Nov. 5, 1929. T. S. RAMSDELL 1,734,302

AUTOMATIC LAP DOFFER

Filed June 8, 1928 3 Sheets-Sheet 1

Fig. 1.

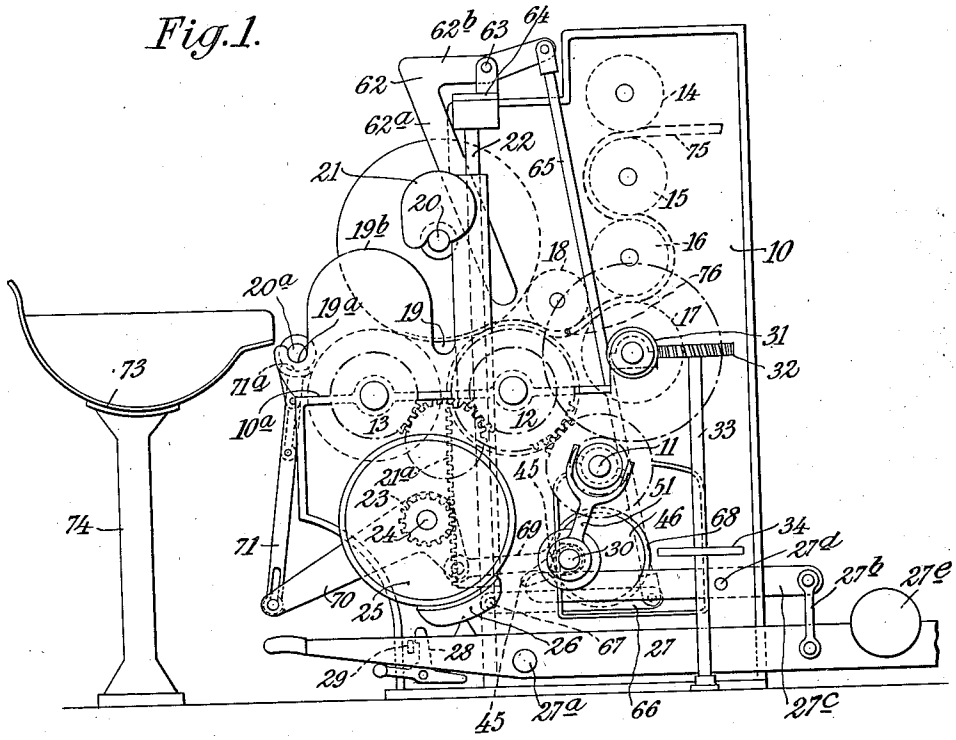


Fig. 5.

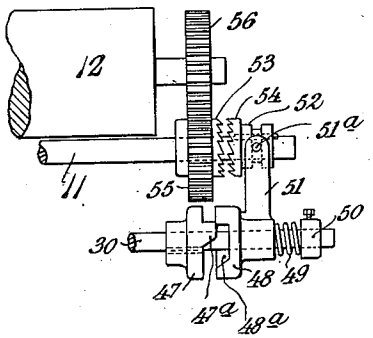
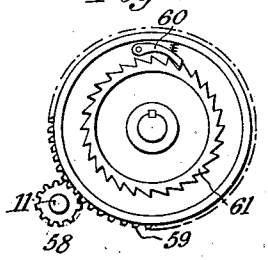


Fig. 6.



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Fig. 2.

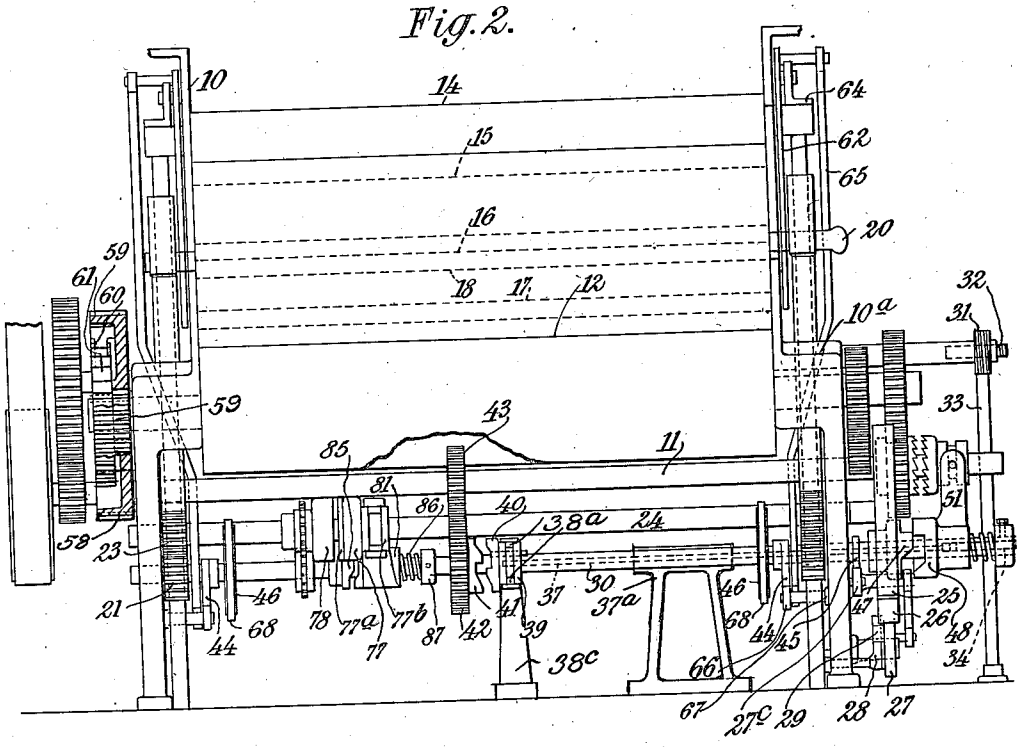
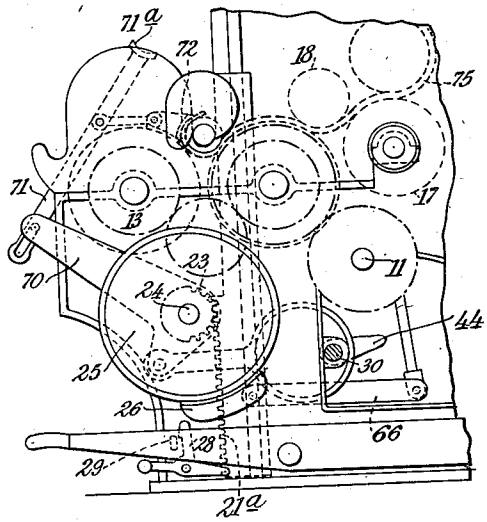


Fig. 3a.



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Fig. 3.

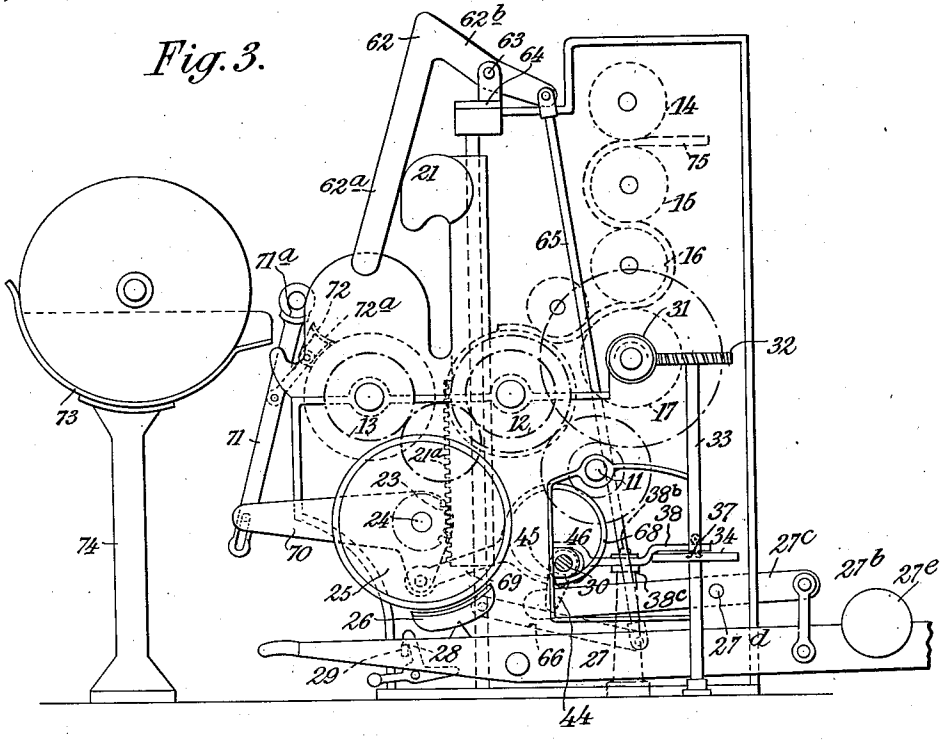


Fig. 4.

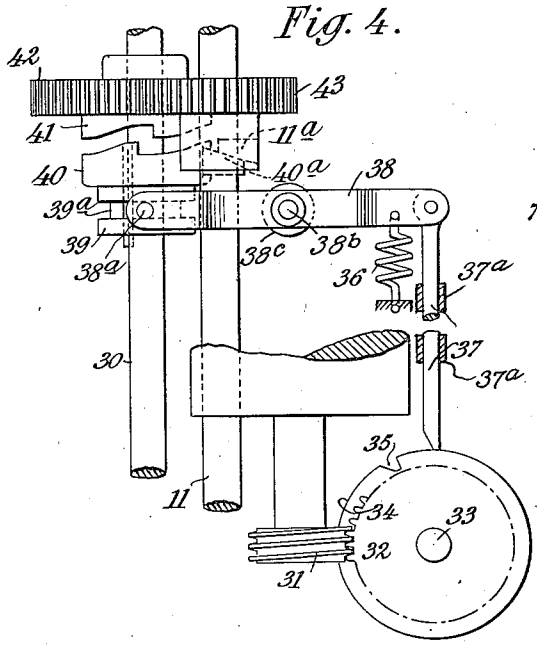
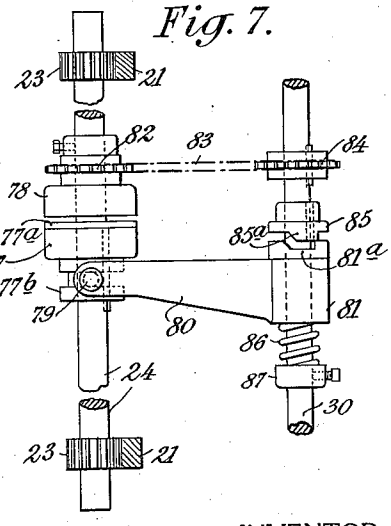


Fig. 7.



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UNITED STATES PATENT OFFICE

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AUTOMATIC LAP DOFFER

Application filed June 8, 1928. Serial No. 283,824.

The present invention relates to an automatic doffing mechanism and more particularly to a lap doffer for a picker calender or analogous machines, and aims to provide certain improvements therein.

Heretofore in the use of machines of the class to which the present invention relates, manual labor had to be employed for removing the full lap roll from the machine and for inserting an empty lap rod into the machine, during which operations the machine had to be at rest. Aside from the fact that these operations were time-consuming, another objection thereto was that unevenness in the lap was frequently caused by the uneven feeding of the lap at the time of starting and running the machine.

According to the present invention I provide means for doffing the completed lap roll from the machine, replacing said doffed lap roll with an empty lap rod and starting the lap around said empty lap rod, all of which operations are automatically accomplished in a very few seconds without stopping the machine, thereby avoiding the strains incident to starting, and insuring evenness in the lap. The mechanism which I employ is a typical picker calender modified through the provision of the doffing attachments comprising means for breaking or severing the lap when a predetermined yardage is on the lap roll, means for discharging the full lap roll from the machine, means for replacing the discharged lap roll with an empty lap rod and means for insuring proper curling of the freshly severed end of the lap about said empty lap rod. The invention also embodies other features of novelty which will be hereinafter more fully described.

A preferred embodiment of my invention is illustrated in the accompanying drawings, wherein

Figure 1 is a side elevation of a picker calender embodying my invention.

Fig. 2 is a front elevation with parts in section of the machine shown in Fig. 1 with the lap roll receiving apron and empty lap rod supports being omitted.

Fig. 3 is a view similar to Fig. 1 showing the position of the various parts of the operating mechanism immediately after the lap roll has been doffed.

Fig. 3ª is a fractional view corresponding to Fig. 3 showing the position of the operating mechanism after an empty lap rod has been placed in position and the freshly severed end of the lap engaged therearound.

Fig. 4 is a top plan view of the controlling means which govern the operation of the doffer mechanism.

Fig. 5 is a front elevation of the means for accelerating the speed of the carrier rolls.

Fig. 6 is a side elevation showing the driving connection between the power shaft and one of the carrier rolls.

Fig. 7 is a top plan view of the mechanism for raising the lap racks.

Referring now to the drawings, wherein like reference characters are employed to designate the same parts in the various figures, let 10, 10 indicate the side walls or frame of a picker calender, said walls being provided with suitable bearings within which are mounted a driving or power shaft 11, carrier rolls 12 and 13, calender rolls 14, 15, 16 and 17, and idler roll 18. Rotation is imparted to the various rolls from the power shaft 11 through suitable driving or gear connections, best illustrated in Figs. 1 and 3 by broken line circles.

The said members 10 as herein shown are each substantially flat excepting for a horizontal offset portion 10ª. Above said offset portions, said members are formed with semi-circular seats 19 and 19ª which provide bearings for the ends of lap rods 20 and 20ª respectively, said seats being connected by a crown portion 19ᵇ. Mounted to rest upon the lap rod 20 adjacent to its ends are a pair of hook-shaped compressor members or lap racks 21 slidably mounted on vertical rails 22, the lower end of each of said lap racks 21 being provided with a suitable rack 21ª for cooperative engagement with a pinion 23 mounted upon a shaft 24, which also has its bearings in the side members 10. Fixed on one end of said shaft 24 is a brake wheel 25 adapted to cooperate with a brake 26, which, in turn, is mounted upon a brake lever 27 pivotally supported at 27ª to the said member

10 and connected through the medium of a link 27^b to a lever 27^c, which is also pivoted to the side member 10 at 27^d. The brake lever 27 is adapted to be held in braking engagement with the brake wheel 25 due to the counter-weight 27^e, and held out of braking engagement with the brake wheel 25 through the medium of a pivoted pawl 28 engageable over a lug 29. The machine thus far described is typical of a picker calender to which the present invention is applicable.

According to the present invention, after a predetermined yardage of lap is received upon the roll, means are provided for automatically severing the lap, doffing the lap roll, replacing an empty lap rod in the machine and starting the freshly severed end of the lap around said empty lap rod. These means comprise an operating shaft 30, the rotation of which is governed by the power shaft 11 through the medium of a mechanism which is operable when a predetermined amount of lap has been wound on the lap rod. This mechanism comprises a spiral gear 31 mounted adjacent the end of a shaft which supports calender roll 17, said spiral gear 31 meshes with a gear 32 at right angles thereto mounted upon a vertical shaft 33, upon which is mounted to rotate therewith in spaced relation to gear 32, a disk 34, having a notch 35 in its periphery. Held in frictional engagement with the outer periphery of disk 34 by a spring 36 is a rod 37 supported upon a slide 37^a. One end of said rod is shaped to engage in the notch 35, and the other end of said rod is pivotally connected with a lever 38, which, in turn, is pivoted intermediate its ends, as shown at 38^b, upon a support 38^c. The opposite end of the lever 38 is forked to straddle a ring 39, and each arm of the fork has a pin 38^a which engages in a groove 39^a in the ring 39, which, in turn, carries an element 40 of a spiral clutch which is slidable upon and rotatable with operating shaft 30. The complemental spiral clutch member 41 is free to rotate upon shaft 30 and carries a gear 42 which is in mesh with a gear 43 fixed upon the power shaft 11. The speed ratio between the driving shaft 11 and gear 32 is such that when the latter makes one complete revolution, a predetermined yardage of lap, say fifty yards, sufficient to constitute a full lap roll, will have passed through the calender rolls. It will thus be seen that when the disk 34 completes one revolution, the disk-engaging end of the rod 37 under the influence of spring 36 will be caused to engage in the notch 35 thereby throwing clutch element 40 into engagement with clutch element 41 whereby shaft 30 will be rotated. Continued rotation of the disk 34 will disengage the end of rod 37 from notch 35 and uncouple the clutching elements. It is desirable when the foregoing action takes place that the shaft 30 be rotated through but one complete revolution and to insure this the clutching element 40 is provided with a lug 40^a adapted to engage a cooperating lug 11^a on the shaft 11 to positively disengage the clutch elements after one complete revolution of the element 40. During the one complete rotation of shaft 30, the various automatic operations hereinbefore referred to take place, as will presently appear.

Mounted upon the shaft 30 are cams 44, 44 of identical form, cam 45, disks 46, 46 of identical form, said disks being eccentrically mounted on said shaft, and a pair of engageable elements 47, 48. Element 47 is provided with a dog 47^a and is fixed upon shaft 30 and rotatable therewith, while element 48 is loose, non-rotatable and slidable on said shaft and normally pressed into engagement with dog 47^a by coil spring 49 mounted upon said shaft between the rear end of element 48 and a fixed abutment 50 on the shaft. Element 48 is formed with a groove 48^a adapted for cooperation with dog 47^a, and also has an upwardly-extending arm 51, the free end of which carries a pin 51^a engaging in the groove of a collar 52 on shaft 11 for a purpose which will be presently made apparent.

Mounted on one end of shaft 11 substantially in alignment with elements 47, 48 on shaft 30 are a pair of clutch elements 53, 54, the former of which is freely rotatable on shaft 11 and carries a gear 55 in mesh with a gear 56 mounted on the shaft which supports carrier roll 12. Clutch element 54 is carried by grooved ring 52 which is slidable along shaft 11 and rotatable therewith. It will thus be apparent that when shaft 30 is rotated and dog 47^a is brought into position opposite groove 48^a, element 48, acted upon by spring 49, is moved to the left, whereupon arm 51 moves clutch element 54 into engagement with its complemental clutch element 53 to rotate the latter, which rotation in turn is imparted through gears 55 and 56 to carrier rolls 12 and 13. Normally the carrier roll 12 is driven from the shaft 11 through gears 58 and 59, spring-pressed pawl 60 carried by gear 59, and ratchet wheel 61, as best illustrated in Figs. 2 and 6. Gear 59 is free to rotate on the shaft of roll 12 and ratchet wheel 61 is keyed on said shaft, hence, backlash or slippage of gear 59 on the shaft of roll 12 is prevented through the medium of the pawl and ratchet engagement.

A comparison of the driving connection of carrier roll 12 through gears 58 and 59, pawl 60 and ratchet wheel 61, and that between gears 55 and 56 will disclose at a glance that the driven speed acquired through gears 55, 56 will be much greater than that obtained under normal driving conditions. In other words, during the interval that the clutch elements 53 and 54 are in engagement, the car-

rier roll 12 may be said to be accelerated momentarily.

The doffer mechanism per se consists of a pair of angular members 62, 62, one at each side of the machine, said members being pivotally supported at 63 upon brackets 64 mounted on the frame members 10. The long arms 62[a] of the angular members are adapted to engage near the ends of the lap rod to discharge the full lap from the machine. The short arms 62[b] are pivotally connected at their free ends to links 65, which, in turn, are pivotally connected to links 66, which are, in turn, pivotally secured to the side members 10 at 67. It will thus be seen that as the cams 45 during the rotation of shaft 30 ride in contact with the links 66 depressing the same, they operate through links 65 to move the angular members 62 about their pivots 63 to discharge the lap roll from the machine. This action is clearly illustrated in Fig. 3.

Mounted upon each disk 46 is a ring 68 which carries a crank 69 pivotally connected at its end to the short arm of a bell-crank lever 70 which is mounted for rotation upon the shaft 24. The end of the long arm of each of the bell-crank levers is connected to the lower end of the empty lap rod supports 71 through a pin and slot connection. The upper ends of the rods 71 are each provided with a concave seat 71[a] for supporting a lap rod. Pivotally carried by the lap rod supports 71 intermediate the ends thereof are a pair of lap end guide members 72 which are formed at their free ends with concave seat 72[a] adapted to engage the end of a freshly severed lap to insure its engagement around an empty lap rod. It will be apparent from the character of the mounting of the members 72 upon the lap rod supports that said members 72 will be, due to the action of gravity thereon, guided wholly by the movements of the lap rod supports 71 and the surface of the carrier roll 13. The movements and operation of elements 71 and 72 will be apparent from an inspection of Figs. 1, 3 and 3[a].

The lap roll, upon being discharged or doffed from the machine, may be thrown onto the floor, but is preferably received in a suitable apron 73 mounted upon an upright support 74 in the front of the machine.

Instead of relying upon the resiliency of the lap roll to move the lap racks upwardly upon the brake being released, mechanical means may be employed for positively insuring the upward movement of the lap racks. A preferred form of mechanism which I employ for accomplishing this result comprises a pair of friction clutch elements 77, 78 mounted upon shaft 24, the element 77 being rotatable with the shaft as a unit but adapted for limited sliding movement thereon, whereas element 78 is mounted to freely rotate upon said shaft 24. One of said elements, for example 77, may be provided with a disk of friction material 77[a]. The clutch element 77 is provided with a sleeve 77[b] having a circumferential groove therein, within which projects a pin 79 carried by a lever 80, which, in turn, is carried by a cam element 81 loosely mounted upon shaft 30. Clutch element 78 is provided with a collar extension upon which is mounted a sprocket wheel 82, over which passes a sprocket chain 83 adapted to be driven by a sprocket wheel 84 keyed to the shaft 30. Fixed upon shaft 30 is a cam element 85 provided with a dog-like projection 85[a] adapted for cooperative engagement with a recess 81[a] in element 81. Pressing against one end of cam element 81 and tending to move it to the right is a coil spring 86, the opposite end of which abuts against a collar 87 fixed on shaft 30. It will thus be seen that as operating shaft 30 rotates, the dog 85[a], upon coming opposite to recess 81[a], permits the element 81 to be moved to the right, which movement brings the clutch elements 77 into engagement with clutch element 78 to rotate shaft 24, and with it pinions 23 to raise racks 21. By properly designing cam elements 81 and 85, the clutch 77, 78 can be thrown in momentarily or just long enough to raise the racks to their upper limit of travel, after which they may descend by the action of gravity thereon.

In the operation of the machine the lap 75 is fed to the machine through calender rolls 14, 15, 16 and 17, under idler roll 18, which bears more heavily on carrier roll 12 than on calender roll 17, and over carrier rolls 12 and 13, to be wound about the lap rod 20, which, when empty, is supported by the carrier rolls 12 and 13. When a predetermined amount of lap has passed through the calender rolls, rod 37 engages in notch 35, causing clutch elements 40 and 41 to engage to rotate shaft 30 through one revolution. During this one revolution of the shaft 30, the following operations take place in succession: (*a*) the brake shoe 26 is released from the brake wheel 25 through engagement of cam 45 with lever 27[c] acting through connecting link 27[b] and brake lever 27, and at the same time the brake lever 27 is held down through engagement of the pawl 28 over lug 29; (*b*) the clutch elements 77, 78 are caused to engage, rotating pinions 23 and raising lap racks 21; (*c*) the elements 53 and 54 are brought into clutching engagement and momentarily accelerate the carrier rolls 12, 13, which, in turn, accelerate idler roll 18 which bears heavily upon carrier roll 12 and causes the lap to be severed at approximately the point 76 due to the increased tension placed thereupon at said point; (*d*) while this latter action is taking place the doffer arms 62 are moved outward due to engagement of the cams 44 with the links 66 to discharge the lap roll from the machine into the apron 73; (*e*) the

lap racks 21 thereupon start to descend due to their own weight, the clutching engagement between elements 77, 78 having been broken, and in the meantime an empty lap rod 20^a which is supported by the recesses 19^a and lap rod supports 71, is elevated through movement of the crank arms 69 and bell-cranks 70; (*f*) while the shaft 30 is completing its one revolution the doffer arms 62 are returned to their normal position because of the weight of their long arms 62^a, the lap racks 21 will have returned to their lower limits, and in doing so the lower ends of said lap rack will have engaged the pawl 28, permitting the brake shoe 26 to again press against the brake wheel 25. However, before the lap racks reach their lowermost limits the empty lap rod 20^a will have been dropped into position in the recesses 19 and the lap end guide member 72 assumed the position shown in Fig. 3^a, so that its concaved end 72^a engages the freshly severed end of the lap and causes the same to curl over the empty lap rod. By the time the shaft 30 completes its one revolution the various movable elements brought into play due to the movement of the rod 37, again assume their original positions and the process of winding a new lap is in progress. The various operations incident to doffing a complete lap roll from the machine and starting a new lap roll on its way are all completed in a few seconds, wholly automatically, and in a manner to insure evenness of the lap. The discharged lap roll is removed from the apron, an empty lap rod placed in position upon the lap rod supports 19^a, and the machine is ready for its next doffing operation. It will thus be seen that a single operator can readily take care of many machines.

From the foregoing description it will be apparent that I have provided an efficient, practicable, automatic lap doffer, and although I have shown a preferred embodiment of my invention and the manner in which it operates, I desire it to be understood that I do not wish to be limited to the specific details of construction or mechanical movements herein disclosed since modifications thereof may be resorted to without departing from the spirit of the invention.

What I claim is:

1. In a picker calender or the like comprising carrier rolls, means for accelerating the carrier rolls momentarily at predetermined intervals.

2. A picker calender or the like comprising carrier rolls, calender rolls, an idler roll between a carrier roll and its adjacent calender roll adapted to be influenced by the rotation of said carrier roll, and means for accelerating the carrier rolls at predetermined intervals.

3. A picker calender or the like comprising a power shaft, carrier rolls driven from said power shaft at a predetermined speed, and a supplemental driving connection between said power shaft and one of the carrier rolls for intermittently accelerating the speed of the carrier rolls.

4. A picker calender or the like comprising a power shaft, carrier rolls driven from said power shaft at a predetermined speed, and a supplemental driving connection between said power shaft and one of the carrier rolls for intermittently accelerating the speed of the carrier rolls, said supplemental driving connection comprising a pair of clutch elements on the driving shaft, one of said clutch elements being freely rotatable thereon and in driving engagement with means on the carrier roll, the other of said clutch elements being rotatable with and slidable along said shaft into clutching engagement with the first-mentioned clutch element at predetermined intervals.

5. A picker calender or the like comprising a power shaft, carrier rolls, an operating shaft, means governed by the rotation of the power shaft for completely rotating the operating shaft at predetermined intervals, and means governed by the rotation of the operating shaft for accelerating the carrier rolls momentarily every time rotation is imparted to the operating shaft.

6. In a picker calender or the like, a power shaft, an operating shaft, means governed by the rotation of the power shaft for rotating the operating shaft, said means comprising a pair of clutch elements on the operating shaft, one of said clutch elements being freely rotatable on said shaft and in driving engagement with means on the driving shaft, and the other of said clutch elements being rotatable with and slidable along said shaft into clutching engagement with the first-mentioned clutch element by a tripping means at predetermined intervals.

7. In a picker calender or the like, a power shaft, an operating shaft, means governed by the rotation of the power shaft for rotating the operating shaft, said means comprising a pair of clutch elements on the operating shaft, one of said clutch elements being freely rotatable on said shaft and in driving engagement with means on the driving shaft, the other of said clutch elements being rotatable with and slidable along said shaft into clutching engagement with the first-mentioned clutch element by a tripping means at predetermined intervals, and cooperating means on the second-mentioned clutch element and the driving shaft for disengaging the clutching elements upon the operating shaft completing one revolution.

8. A picker calender or the like comprising calender rolls, carrier rolls, a lap roll resting on the carrier rolls receiving the lap which passes though the calender rolls, and means operable when a predetermined amount of

lap has passed through the calender rolls, for accelerating the carrier rolls momentarily to sever the lap between the calender rolls and the carrier rolls.

9. A picker calender or the like comprising calender rolls, carrier rolls, an idler roll between a carrier roll and its adjacent calender roll adapted to bear with greater pressure upon said carrier roll than upon said calender roll, a lap roll resting on the carrier rolls and receiving the lap which passes through the calender rolls, and means operable when a predetermined amount of lap has passed through the calender rolls, for accelerating the calender rolls momentarily to sever the lap between the bearing points of the idler roll upon the carrier roll and its adjacent calender roll.

10. A picker calender or the like comprising a power shaft, calender rolls, carrier rolls, a lap roll resting on the carrier rolls receiving the lap which passes through the calender rolls, an operating shaft, means governed by the rotation of the power shaft for rotating the operating shaft, when a predetermined amount of lap has passed through the calender rolls, and means operable by the rotation of the operating shaft for severing the lap, and doffing the lap roll from the machine.

11. A picker calender or the like comprising a power shaft, calender rolls, carrier rolls, a lap roll resting on the carrier rolls receiving the lap which passes through the calender rolls, an operating shaft, means governed by the rotation of the power shaft for rotating the operating shaft, when a predetermined amount of lap has passed through the calender rolls, and means operable by the rotation of the operating shaft for severing the lap, doffing the lap roll from the machine, inserting an empty lap rod in place and causing the fresh end of the severed lap to curl around the lap rod.

12. A picker calender or the like comprising calender rolls, carrier rolls, a lap roll resting on the carrier rolls for receiving the lap which passes through the calender rolls, means for controlling the amount of lap to be wound on a lap rod, lap racks for holding the lap roll under compression, and means operable by the means for controlling the amount of lap to be wound on the lap rod for raising the lap racks when the predetermined amount of lap is on the lap rod.

13. A picker calender or the like comprising a power shaft, calender rolls, carrier rolls, a lap roll resting on the carrier rolls for receiving the lap which passes through the calender rolls, means for controlling the amount of lap to be wound on a lap rod, lap racks for holding the lap roll under compression, an operating shaft, means operable by the power shaft for rotating the operating shaft when the predetermined amount of lap is on the lap rod, and means governed by the rotation of the operating shaft for positively raising the lap racks.

14. A picker calender or the like comprising calender rolls, carrier rolls, a lap roll resting on the carrier rolls receiving the lap which passes through the calender rolls, means for controlling the amount of lap to be wound on a lap rod, means for severing the lap, lap racks for holding the lap roll under compression, a brake controlling the movement of the lap rack, a doffer for discharging the full lap roll from the machine, and means operable by the means for controlling the amount of lap on the lap roll for controlling the following operations in succession: (*a*) releasing the brake; (*b*) raising the lap racks; (*c*) operating the means for severing the lap; and (*d*) moving the doffer to discharge the lap roll.

15. A picker calender or the like comprising calender rolls, carrier rolls, a lap roll resting on the carrier rolls receiving the lap which passes through the calender rolls, means for controlling the amount of lap to be wound on a lap rod, means for severing the lap, lap racks for holding the lap roll under compression, a brake controlling the movement of the lap rack, a doffer for discharging a full lap roll from the machine, an empty lap rod support and lap end guide, and means operable by the means for controlling the amount of lap on the lap roll for controlling the following operations in succession: (*a*) releasing the brake; (*b*) raising the lap racks; (*c*) operating the means for severing the lap; and (*d*) moving the doffer to discharge the lap roll, replacing an empty lap rod in the machine and causing the fresh end of the severed lap to curl around the empty lap rod.

16. A picker calender according to claim 15, wherein the means which are operable by the means for controlling the amount of lap on the lap roll are mounted on a rotatable shaft and wherein all of the successive operations mentioned are carried out during one complete revolution of the rotatable shaft.

17. A picker calender according to claim 15, wherein the lap end guide is pivotally supported near the outer ends of the lap rod supports and is partly actuated by gravity.

In witness whereof, I have hereunto signed my name.

THOMAS S. RAMSDELL.