(No Model.)

3 Sheets—Sheet 1.

A. DICKERMAN.

WAD WINDING MACHINE.

No. 365,054. Patented June 21, 1887.

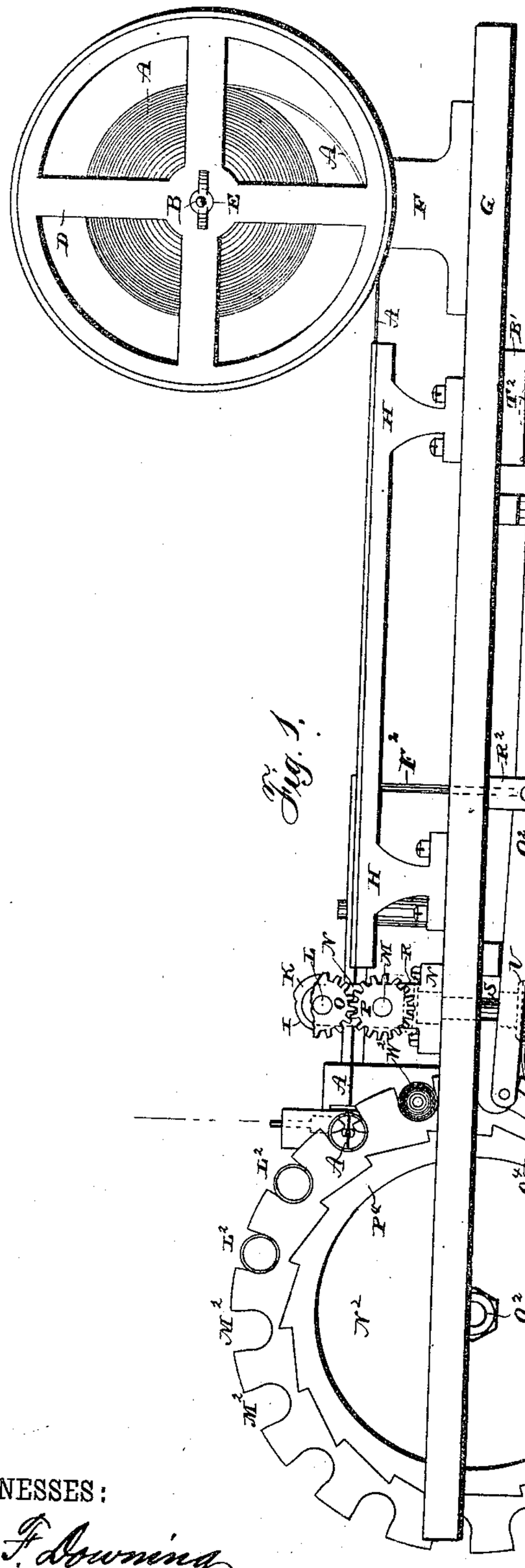

Fig. 1.

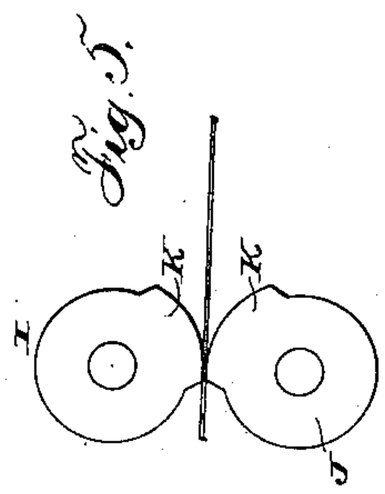

Fig. 5.

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(No Model.)

3 Sheets—Sheet 2.

A. DICKERMAN.

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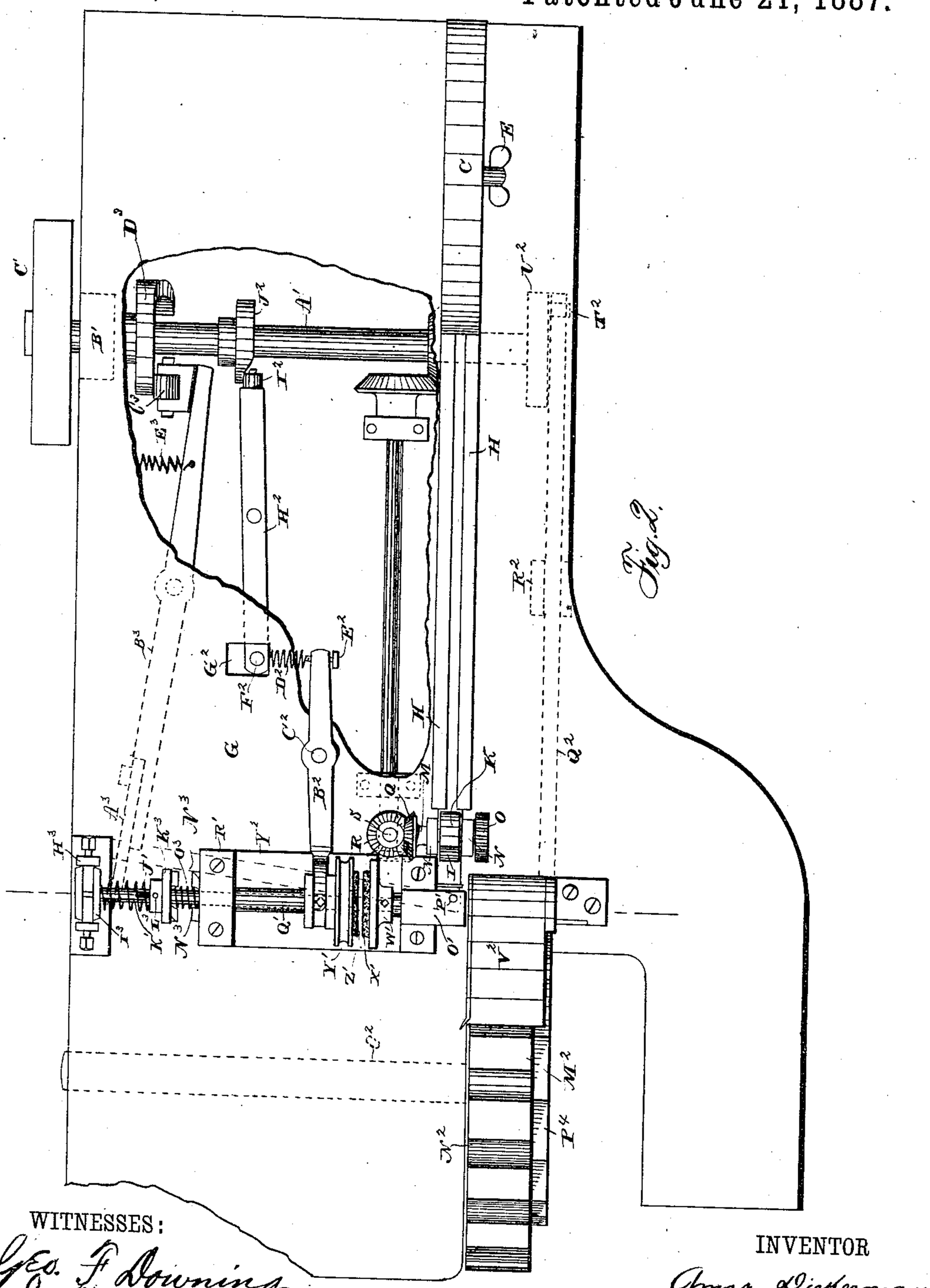

Fig. 2.

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3 Sheets—Sheet 3.

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WAD WINDING MACHINE.

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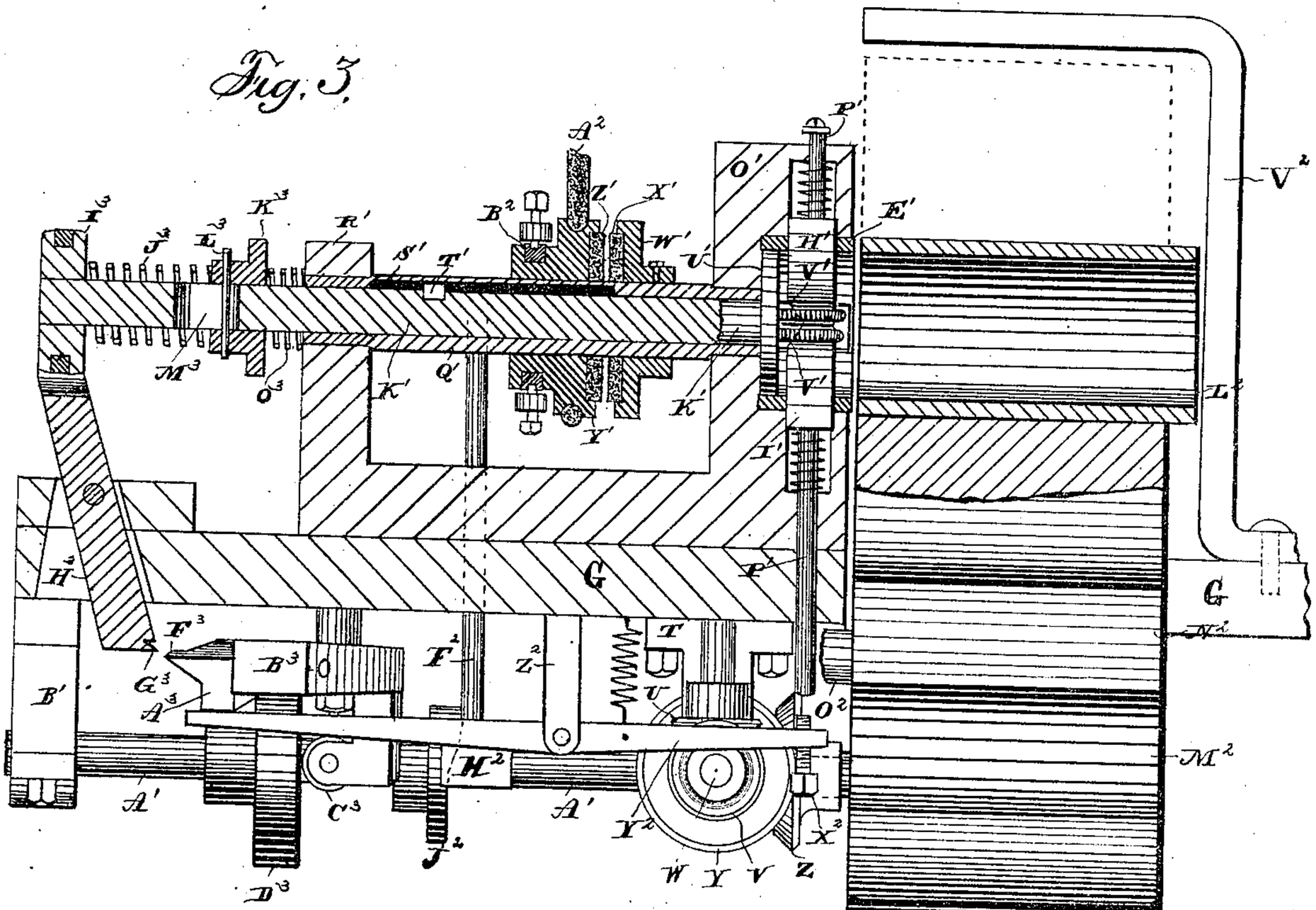
Fig. 3.



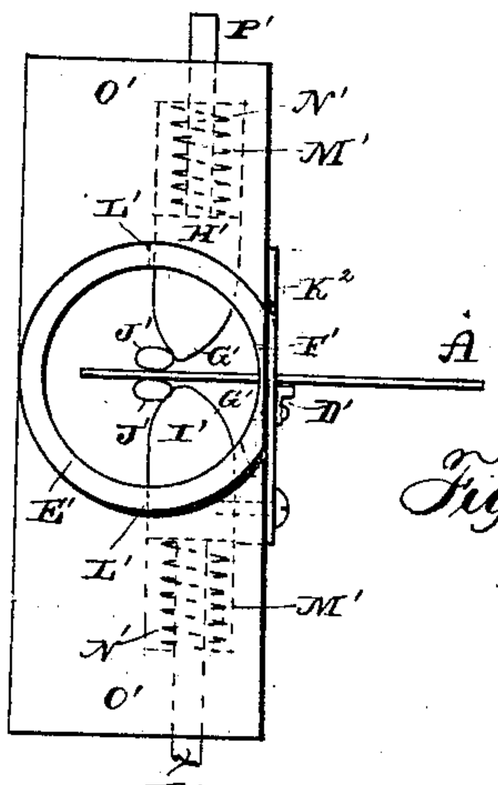
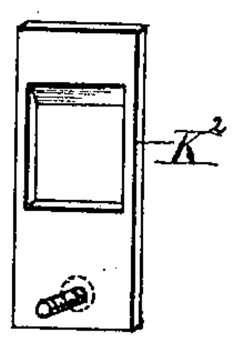


Fig. 6.

Fig. 4.



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UNITED STATES PATENT OFFICE.

AMOS DICKERMAN, OF NEW HAVEN, CONNECTICUT.

WAD-WINDING MACHINE

SPECIFICATION forming part of Letters Patent No. 365,054, dated June 21, 1887.

Application filed January 20, 1886. Serial No. 189,162. (No model.)

To all whom it may concern:

Be it known that I, AMOS DICKERMAN, residing at New Haven, in the county of New Haven and State of Connecticut, have invented certain new and useful Improvements in Wad-Winding Machines; and I do declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improvement in machines for automatically winding and introducing wads into tubes for paper cartridge-shells; and it consists in certain details of construction and combinations of parts as will be hereinafter described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a view in side elevation of a machine embodying my invention, with the shield or guard removed. Fig. 2 is a plan view thereof, with a portion of the bed broken away. Fig. 3 is a view of the machine, partly in end elevation and partly in section. Fig. 4 is a detail view showing the ends of the spindle, the sleeve, the reciprocating heads, and the cutter. Fig. 5 is a detail view of the feed-rolls; and Fig. 6 is a detached perspective view of the strip-cutter.

The strip A, from which the wads are formed, is coiled and placed upon a spindle, B, in a case, C, in which the coil is retained by a removable plate, D, fitting over the end of the spindle and held in place by a thumb-nut, E, located upon the end of the same, the said case having a standard, F, secured to the bed G of the machine. From the case the strip is led through a horizontal guide, H, to a pair of feed-rolls, I and J, forming the stock-feed, and each provided with a cam-face, K, and respectively secured to shafts L and M, mounted in bearings N N. The shaft L is provided with a pinion, O, meshing with a pinion, P, secured to the shaft M, which is provided at its opposite end with a bevel-pinion, Q, meshing with a similar pinion, R, carried by an upright shaft, S, mounted in the bed of the machine in bearings T and provided at its lower end with a bevel-pinion, U, meshing with a similar pinion, V, carried by a horizontal shaft, W, suspended beneath the machine in bearings X, and provided at its opposite end with a bevel-pinion, Y, meshing with a similar pinion, Z, located upon the driving-shaft A', which is suspended beneath the bed of the machine in bearings B' and driven through a pulley, C', or otherwise. The said feed rolls I and J feed the strip A over a table, D', and into a horizontal sleeve, E', through an opening, F', formed in the side thereof. As the strip enters the sleeve it is guided by the converging beveled faces G' G' of the movable heads H' and I' between the ends J' J' of the bifurcated spindle K', which rotates and winds the wad, the same filling the sleeve E', which corresponds in internal diameter to the diameter of the wad. The said movable heads H' and I' are located opposite each other and between the bifurcated spindle and the opening F' in the sleeve E', and reciprocate in vertical planes through openings L' L', formed in the latter. As the wad develops, the heads being held in contact with it by springs M' M', they are gradually retired into chambers N' N', formed in the upright O' against the tension of such springs, which are located in the said chambers and encircle the stems P' P', with which the heads are provided, and which have bearing in and extend above and below the upright O', respectively.

The spindle K' extends through a hollow shaft, Q', having its opposite ends mounted in the upright O' and in the upright R', and provided with an elongated slot, S', receiving a key, T', secured to the spindle, whereby the latter is coupled with the shaft with a capacity for reciprocation therein. At its forward end, and just to the rear of its ends J' J', the spindle is provided with a wad remover or follower, U', playing in the sleeve E', and located in the rear end thereof when the wad is winding, and serving to remove the wad from the spindle and to introduce it into the tube when finished. The plunger is not moved forward until the wad has been wound and the movable heads H' and I' retired; but, to guard against possible collision, the rear faces of the ends of the heads are beveled, as at V' V', so that in case the heads are not pushed back entirely out of the way of the follower by the wad the engagement of the follower with the

beveled faces V′ V′ of the heads will complete their retirement without injury to the machine.

The hollow shaft Q′ carries a fixed disk, W′, provided with a friction-surface, X′, and also a loose pulley, Y′, provided with a friction-surface, Z′, driven by a belt, A², from any convenient source of power and shifted on the shaft for periodically applying and relieving the friction between the two surfaces by a forked lever, B². The said lever B² is fulcrumed on a stud, C², standing above the bed of the machine, and has its opposite end connected through a spring, D², made adjustable in tension by a thumb-screw, E², with an upright arm, F², extending upward through and playing in a slot, G², formed in the bed of the machine, and carried by a lever, H², pivoted to the under face of the bed of the machine and provided at its opposite end with an anti-friction roll, I², engaging with a cam, J², mounted upon the driving-shaft A′ aforesaid.

The tension of the spring D² determines the amount of friction developed between the friction-surfaces X′ and Z′ when in contact, and this should always be less than the friction developed between the wad and sleeve when the former is completed and wound to full size, so that such friction, being greater than that between the said surfaces, will suffice to arrest the rotation of the hollow shaft and the spindle when the wad is wound to full size before the friction between the friction-surfaces is relieved. In this connection it may be explained that the machine is to be constructed so that the period of applied friction between the friction-surfaces will be equal in time to the time required for winding a full-sized wad from the thinnest of paper, so as to adapt the machine for winding full-sized and uniform wads entirely independent of the thickness of the paper strip. Then, when the paper being thick, the wad is wound to full size before the expiration of the period of applied friction, the friction between it and the sleeve being greater than that between the friction-surfaces stops the spindle, while the surface Z′ slips upon the surface X′ until the period of applied friction expires, or, in other words, until the anti-friction roll I² passes the drop of the cam J².

The severing of the completed wad from the strip A is effected and controlled by the wad, which, by retiring the movable head I′, operates a strip-cutter or knife, K², connected therewith in cutting the strip just as the wad is finished.

The tubes L², into which the wads are introduced, are carried in the pockets M² of a tube-carrier wheel, N², rotating in a vertical plane in front of the machine and mounted on a shaft, O², suspended beneath the bed thereof and rotated to bring the tubes into alignment with the sleeve E′, and consequently into position to receive the wad by a pawl, O², engaging with a rack, P⁴, carried by the said wheel and controlled by a spring, P², and carried by a lever, Q², hung in a bearing, R², depending from the bed of the machine, and having its rear end slotted, as at S², to receive a pin, T², mounted in a wheel, U², secured to the driving-shaft A′. A shield or guard, V², fitting over the tube-carrier wheel, as shown in Fig. 1 of the drawings, and secured to the bed of the machine, prevents the tubes from being displaced when the wads are introduced into them. A wad, W², introduced into one of the tubes L², is shown in Fig. 1 of the drawings.

The reciprocation of the spindle K′ for operating the follower U′ to eject the wad is automatically controlled by the wad which retires the movable head I′ and engages the stem P′ thereof with a screw, X², located in the end of a lever, Y², fulcrumed in an arm, Z², depending from the frame of the machine. The opposite end of such lever supports and actuates a pivotal arm, A³, pivoted to an operating-lever, B³, fulcrumed beneath the bed of the machine and carrying an anti-friction roll, C³, engaging with a cam, D³, located upon the shaft A′, and having attached to it a spring, E³, for keeping the said roll in contact with the said cam. The pivotal arm A³ is provided with a beveled nose, F³, adapted to enter a notch, G³, formed in the lower end of a pivotal arm, H³, the forked upper end of which is connected with the rear end of the spindle K′ through a grooved disk, I³, secured thereto. A heavy spring, J³, encircling the rear end of the spindle, is provided for retracting it after it has been thrown forward by the arm H³, which is actuated for the purpose from the driving-shaft A′ through the lever B³, which is coupled with the arm H³ by the pivotal arm A³, which is lifted for such purpose by the lever Y², controlled by the wad through the movable head I′. The said spring J³ is interposed between the grooved disk I³ aforesaid, and a clutch, K³, carrying a pin, L³, extending through a slot, M³, formed in the spindle K′, whereby the clutch is coupled with the spindle with a capacity for reciprocation thereupon. Lugs N³, located upon the upright R, engage with the clutch K³ for stopping the spindle in position to receive the end of the strip A between its ends J′ J. A light spring, O³, interposed between the said clutch and upright, serves to disengage the former from the lugs N³ aforesaid after the retraction of the spindle and the insertion of the strip between the ends thereof.

The operation of the machine is as follows: The feed-rolls I and J are timed so that immediately after the retraction of the spindle K′ succeeding the introduction of the previously wound wad into the tube, they will engage their cam-faces K K with the strip A and advance it forward, so as to effect the insertion of its end between the ends J′ J′ of the spindle K′, after which the cam-faces are carried beyond the range of the strip, which is left free to be drawn in by the spindle. Then the pulley Y′ is moved upon the hollow shaft Q′ through its connections with the driving-shaft

A′ and its friction-surface X′ engaged with the friction-surface Z′ of the fixed disk W′, which is secured to the said shaft Q′, and the pulley Y′ being rapidly rotated through the belt A^2, the shaft Q′ and the spindle K′ are actuated in rapid rotation. As the spindle rotates it winds the wad from the strip A, which is free to be drawn in by the spindle as described. As the wad develops, it gradually retires the movable heads H′ and I′, which are in contact with it from the beginning, and finally pushes them entirely out of the sleeve E′. The spindle will now be stopped either by the friction developed between the wad and sleeve, or by the termination of the period of applied friction, according to the time occupied in winding the wad, the time so consumed being dependent upon the thickness of the paper.

The retirement of the head I′ during the development of the wad has operated through the stem P′ of the said head to cause the lever Y^2 to lift the pivotal arm A^3 into position for the entrance of its nose F^3 into the notch G^3 of the arm H^3, this relation of parts obtaining or being brought about when the wad has been wound to full size and the spindle stopped, after which the lever B^3 is actuated through its connection with the driving-shaft A′ in coupling the pivotal arm A^3 with the arm H^3, and in actuating the latter in moving the spindle forward, so as to eject the completed wad and to introduce it into the tube, which has been brought into position for the purpose by the tube-carrier wheel N^2, the ejection of the wad being effected by the follower U′, carried by the spindle. As the spindle is moved forward, as described, the spring O^3, being lighter than the spring J^3, is first compressed and the clutch brought into position to be engaged with the lugs N^3, (see Fig. 2,) located upon the upright R′. Further forward movement of the spindle compresses the spring J^3, which operates after the introduction of the wad into the tube to retract the spindle. Before this retraction occurs, however, the anti-friction roll C^3 of the lever B^3 passes over the drop of the cam D^3 and permits the said lever to be drawn back by the spring E^3, whereby the arms A^3 and H^3 are uncoupled. The spindle, being now disengaged from the wad, is free, and will be sufficiently rotated by the loose pulley Y′, there being enough friction between the same and the shaft Q′ to rotate the latter, and hence the spindle K′, to engage the clutch K^3 with the lugs N^3, whereby the spindle is brought into position for the insertion of the strip between its ends J′ J′. After the heavy spring J^3 has expanded, and in so doing retracted the spindle, the lighter spring O^3 expands and the clutch K^3 is disengaged from the lugs N^3, leaving the spindle K′ free to be rotated. Meantime, and before the said lugs and clutch have been disengaged, and while the spindle is held against rotation, the cam-faces K K of the feed-rolls I and J have been brought into engagement with the strip, which is then fed forward and guided between the ends J′ J′ of the spindle, which is then positively rotated by the movement on the hollow shaft Q′ of the loose pulley Y′, to engage the friction-surface thereof with that of the disk fixed to the shaft, and the operation above set forth is repeated, all the mechanisms being properly timed and driven from the single driving-shaft A′.

It is to be particularly noted that the wads automatically control the mechanism which ejects them from the sleeve and introduces them into the tubes, and that only full-sized wads will put such mechanism in action, so that no undersized wads are put into tubes by my machine, which is mechanically incapable of putting anything but full-sized wads into the tubes, for unless the wad is wound to full size it will not retire the movable head I′ sufficiently to operate through its stem P′ to actuate the lever Y^2 in lifting the arm A^3 into position to couple the arm H^3 with the lever B^3 when the same is actuated by the cam D^3 for moving the spindle forward, whereby the said arm A^3, instead of coupling with the arm H^3, will pass under the same when the lever B^3 is actuated for moving the spindle forward, leaving the spindle unmoved. It will thus be seen that the machine will not feed undersized wads to tubes, whereby perfect uniformity of product is secured; also, by controlling the action of the ejecting and introducing mechanism by the wads, accidents to the machine are largely avoided. It is to be noted also that in my improved machine the cutting of the strip after the wad has been wound is automatically controlled by the wad, which does not, therefore, depend for uniformity upon the length of the strip or its thickness.

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

1. In a wad-winder, the combination, with a wad-winding spindle, of a movable head arranged to be moved by the wad while the same is being formed, a wad-remover, and connections, substantially as shown, between the said head and wad-remover, whereby the latter is controlled by the wad, substantially as set forth.

2. In a wad-winder, the combination, with a wad-winding spindle, of a movable head arranged to be moved by the wad while the same is being formed, and having guiding-faces to guide the strip to the wad-winding spindle, substantially as set forth.

3. In a wad-winder, a wad-winding spindle, a sleeve inclosing it, and movable heads passing through the sleeve and normally located adjacent to the spindle and gradually retired by the wad as it is formed, substantially as set forth.

4. In a wad-winder, the combination, with a wad-winding spindle, of a sleeve having an opening to admit the strip to the spindle which projects into the sleeve, and two beveled movable heads located in the sleeve and

respectively on the opposite sides of the said opening therein, substantially as set forth.

5. In a wad-winder, the combination, with a rotary wad-winding spindle, of a movable head moved by the wad as the same is formed, and a strip-cutter connected with such movable head so as to be controlled thereby in cutting the strip, substantially as set forth.

6. In a wad-winder, the combination, with a wad-winding spindle, of feed-rolls having cam-faces to feed the strip, a wad-remover, a movable head actuated by the wad, and a strip-cutter controlled by such head, substantially as set forth.

7. In a wad-winder, the combination, with a wad-winding spindle, of a movable head moved by the wad as the same develops, a wad-remover, and connections, substantially as shown, between such head and remover, including safety mechanism, substantially as described, whereby the remover is operated only when the wad is wound to full size, substantially as set forth.

8. In a wad-winder, the combination, with a wad-winding spindle, of a movable head moved by the wad as the same develops, a wad-remover, and connections, substantially as shown, between such head and remover, including a coupling, which is coupled only when the wad is wound to full size, substantially as set forth.

9. In a wad-winder, the combination, with a rotary wad-winding spindle, of a movable head moved by the wad as the same is formed, power connections for moving the spindle longitudinally, and a lever operated by the movable head to couple the power connections and spindle when the wad has been wound to full size, substantially as set forth.

10. In a rotary wad-winder, the combination, with a wad-winding spindle, of a movable head normally located adjacent to the spindle and gradually retired by the wad as it is formed, an operating-lever driven by power for reciprocating the spindle and provided with a pivotal arm, a pivotal arm connected with the rear end of the spindle and depending below the same, and connections, substantially as shown, operated by the movable head for coupling the operating-lever with the pivotal arm of the spindle when a full-sized wad has been wound and failing of such coupling otherwise, substantially as set forth.

11. In a wad-winder, the combination, with a rotary and reciprocating wad-winding spindle, of a spring for retracting it, a clutch for stopping it in position to receive the strip, and a lighter spring for operating the clutch, substantially as set forth.

12. In a wad-winder, the combination, with a rotary and reciprocating wad-winding spindle, of a spring encircling it and retracting it to disengage it from the wad, a clutch carried by the spindle with a capacity for reciprocation thereupon, and adapted to stop the spindle in position to receive the end of the strip, and a spring encircling the spindle and lighter than the said retracting-spring, and operating the said clutch, substantially as set forth.

13. In a wad-winder, the combination, with a wad-winding spindle, of a wad-remover controlled by the wad, and an adjustable friction-coupling constructed to periodically rotate the spindle and to be set to develop less friction than the wad when the same is wound to full size, substantially as set forth.

14. In a wad-winder, the combination, with a wad-winding spindle, of a wad-remover controlled by the wad, a fixed and a loose friction-disk located upon the spindle, the loose disk being rotated, and power connections, including levers and cams, for periodically engaging and separating such disks, substantially as set forth.

15. In a wad-winder, the combination, with a wad-winding spindle, of a stock-feed, a wad-remover, a tube-carrier, a main driving-shaft, and power connections, substantially as shown, with such shaft for rotating and reciprocating the spindle and operating the feed, remover, and tube-carrier, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

AMOS DICKERMAN.

Witnesses:
M. S. SEELEY,
E. I. NOTTINGHAM.