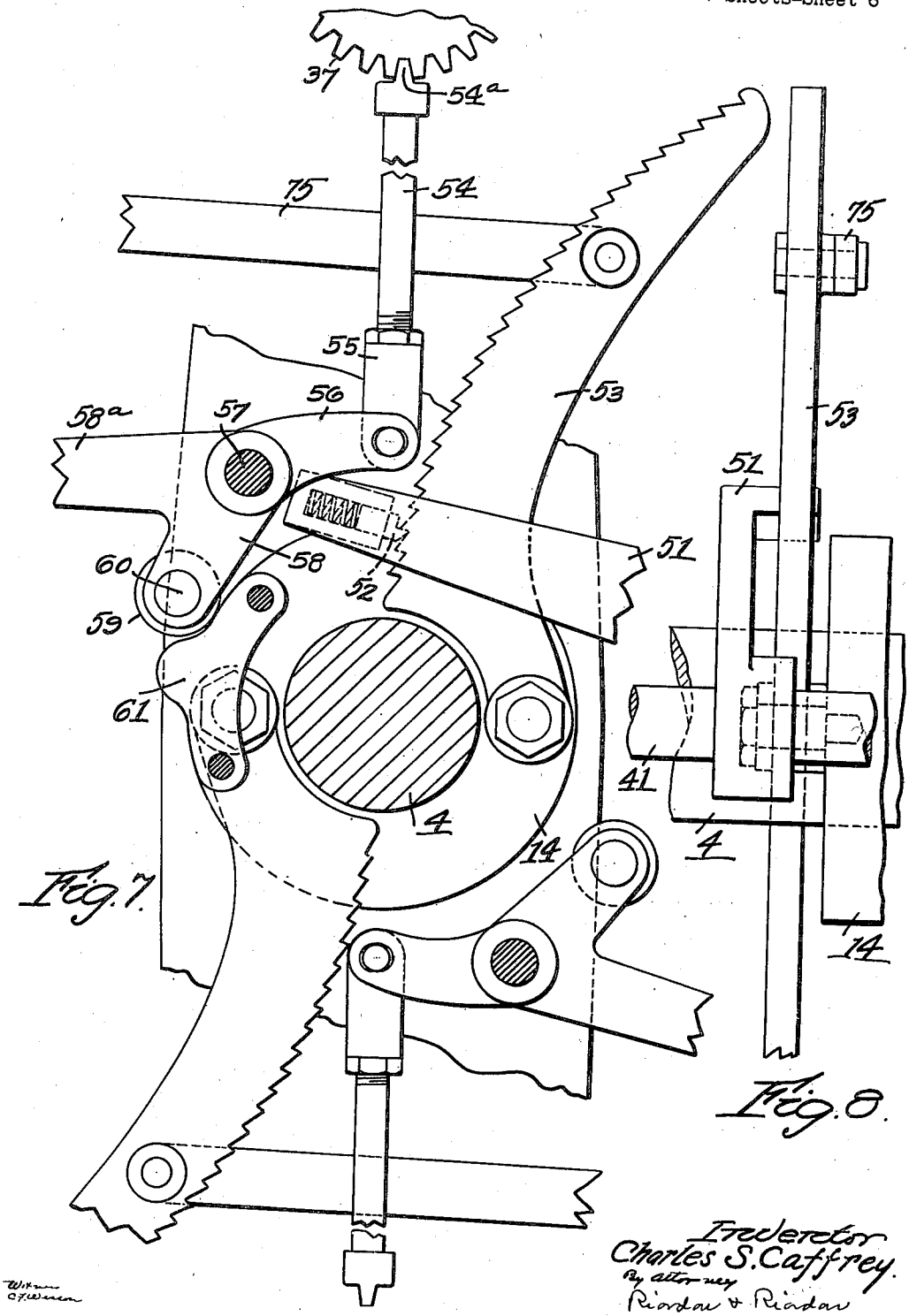


Fig. 7.

Fig. 8.

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WEB SPLICING DEVICE

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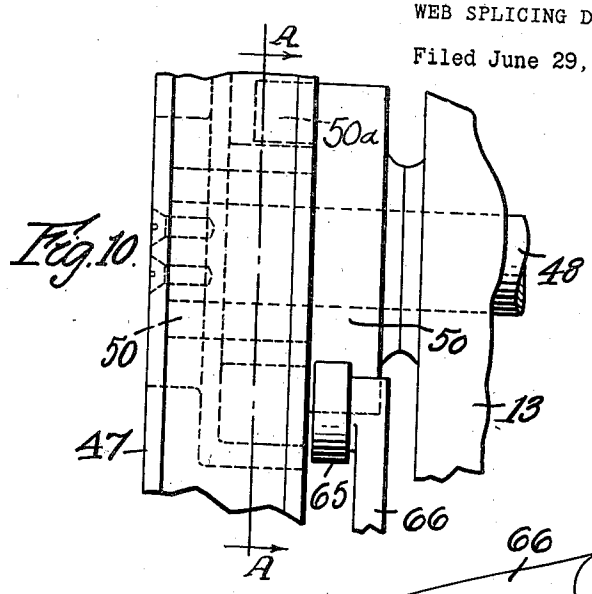
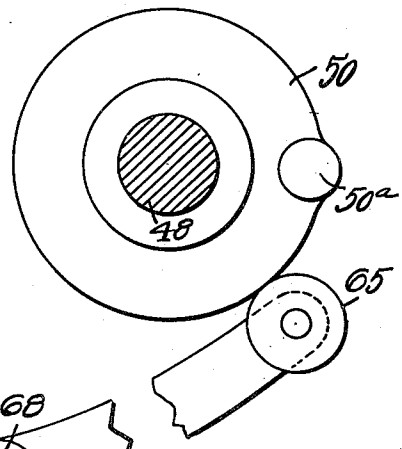


Fig. 10.



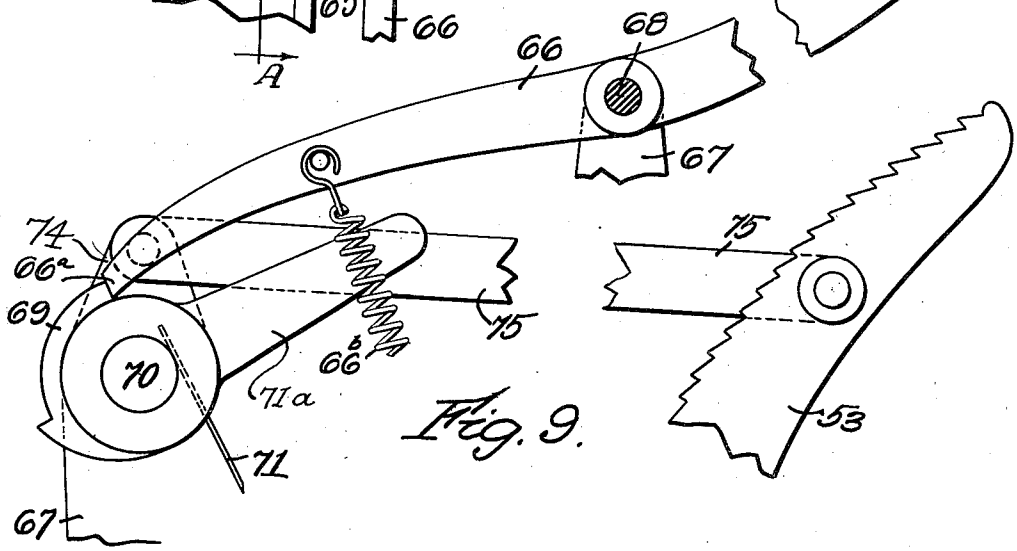


Fig. 9.

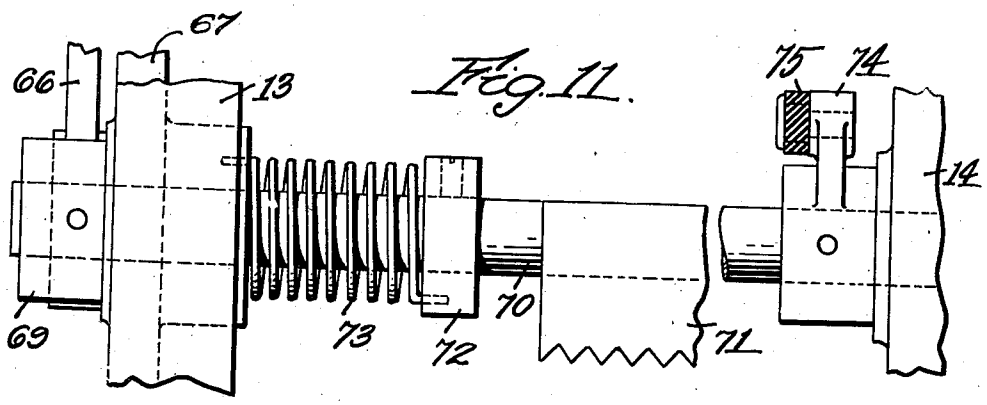


Fig. 11.

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Patented Nov. 16, 1943 2,334,160

UNITED STATES PATENT OFFICE

2,334,160

WEB SPLICING DEVICE

Charles S. Caffrey, Port Washington, N. Y., assignor to Wood Newspaper Machinery Corporation, Plainfield, N. J., a corporation of Virginia

Application June 29, 1939, Serial No. 281,999

4 Claims. (Cl. 242—58)

It is well known in the printing trade to use a full speed web splicing device where a driving mechanism is used to bring the new roll up to web speed prior to contact of the new roll and the running web. This type of machine is highly satisfactory but more expensive than the ordinary magazine reel which may be used to make splices at approximately 40 feet a minute.

The objects of the present invention include: providing an apparatus for splicing a new press roll to an exhausting web at medium speeds between the 40 ft. per minute speed of the ordinary magazine reel and full press speed which in some cases runs as high as 2000 ft. per minute; providing an apparatus for advancing a new roll into engagement with a running web, whereby the latter frictionally drives the former, is spliced thereto, the web is cut just after the splice, and an automatic tension control for the new roll is brought into play; providing a rotatable reel for mounting a plurality of rolls, preferably two, i. e., an exhausting roll and a new paste-prepared roll whereby the new roll may be advanced to frictionally engage the running web of the exhausting roll, means to lock the new roll against rotation, means to release the lock upon a predetermined rotation of the reel, the new roll being then rotated by the web, an automatic tension regulator for the new roll, means to hold the regulator inoperative, means to release the holding means upon a predetermined rotation of the new roll consequent to the release of the roll lock, means associated with the releasing means for the holding means to automatically cut the exhausting web after the splice, the splice being made by the frictional pressure between the web and the new roll after the release of the roll lock, and side register means for the roll.

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 elevation of the machine;

Fig. 2 is a front elevation of one end of the machine, parts being broken away;

Fig. 3 is a front elevation of the other end of the machine, parts being broken away;

Fig. 4 is an elevational view of the automatic tension device and the web cutting device and associated parts, in which parts are broken for clarity;

Fig. 5 is a detail view of the side register device;

Fig. 6 is a detail view of the roll lock;

Fig. 7 is a view similar to Fig. 4 but on a larger scale, with parts broken away;

Fig. 8 is a side view of the parts shown in Fig. 7;

Figs. 9 and 11 are detail views of the web knife and associated parts;

Fig. 10 is a detail view of the hub and associated parts; and

Fig. 10a is a section on the line A—A of Fig. 10.

It is understood, of course, that parts of the mechanism may be used without other combined or associated parts without departing from the scope of the invention. Thus the splicing might be accomplished even though the automatic tension device were not used.

As shown in the drawings there is provided a base 1 to which are bolted end pedestals 2 and 3. A shaft 4 is rotatably mounted in the pedestals and carries a gear 5 keyed thereto. The gear 5 meshes with a worm 6 on a shaft 7, the latter being mounted in a guard bracket 8 in turn mounted on the pedestal 2. The shaft 7 carries a gear 9 meshing with a gear 10, the latter being fastened to a shaft 11. The shaft 11 is carried in the guard bracket 8 and mounts a hand-wheel 12 at its outer end. Motion of the wheel 12 will rotate the shaft 4, as is obvious.

Reel spiders 13, 14 are rigidly secured to the shaft 4 adjacent the pedestals, and by means of the shafts 15, 16 rotatably mounted at opposite extremities of the spiders, the latter rotatably support paper rolls 17 and 18. The shafts 15 and 16 may be referred to as paper roll shafts, and they are detachable from the spiders for mounting the paper rolls in the reel. Caps 19, 20, best shown in Fig. 1, hold the paper roll shafts in place, and themselves are held by hinge pins 21, 22 respectively, which may be locked as by thumb screws, not shown. The caps 19, 20 allow the paper roll shafts 15, 16 to rotate and to move longitudinally but hold them against radial movement.

The paper roll shafts 15, 16 are identical as are the means to hold the rolls thereon. Referring to Figs. 5 and 6, it will be noted that the shaft 15 carries two truncated cones 21a and 22a, the former being secured in desired position on shaft 15 by a set screw 23. The position of the cone 21a is determined by the width of the paper roll. The cone 22a is slidably mounted on the shaft and is adjusted towards and away from the cone 21a by a nut 24 threadedly mounted on a sleeve 25 which is secured to the shaft by a set screw 26. It is obvious that by this means the roll 17 may be secured on the shaft 15 by the cones 21a and 22a bearing against the core 17a of the roll. The core has a slot or depression 17b at one end, as shown in Fig. 6, and this slot is

engaged by the head of a pin 21b, to aid in securing the roll on the shaft. In passing, it is to be noted that the shaft 15 carries a gear 27 meshing with a gear 37 when the shaft is located in the reel.

One end of the shaft 15 extends beyond the spider 14, as shown in Fig. 5, and is peripherally grooved adjacent its end to accommodate a side register trunnion 28. This trunnion is located at the free end of a lever 29 pivotally mounted on a lug 30 on the spider 14. The lever is movable about its pivot by a shaft 31 having a hand wheel 32 and threaded through a poppet 33 engaging the lever 29 at approximately its midpoint. The shaft 31 is restrained from longitudinal movement by a shoulder 30a and a collar 34 pinned to the shaft, the shoulder and collar being on opposite sides of the spider 14. The shaft 31 is frictionally held against any alteration of position due to vibration by a spring pressed ball 35 engaging a countersink in the collar 34. Rotation of the hand wheel 32 adjusts the poppet 33 longitudinally of the shaft 31 and hence the shaft 15 is adjusted in the same direction through the movement of lever 29.

To insert a roll 17 into the reel, the shaft 15 is first dismounted therefrom, with the gear 27 remaining in fixed relation to the shaft. The cone 21a is set to suit the width of the roll, and cone 22a and sleeve 25 are removed from the shaft so as to pass the latter through the core 17a in the roll. The pin 21b positions the roll and cone 22a and sleeve 25 are then slid back onto the shaft and secure the roll by tightening the set screw 26 and the lock nut 24. The spider is rotated to a position where the shaft 15 may be inserted directly into the bearings of the spiders 13, 14 and when this has been done, the cap 19 is closed. Care should be taken that the gear 27 meshes with gear 37; that the groove in shaft 15 engages the trunnion 28, and that a tension arm 38, to be later described, is reset.

Turning to Fig. 4, it will be seen that the tension arm 38 is pivotally mounted at one end on a shaft 41. This shaft 41 is supported in a bracket 39 bolted to the spider 13. A tension shoe 40 is pivoted to the other end of the arm 38, and this shoe, as will be seen, bears against the periphery of the roll 17 and controls the web tension so that it is dependent on the roll diameter. A lever 42 is fixed to the shaft 41 and carries a poppet 43 anchoring one end of a spring 44, the other end of which is secured to an end of a brake band 45, passing about a brake drum 47. The end of the spring 44 passing through the poppet 43 is threaded and the spring tension is adjustable by means of the coacting hand wheel 46. The other end of the band 45 is held by a bracket 49 and stud 49a to the spider 13.

It is evident that moving the shoe 40 in a clockwise direction will shorten the spring 44 and decrease tension on the brake band, and conversely, moving the shoe counterclockwise will stretch the spring and increase tension.

Mounted on the spider 13 by a bracket 48a is a shaft 48 which carries at one end the gear 37 meshing with the gear 27 on the shaft 15, and at its other end a hub 50, keyed thereto.

When resetting the tension arm 38 for a new roll it is apparent that full tension would be placed on the brake drum and it would not be possible to move the roll against this tension for pasting, unless some means to hold the tension momentarily inoperative were provided. For this and other reasons, the drum 47 is rotatably mounted on the hub 50 and these elements are constructed in such manner that although the drum is held from rotation by the brake band 45, the hub 50 and hence the roll 17 may turn a little less than a full revolution before being locked against the drum, thereby applying the brake tension to the web. This is accomplished by providing a piece 50a on the hub which engages a member on the drum, whereby the latter drives the former at one relative position of the parts; see Fig. 10a.

Before setting the tension arm 38 it will be necessary to align a mark on the drum with a fixed mark on the machine to permit the greatest amount of roll freedom previous to the hub and brake engagement.

The new roll to be pasted in must have the leading edge prepared to obtain a proper splice. The leading edge of the paper is trimmed in accordance with the size and type of material, and the edges have a suitable adhesive applied thereto. The leading points may be held down with a small amount of ordinary grease to prevent the sheet from unwinding. In setting the reel, prior to making the paster, the new roll should be locked, by the mechanism described below, in a position such that the tail end of the glue or adhesive will be approximately three inches from the point where the web from the expiring roll will leave contact with the surface of the new roll when the reel is later rotated to bring the new roll in frictional contact with this running web.

The shaft 41 carries a lever 51 in addition to the arm 38, and at its free end, this lever mounts a spring pressed pawl 52 engaging a tension ratchet arm 53 pivoted to the spider 14, see Fig. 7. It is clear that if the pawl 52 be disengaged from the arm 53, the spring 44 will be allowed to move the shoe 40 against the roll 17, to regulate the tension thereof.

A rod 54 is slidably mounted in the bracket 48a, see Fig. 6, and has a single gear tooth shaped projection 54a on its upper end to engage the teeth on the gear 37. At the lower end, the rod 54 is provided with threads for adjustment with respect to a boss 55 carried in a lever 56, see Figs. 4 and 7. This mechanism is located at the inside of the spider 13. The lever 56 is secured to one end of a shaft 57 which passes through the spider 13 and has a cam lever 58 fixed to its other end. Said cam lever 58 carries a handle 58a and a roller 59, the latter mounted on a stud 60. A cam 61 is bolted to the pedestal 2, and intercepts the roller 59 as the reel is rotated, thus causing the projection 54a to disengage from the gear 37 by the linkage just described. The rod 54 is held in locking or unlocking position by a pin 62 carried in a drilled hole 62a in the bracket 48a, the pin 62 being actuated by a spring 63 secured by a set screw 64, and engaging countersunk holes 64a in the rod 54.

Thus, rotation of the reel will release the lock 54a, which prevents the roll from rotating until such release. It is to be pointed out that the cam 61 is so placed as to provide for the longest wrap possible of the expiring web about the new roll, and this is necessary in order to have the new roll attain approximately the same speed as the expiring web. The greater the friction between the web and the new roll, the easier it is to obtain correct linear speed.

Assuming that Fig. 1 illustrates the position in which the expiring web produces the greatest wrap about the roll 17 previous to the release of the lock 54a, and that the expiring roll 18 has

reached its minimum diameter, the operator continues to rotate the reel in a counterclockwise direction by means of the hand wheel 12. After an interval, the cam 61 releases the lock 54a and frees the roll 17 which then turns under influence of the friction between it and the expiring web; and the leading edge of the new roll, previously prepared, will adhere to the web by reason of the frictional pressure, and be carried along by the web.

Rotation of the roll 17 will cause the hub 50 to rotate by means of the shaft 48 and gears 27 and 37. The hub 50 is provided with a cam projection 50a that engages a roller 65 mounted on one end of a lever 66, the latter being pivotally mounted at approximately its mid point on a bracket 67 by a stud 68, the bracket being bolted to the spider 13. As shown in Figs. 4 and 9, the other end of lever 66 is provided with a latch 66a to engage a double-toothed ratchet 69, the latter being fixed to a shaft 70 rotatably mounted in the bracket 67. The latch is held to the ratchet by a spring 66b secured to the lever 66 and the spider 13. The shaft 70 extends across the machine to a bracket similar to the bracket 67 but secured to the spider 14.

The shaft 70 has secured thereto a serrated knife blade 71 that extends the width of the web 18a and is held from the web by the latch 66a and associated ratchet 69, so long as the lever 66 is not rocked by the hub projection 50a. A collar 72 is fixed to the shaft 70 by a set screw or other means and anchors one end of a spring 73 coiled about the shaft 70. The other end of the spring is secured in the bracket 67. The spring is so tensioned, as seen in Fig. 11, that release of the ratchet 69 by the lever 66 under influence of the hub projection 50a, will allow the spring 73 to tend to coil and thus rotate the shaft 70, bringing the knife 71 into the web and severing the latter. The knife 71 may be reset by the lever 71a secured to the shaft 70.

The shaft 70 also has secured thereto a lever 74 carrying one end of a connection link 75 whose other end is attached to the pivoted tension ratchet arm 53, see Figs. 4 and 9.

As previously explained, release of pawl 52 from the ratchet 53 causes the shoe 40 to engage the roll 17, and this release is accomplished by the connection link 75, moving to the right as seen in Figs. 4 and 9, under influence of the spring 73.

The operator can now rotate the reel to a position facilitating the removal of the expired roll 18 and the insertion of a new roll, and as the roll 17 runs out, it is brought to the position formerly held by the roll 18. The parts described above as to the roll lock, the tension lock and the knife are duplicated with respect to the roll 18, as shown in Fig. 4. The knife 76 is reset by the lever 78 secured to the shaft 77, which engages a convenient projection on a bracket 79 in the counterclockwise movement of the reel. By this means, the shaft 77 is rotated against the action of a spring similar to that at 73 and the latch 91 engages the ratchet 90 and is locked thereby until the next movement of the lever 80 under influence of its coacting hub projection 50b.

When the shaft 70 reaches the position of the shaft 77 in Fig. 4, a like resetting will take place. The knife 71 will be returned to inoperative position, and the ratchet arm 53 will be returned to reengage the pin 52 to hold the tension arm 38 from going any closer to the roll, thereby establishing a constant tension for the remainder of the time that the roll 17 is operating. The paper roll lock 54a will remain out of position until the new roll has been prepared and set, and then the lock is reengaged with the gear 37 by means of the handle 58a.

It is believed the operation of the device will be clear without further explanation, and that, the requirements of the invention are fulfilled. The new roll is easily insertable into the reel where it can be spliced into the old web without slowing the press materially, and proper tension control can be retained by means of the automatic tension regulator and the side register adjustment.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. In a device of the class described, a movable support, a shaft journaled therein, means to prevent rotation of said shaft, a tension device for said shaft, means to hold said device inoperative, means to release said rotation preventing means upon a predetermined movement of the support, and a lever cooperating with means on said shaft to release said holding means upon a predetermined movement of said shaft.

2. In a web splicing device, a roll rotatable on its own axis, movable means for supporting said roll, means to positively lock the roll against rotation, in combination with a traveling web, means to relatively move the web and roll whereby they frictionally engage, means to release the locking means, and means operated by the rotation of the roll to cut the web at an interval after the release of the locking means.

3. In a web splicing device, a roll rotatable on its own axis, movable means for supporting said roll, means to lock the roll against rotation, in combination with a traveling web, means to relatively move the web and roll whereby they frictionally engage, means to release the locking means, a tension device for the roll, and means to render said tension device operative upon rotation of the roll.

4. A frame, a shaft journalled in the frame, a hub mounted in fixed relation to the shaft, a drum mounted in rotary relation to the shaft, interengaging means between the hub and the drum whereby the former drives the latter in a single relative position thereof, a tensioned band about the drum, means holding the band in full tension position, means on the hub releasing said holding means in one position of its rotary movement.

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