

A. S. WOODWARD.

PRESSURE CONTROLLED APPARATUS FOR CALENDERING ROLLS.

No. 546,480.

Patented Sept. 17, 1895.

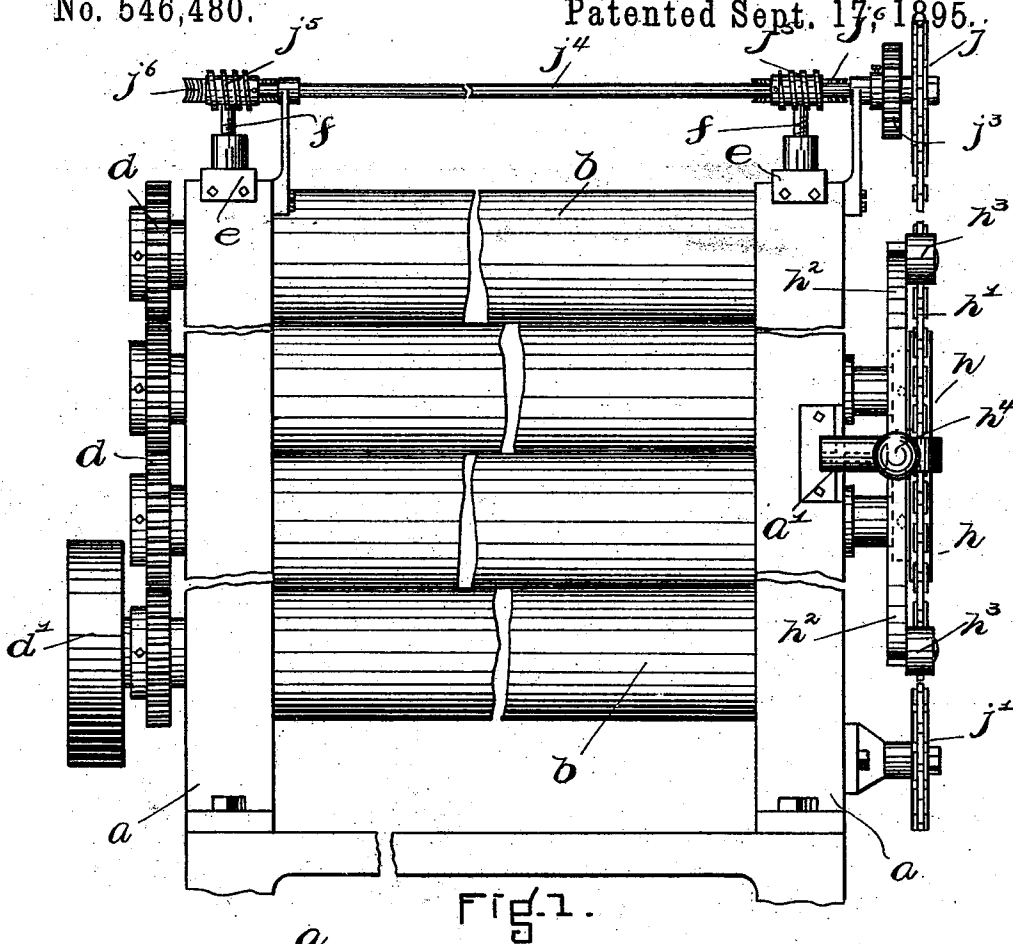


Fig. 1.

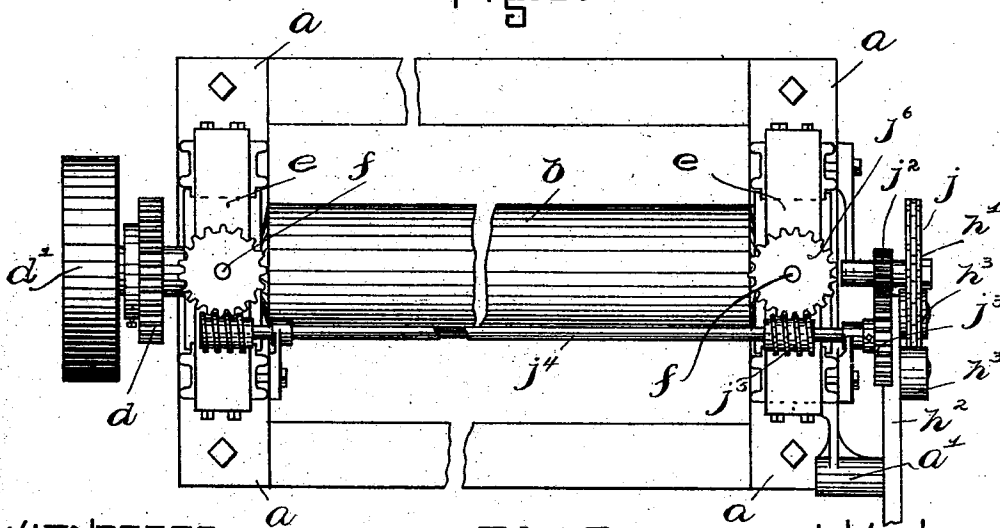


Fig. 2.

WITNESSES.

H. J. Hammon
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INVENTOR.

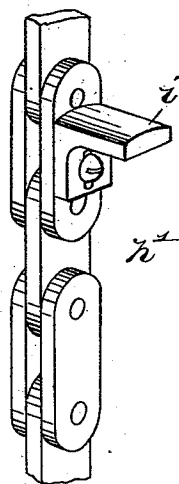
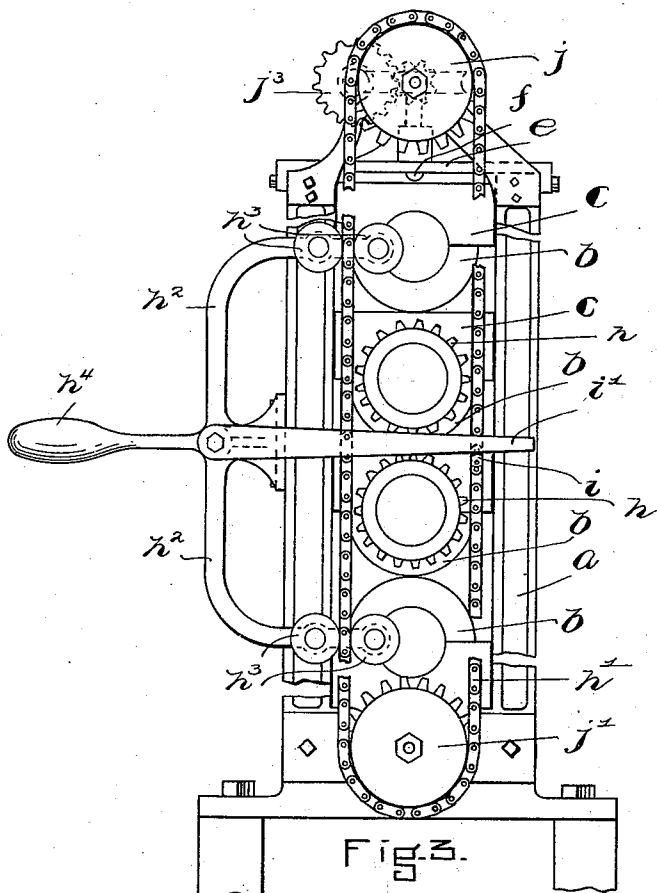
A. S. Woodward
by Wright & Brown
Attys.

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Fig. 5.

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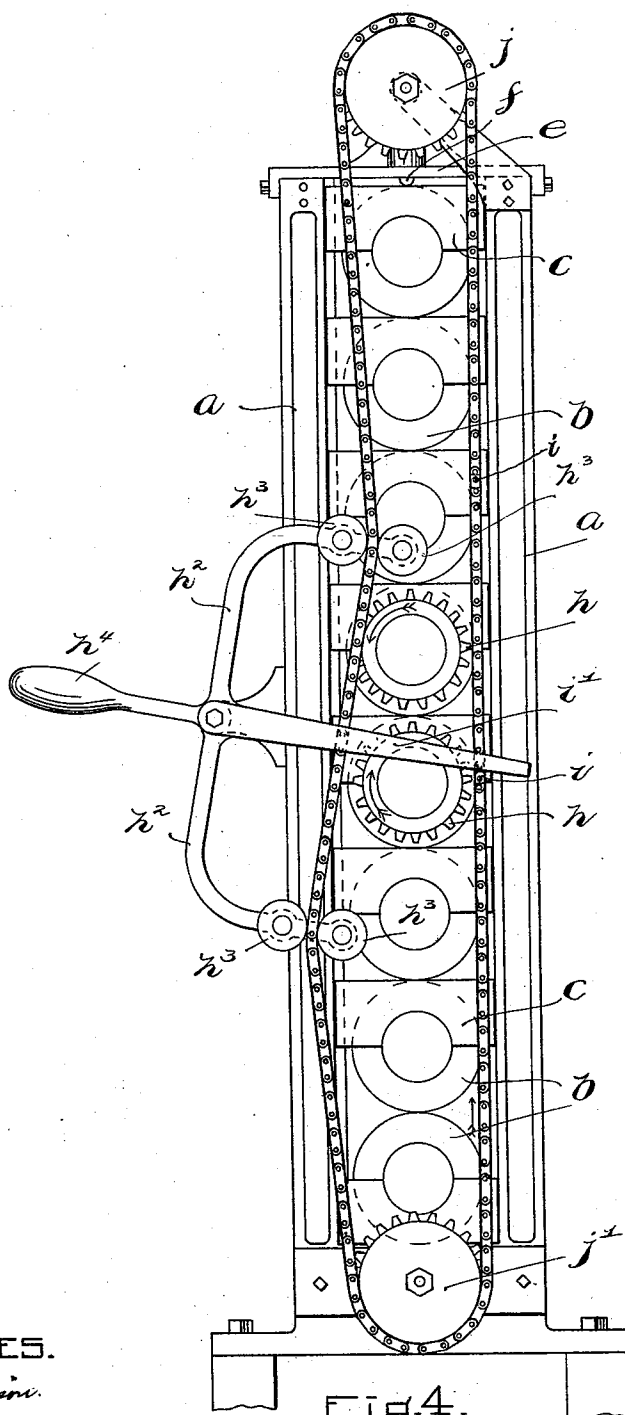
by Wright & Son, for the
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FIG. 4.

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FIG. 7.

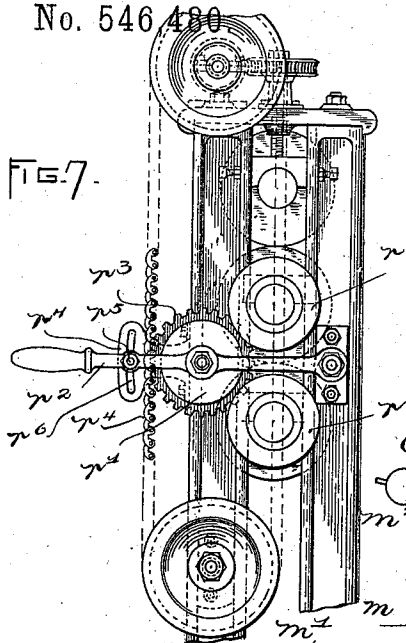


FIG. 6.

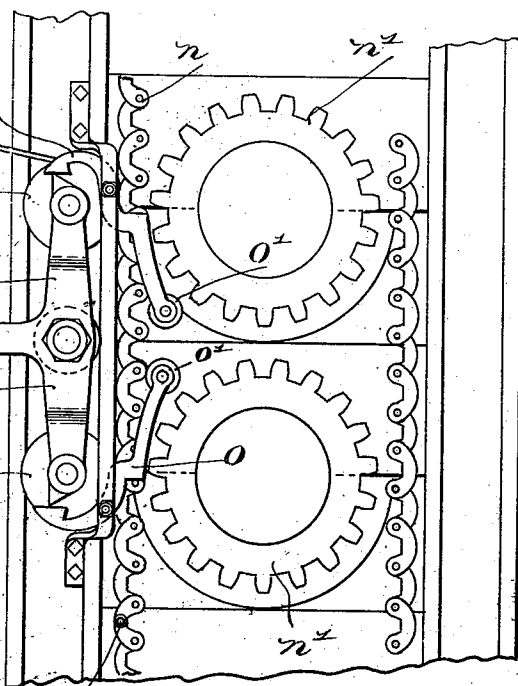
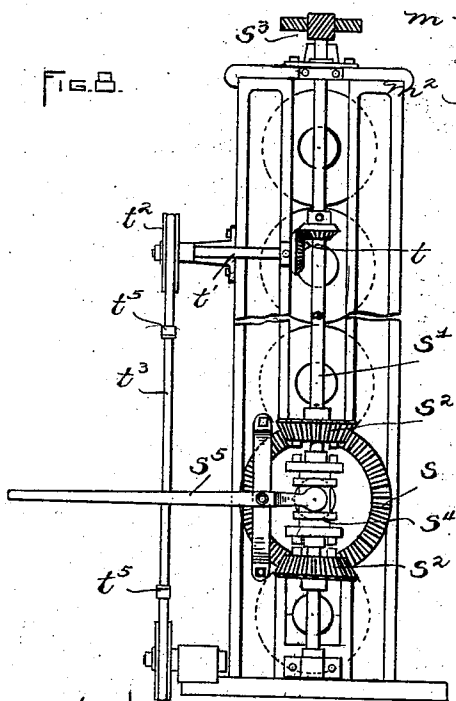


FIG. 8.



WITNESSES:

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INVENTOR:

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UNITED STATES PATENT OFFICE.

ALONZO S. WOODWARD, OF PEPPERELL, MASSACHUSETTS, ASSIGNOR OF ONE-HALF TO GEORGE JENKS AND FRED W. LOVEJOY, OF SAME PLACE.

PRESSURE-CONTROLLED APPARATUS FOR CALENDERING-ROLLS.

SPECIFICATION forming part of Letters Patent No. 546,480, dated September 17, 1895.

Application filed January 30, 1894. Renewed July 6, 1895. Serial No. 555,163. (No model.)

To all whom it may concern:

Be it known that I, ALONZO S. WOODWARD, of East Pepperell, in the county of Middlesex and State of Massachusetts, have invented certain new and useful Improvements in Pressure-Controlled Apparatus for Calendering-Rolls, of which the following is a specification.

In paper manufacture it is necessary to relieve the calendering-rolls of pressure when introducing the paper, in order to prevent breakage of the latter, and heretofore the pressure has been applied and removed by hand, the pressure-controlling screws being turned with a wrench or other means.

It is the design of this invention to provide means for controlling the pressure by the power which operates the rolls.

To this end the invention may be said to consist in the combination, with a set of calendering-rolls and pressure-applying devices, of means for operatively connecting one or more of the rolls with said devices and means for automatically breaking the connection at a predetermined point.

The invention further consists in incidentals to the above, all of which are fully described hereinafter, and recited in the claims.

The invention is illustrated in the accompanying drawings, of which—

Figure 1 shows a partial front elevation of a set of calendering-rolls with my improved pressure-controlling means combined therewith. Fig. 2 shows a top plan view. Fig. 3 shows an end elevation with the pressure-controlling devices in inoperative or normal adjustment. Fig. 4 shows a similar view with said devices connected for removing the pressure. Fig. 5 shows a detail of a section of a chain which forms part of the apparatus. Figs. 6, 7, and 8 show modifications.

The same letters of reference indicate the same parts in all the figures.

In the drawings the letter *a* designates columns which support the rolls. *b* designates the rolls arranged in vertical series between said columns and resting one upon the other.

c designates yokes which confine the journals of the rolls and fit slidewise on the columns.

d designates intermeshing gears on the rolls and driven from a pulley *d'*.

e designates cross-pieces extending between the upper ends of the columns, and *f* designates screws supported by said cross-pieces and bearing on the top yokes *c*. By turning said screws pressure is applied to and removed from said rolls. Heretofore these screws have been turned by hand. My invention provides for operating said screws by the power which drives the rolls.

The means here shown for operatively connecting the screws with the rolls are arranged as follows: Two adjacent rolls carry separated gears *h*, having reverse directions of rotation, and an endless chain *h'* passes on opposite sides of said gears and is normally disconnected therefrom. It may be connected with either of said gears by means of an oscillatory fork, whose arms *h²* extend on opposite sides of the gears and carry anti-friction rollers *h³*, between which one stretch of the chain passes. The said fork is pivoted centrally to a bearing on one of the columns *a*, as shown at *a'*, and has a handle *h⁴*, by means of which the fork may be oscillated and the chain carried thereby into engagement with one or the other of the gears *h*, sufficient slackness being allowed in the chain for this purpose. Obviously when the chain is engaged with one gear it is driven in one direction, and when engaged with the other gear it is driven in the opposite direction. The stretch of chain opposite that engaged by the fork is provided with a pair of lateral lugs *i*, and the fork has a centrally-located arm *i'*, which extends between said lugs, and is adapted to be acted upon thereby at predetermined times to disconnect the chain and gear. The lugs *i* may be located to bring about the disconnection at the proper time. The chain is carried by sprocket-wheels *j* and *j'*, supported on studs at the top and bottom of the supporting-frame. The stud supporting the upper sprocket-wheel *j* also carries a spur-gear *j²*, in mesh with a larger gear *j³*, on a shaft *j⁴*, extending across the top of the frame and having worms *j⁵*, which mesh with worm-wheels *j⁶*, affixed to the screws *f*. It will now be understood that when the handle

h^1 is operated to throw the chain into engagement with one of the gears h the screws f will be turned in one direction, and when said handle is operated to throw the chain into engagement with the other gear h the screws will be turned in the opposite direction, and that at a predetermined point the action will be automatically stopped by the lugs i encountering and moving the arm i' . Thus pressure may be applied to and removed from the rolls by the power which drives the rolls and the operation automatically limited.

It is evident that the invention may be carried out by other means than here shown, and hence is not limited in this respect. For example, the construction shown in Fig. 6 may be employed to accomplish the purpose, and for some reasons is preferable to that already described. In this modified form the lateral arms m of a T-shaped lever, whose central arm m' constitutes a handle, carry rollers m^2 to act on the outer side of the chain n , whose links form cogs to intermesh with the gears n' on two of the calenders, so that by tilting the lever the chain may be carried into mesh with either of said gears according to the direction of movement of the lever. The ends of the arms m are beveled, and detent-levers o , pivoted to the frame of the machine, are carried against them by gravity, said levers being formed with catches to take over the arm m and thereby hold the chain in mesh with the gears. The detent-levers extend across the chain and carry rollers o' , bearing against the inner sides of the latter and normally holding the chain out of engagement with the gears. In the operation of the apparatus when the T-shaped lever is turned on its pivot in one direction one of the rollers m^2 is carried against the chain, throwing the latter into mesh with one of the gears, and the arm m is carried past the catch of the detent-lever, so that said catch takes over it, and by its movement to effect this carries its roller back to permit the chain to mesh with the gear. The parts are locked by the engagement of the detent with the arm m and are automatically restored to normal adjustment by a lug p on the chain coming against a suitably-formed part of the detent back of its pivot, said lug moving the detent in a direction which causes its roller to push outward on the chain, tending to disengage it from the gear and its catch to be moved free from the lever-arm. This modified construction has the advantage that the chain can be carried in closer proximity to the gears, and not so great a lateral movement of it is required to throw it into and out of engagement with the gears. Moreover, it provides means for locking the parts with the chain in engagement with either gear.

While the calendering-rolls are shown as connected by gearing, this is not essential, and in the class of work to which my invention applies such gearing would not be em-

ployed; but the rolls would operate by friction.

The form of chain shown in Fig. 6 is the preferred form, and in practice the lower wheel supporting the chain is simply an idler having a plain periphery, and the teeth of the upper wheel are spaced to engage every other link of the chain to avoid cramping.

Referring next to the modification shown in Fig. 7, the letter r designates friction-rolls affixed on the journals of two of the calendering-rolls, and r' designates a friction-roll carried by a lever r^2 and designed for operative contact with either of the rolls r . A gear r^3 is arranged to rotate with the roll r' , and meshes with the chain r^4 , which is in operative connection with the pressure-applying screws, as in the constructions before described. By operating the lever r^2 the roll r' is thrown into contact with one or the other of the rolls r , according as the pressure is to be applied or removed, and the rotation of the gear r^3 thereby produced causes the chain to be driven in a direction to accomplish the desired result. The lever is shown as guided and limited in its movements by the engagement of a bolt r^5 in a slot r^6 of a fixed bracket r^7 . A suitable amount of friction may be secured by means of these provisions to cause the lever to be maintained at different positions to which it is brought. The chain may be provided with lugs, as before, to effect an automatic disconnection at a predetermined time.

In the modification shown in Fig. 8 a bevel-gear s is affixed to the journal of one of the carrying-rolls, and a vertical shaft s' carries loose bevel-pinions s^2 , meshing into said gear s at opposite sides, and is connected through skew-gears s^3 with the pressure-applying screws. A doubled-ended clutch s^4 is splined on the shaft s' between the pinions s^2 and is adapted to connect with either of them, they being provided with clutch-teeth, as shown. A shipper-lever s^5 controls the double-ended clutch, so that by operating said lever the shaft s' may be caused to be driven in either direction, so as to apply or remove the pressure. Automatic disconnection is effected through the following instrumentalities: Bevel-gears t connect the shaft s' with a shaft t' , which carries a pulley t^2 . A belt t^3 , carried by this pulley and another pulley t^1 , has affixed to it lugs t^3 , adapted to act against the shipper-lever.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination with calendering rolls and devices for applying pressure thereto, of means adjustable to operatively connect one or more of the calendering rolls with or disconnect the same from said pressure applying devices, whereby pressure may be applied or removed by the revolution of the rolls, and a disconnector set in motion by the establishment of the connections.

2. The combination with calendering rolls and devices for applying pressure thereto, of means adjustable to operatively connect one or more of the calendering rolls with or disconnect the same from said pressure applying devices, whereby pressure may be applied or removed by the revolution of the rolls, and a disconnecter in the form of an endless traveler set in motion by the establishment of the connections.

3. The combination with calendering rolls and devices for applying pressure thereto, of means adjustable to operatively connect one or more of the calendering rolls with or disconnect the same from said pressure applying devices, whereby pressure may be applied or removed by the revolution of the rolls, a clutch lever for making and breaking the connections, and an endless traveler set in motion by the establishment of the connections and having a lug or lugs to act against the clutch lever and break the connections at a predetermined point.

4. The combination, with calendering-rolls and screws for applying pressure thereto, of gears on two of the rolls, a chain adapted to engage said gears and operatively connected with the pressure-applying screws, and means for engaging the chain with one or the other of said gears.

5. The combination, with calendering-rolls and screws for applying pressure thereto, of gears on two of the rolls, a chain adapted to engage said gears and operatively connected with the pressure-applying screws, and a lever having lateral arms which engage the chain on opposite sides of the gears and by whose oscillation the chain may be engaged with one or the other of said gears.

6. The combination, with calendering-rolls and screws for applying pressure thereto, of gears on two of the rolls, a chain adapted to engage said gears and operatively connected with the pressure-applying screws, and a lever having lateral arms which engage the chain on opposite sides of the gears and by whose

oscillation the chain may be engaged with one or the other of said gears, the said lever having a centrally-located arm extending between lugs on the chain, substantially as and for the purpose described.

7. The combination with calendering rolls and devices for applying pressure thereto, of means adjustable to operatively connect one or more of the calendering rolls with or disconnect the same from said pressure applying devices, whereby pressure may be applied or removed by the revolution of the rolls, detent devices for locking the parts in connection, and detent tripping means set in motion by the establishment of the connection.

8. The combination, with calendering-rolls and screws for applying pressure thereto, of gears on two of the rolls, a chain adapted to engage said gears and operatively connected with the pressure-applying screws, a lever having lateral arms which engage the chain on opposite sides of the gears and by whose oscillation the chain may be engaged with one or the other of said gears, and detents which engage and lock the lever and carry rolls to act on the chain.

9. The combination, with calendering-rolls and screws for applying pressure thereto, of gears on two of the rolls, a chain adapted to engage said gears and operatively connected with the pressure-applying screws, a lever having lateral arms which engage the chain on opposite sides of the gears and by whose oscillation the chain may be engaged with one or the other of said gears, detents which engage and lock the lever and carry rolls to act on the chain, and a lug or lugs on the chain to act on the detents.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 4th day of January, A. D. 1894.

ALONZO S. WOODWARD.

Witnesses:

HORACE BROWN,
A. D. HARRISON.