L. J. FROHN.

CUT-OFF MECHANISMS FOR TAPING MACHINES AND THE LIKE.

APPLICATION FILED DEC. 5, 1917. RENEWED APR. 3, 1919.

1,318,320. Patented Oct. 7, 1919.

2 SHEETS—SHEET 1.

Fig. 1.

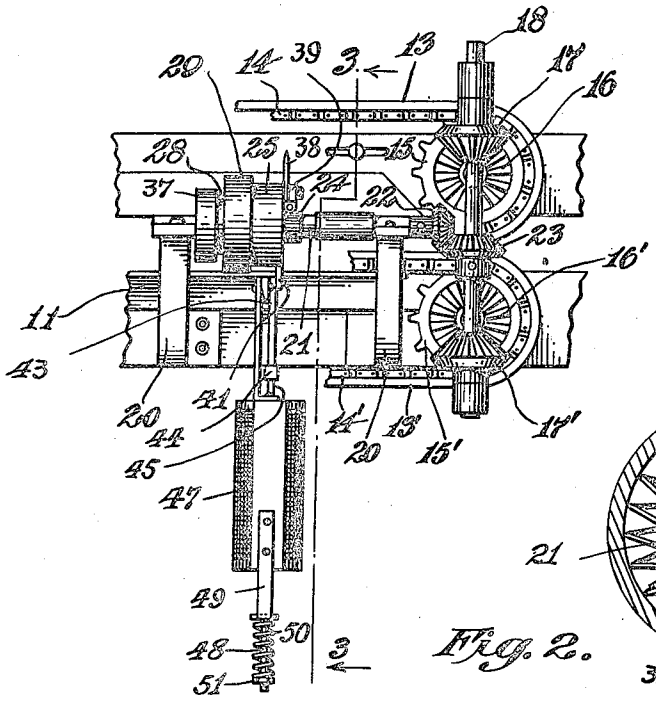


Fig. 6.

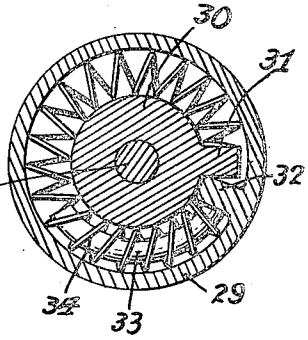
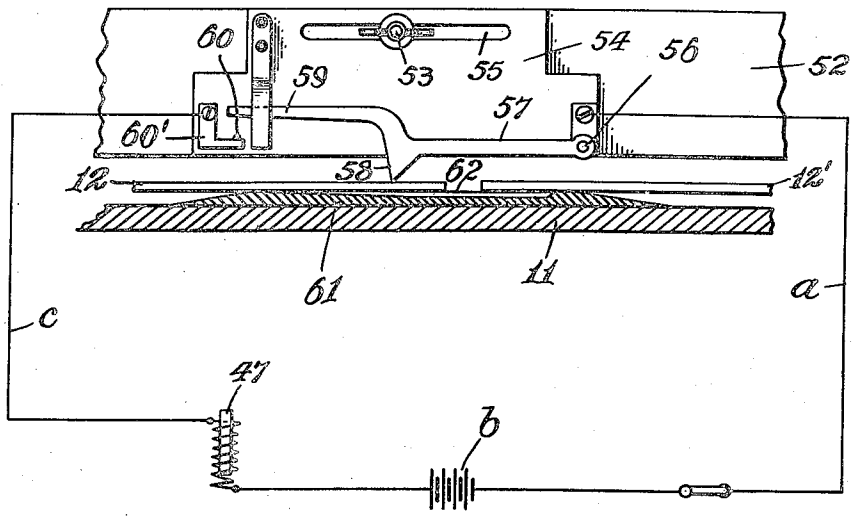


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

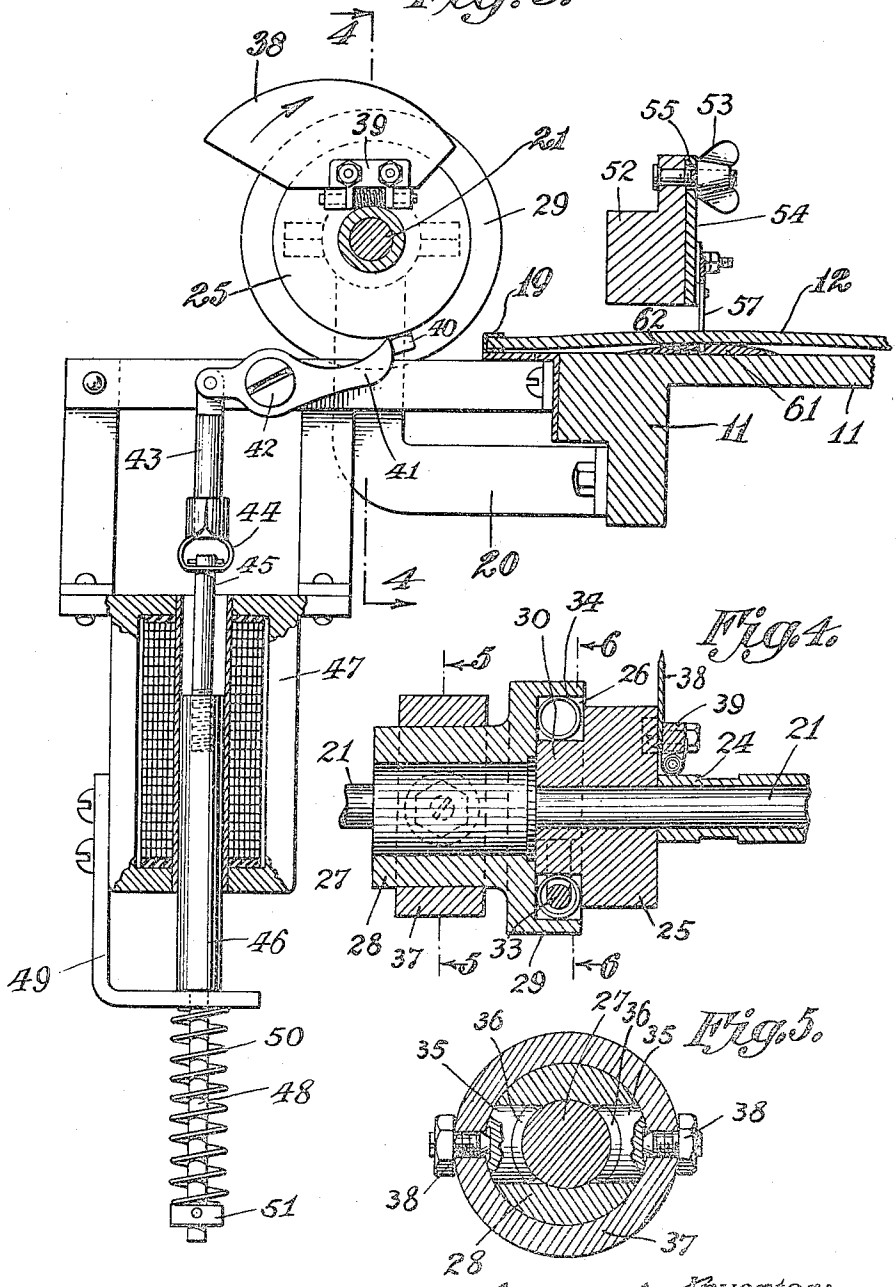


Fig. 4.

Fig. 5.

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UNITED STATES PATENT OFFICE.

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CUT-OFF MECHANISM FOR TAPING-MACHINES AND THE LIKE.

1,318,320. Specification of Letters Patent. Patented Oct. 7, 1919.

Application filed December 5, 1917, Serial No. 205,486. Renewed April 3, 1919. Serial No. 287,344.

To all whom it may concern:

Be it known that I, LEONARD J. FROHN, a citizen of the United States, and a resident of the city of New York, borough of Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Cut-Off Mechanisms for Taping-Machines and the like, of which the following is a specification.

This invention relates generally to mechanisms for severing a temporary connecting medium between spaced work units in transit through a machine, with more particular reference to what are generally known as book-taping machines, which are designed to apply to a corresponding edge of each of more or less irregularly spaced piles of assembled sheets, advancing through the machine, a continuous strip of adhesive tape to unite the sheets of each pile at such edge either to form a finished product, as in the production of pads, tablets and the like, or as a step preliminary to other operations, as in the binding of books. The present invention more particularly contemplates material improvements in mechanism for severing the tape or strip between the work units, it being well-known in the book-backing or binding art, for example, that the continuous strip, with a suitable adhesive applied to one side thereof, is successively applied to each of a train of advancing piles of sheets between which the tape must be severed after having been applied thereto.

It is obviously desirable that this cut-off mechanism should be actuated and be timed to operate automatically, and mechanical means for performing the tape-cutting operation are shown and described in detail in Patent to Joseph Hren, No. 1,252,114, granted January 1, 1918. In the machine of the Hren patent, a revolving knife is provided, the actuating means for which are inoperative while a taped pile of sheets is passing underneath the knife, each pile in turn causing the elevation of a part or member which prevents operation of said knife, said part or member dropping to normal position when the end of said pile is reached and thus releasing the cutting mechanism for operation of said knife to sever the tape strip.

This means of releasing the cutting mechanism has been found to be generally satisfactory when the book, pad or taped pile of sheets is of sufficient thickness to cause substantial movement of the checking and releasing part or member, and when the parts are so carefully proportioned and adjusted to such a degree of nicety that the forces of friction opposing such movement are readily and dependably overcome. However, it is not at all uncommon to apply binding tape to the edge of a very small number of sheets—even, at times, to a single sheet—and under such conditions, it will be apparent that the thickness of the work might be entirely insufficient to insure movement of any part or member in its path to an extent to dependably operate the checking and releasing means for the cutting mechanism. Furthermore, careful proportioning and nicety of adjustment involve time and expense, and at best—in connection with devices of this character—do not insure reliability.

The principal object of the present invention is the provision of work-controlled cut-off mechanism, actuation of which is automatically timed and proper operation thereof insured irrespective of the thickness of the work units and without the necessity of exercising extraordinary care in proportioning and adjusting the various parts of the device. In other words, I have in view the provision of checking and releasing means for spring-impelled tape-severing mechanism automatically actuated and actuation thereof properly timed through the instrumentality of the advancing work units successively whether one sheet or any ordinary or usual number of superposed sheets are being taped, and without more than the usual and expected watchful regard and attention in the proportioning and adjustment of parts of the device.

My invention will be more readily understood by reference to the accompanying drawings, forming a part of this specification, in which:

Figure 1 is a side elevation of taping ma-

chine cut-off mechanism embodying my invention;

Fig. 2 is a similar view of a portion of the opposite side thereof, on an enlarged scale, partly in section and partly diagrammatic;

Fig. 3 is an enlarged transverse section taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a vertical section taken substantially on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged sectional detail view taken substantially on the line 5—5 of Fig. 4, and

Fig. 6 is a similar view taken substantially on the line 6—6 of Fig. 4.

Referring now to the drawings in detail, numeral 11 designates a portion of the top of a work table in a machine for applying adhesive tape to work units such as piles of assembled sheets to be formed into books, pads and the like. These work units 12 are successively advanced along the edge of the table top 11, preferably by the coöperating belts 13 and 13′ carried by the outer faces of the chains 14 and 14′, respectively, these chains passing over sprocket wheels 15 and 15′ (and their opposite counterparts, not shown, at the other end of the machine) driven in unison by bevel gears 16 and 16′ in mesh with similar gears 17 and 17′ on the shaft 18 which is connected in any desired manner with a suitable source of power.

To the end or side edge of each pile 12 of sheets, as the same has been advanced, has been applied a continuous strip of adhesive tape 19. If these piles of advancing sheets could be spaced apart uniformly and with mathematical precision, it would not be a difficult matter to effect the severing of the continuous tape-strip therebetween by connecting suitable cut-off mechanism with the pad advancing mechanism, in such manner that the tape would be severed at the proper intervals. However, as a matter of fact, it is impossible to feed these piles of sheets into the machine by hand in such manner as to insure spaces of equal width between the piles, and this necessitates controlled irregularity in the operation of the cut-off mechanism and makes it impossible to depend upon any synchronism of movements or operations between said cut-off mechanism and the pad advancing mechanism. In other words, means entirely independent of the pad advancing means should be provided for actuating the tape severing mechanism, and at the same time such actuation should be automatically controlled by the advancing work units.

In carrying out my invention, I may well employ the rotary knife and knife-actuating means shown and described by the said Hren in his patent aforesaid. To this end, I secure to the table top 11 brackets 20 at the ends of which is journaled the horizontal shaft 21, driven from the shaft 18 by means of the intermeshed bevel gears 22 and 23. Loosely mounted on the shaft 21 is the sleeve 24 which includes or carries the hub or fixed collar 25, the latter being provided with the peripheral recess 26. In order to provide sufficient braking surface, or surface for frictional resistance, for reasons which will subsequently appear, the shaft 21 is provided with an enlarged portion 27 (or this portion may obviously be a fixed sleeve on said shaft). On this sleeve or enlarged portion 27 is revolubly mounted a sleeve 28 having an enlarged cup-shaped extremity 29 adjacent to the collar 25 and providing a projecting rim surrounding the end of the collar 25 to substantially inclose the peripheral recess 26 at the end thereof.

The reduced portion 30 at the end of the collar 25, which forms the base of the peripheral recess 26, is provided with a lug 31 projecting into said groove or recess, while from the inner face of the rim 29 projects a lug 32, carrying the circular-cylindrical rod 33, engagement between the lugs 31 and 32 limiting relative rotation of the parts 25 and 29 in one direction, and contact between the end of the rod 33 and the lug 31 limiting relative rotation of said parts in the other direction. Within the channel or recess 26 is mounted a coil-spring 34 which is under some compression when the lugs 31 and 32 are in contact, as shown in Fig. 5. Obviously, movement of said lugs away from each other will store additional energy in said spring as the same is further compressed, this spring being energized to its maximum extent when the free end of the rod 33 comes into contact with the lug 31.

Slidable in transverse bores in the sleeve 28 are the two similar and corresponding plugs 35 35, the inner ends of which are curved to conform to the cylindrical surface of the enlarged portion or fixed sleeve 27 of the shaft 21, strips of leather or other suitable material being provided at the inner end of the plugs 35 35 to provide removable frictional wearing or braking faces 36 36. A collar 37 is mounted on the sleeve 28 over the plug 35, and set-screws 38 38 pass through threaded apertures in the collar 37 in such relative position that the interior end of each screw engages a plug 35 for the purpose of varying pressure of said plug against the enlarged portion or sleeve 27 and thereby varying the resistance to relative rotary movement of the sleeve 28 on the enlarged portion 27 of the shaft 21, and to compensate from time to time for reduction in thickness of the facing due to abrasion.

It will be apparent that in the absence of forces sufficient to overcome the braking pressure exerted by the plugs 35 35 against the fixed sleeve or enlarged portion 27 of the shaft 21, the sleeve 28 will rotate with said shaft 21, and in the absence of any checking means will, through the spring 33, rotate the loose hub or collar 25. If, however, said hub or collar 25 is checked against rotation, the sleeve 28 will be rotated until the end of the rod 34 comes in contact with the lug 31, thus checking further rotation of the sleeve 28, and the resisting forces being greater than the forces of friction due to the pressure between the plugs 35 35 and the enlarged portion or sleeve 27 of the shaft 21, said enlarged portion or sleeve 27 will rotate independently of the sleeve 28 under a certain amount of frictional resistance. However, energy will have been stored in the coil-spring 34, and should the collar 25 now be released, it will rotate under action of said spring, at high initial velocity, until checked by engagement of the lug 31 with the lug 32, or until again stopped by operation of the checking means to which I have referred and which I shall hereinafter describe in detail.

Secured to the collar 25 is the knife-blade 38, this blade being preferably provided with a circular cutting edge adapted upon rotation of said collar 25 to cross the path of movement of the continuous tape 19, a suitable slot being provided in the table edge to permit of the passing of this knife-blade. This knife may be secured to the collar 25 in any suitable manner, but I prefer to mount this knife upon the sleeve 25 in such manner as to provide against breakage of the knife or stoppage of the machine or "choking" of the advancing work in the event that the cutting edge of the knife should engage one of the books or pads or one of the piles of sheets being advanced, or for some other reason fail to clear itself from the path of the advancing work. Consequently, I secure the knife to a bracket 39 pivotally secured to the sleeve 25 and spring-pressed to a position in which said knife is disposed at right angles to the shaft 21, but is capable of pivotal movement against the action of the spring to swing said knife into an inclined position or even into a position substantially parallel to the shaft 21.

The knife and the knife actuating mechanism above described are substantially as shown and described in the patent to Hren, aforesaid, and need not be further described in detail here. It is only essential for the purposes of this description to state that a rotary cutting knife of this character be provided, spring-pressed in a direction to perform the cutting operation, and normally checked under action of its spring, energy being again stored in said spring, after operation of the knife, by further rotation of the shaft 21 in the manner which I have just described.

To check the knife against operation under action of the spring 34, I mount upon the collar 25 a lug or stop 40 adapted to impinge against the end of the pawl 41, which end is normally located in the path of movement of said lug upon rotation of said sleeve 25. This pawl is pivoted at 42, and at the other end thereof is provided the arm 43 carrying what may be termed a stirrup 44 at the lower end thereof. This stirrup 44 provides a connection for the end of the rod 45, carried at the upper end of the armature 46 of the solenoid 47, or any other form of electro-magnet, this connection affording a certain independent movement of the rod 45 relative to the rod 43, for a purpose which will hereinafter be made clear.

The lower end of the armature 46 is provided with a reduced extension or rod 48, slidable through a suitable orifice in the bracket 49, a spring 50 in compression between the end of said bracket and a collar 51 on said arm 48 retaining said armature 46, and consequently the connecting-rod 45, in its lowest or most depressed position, and thus operating through the stirrup 44 to retain the pawl 41 in its engaging position with respect to the stop or lug 40.

Adjustably clamped to the part 52 of the frame of the machine, preferably by means of a thumb-screw 53, is the plate 54, provided with the slot 55 through which projects the threaded shank of the screw 53. Pivoted at 56 to the plate 54, is an oscillating arm 57, which has what may be termed an elbow 58 located in the path of movement of the advancing work. This arm 57 is insulated from the plate 54, but is in circuit with the feed-wire *a* from a suitable source *b* of electric energy, the other wire *c* including the solenoid 47. The free end 59 of the arm 57 is adapted, through the contact point 60 on the plate 60′, to which leads the wire *c* and which is insulated from the plate 54 upon which it is supported, to open and close said circuit through oscillation of said arm.

Upon the table-bed 11, underneath the arm 57, I prefer to provide a relatively thin plate 61 having beveled edges so as not to impede the advancing work which is slightly elevated as it passes over said plate. The plate 61 is also provided with a longitudinal groove 62, preferably of substantially rectangular cross-sectional configuration, located immediately below the elbow 58 in the arm 57. In the absence of any work upon the plate 61, the elbow 58 will obviously enter and rest within the groove 62, under which conditions the arm 57 will be in its depressed position and in such position clos-

ing the circuit through the end 59 of the arm 57 and the contact point 60. However, when any work, such as a taped pad 12, is passing over the plate 61, it will be apparent that through engagement with the relatively inclined face of the elbow 58 the arm 57 will be raised to break the circuit, the positions of the various parts then being as illustrated in Fig. 3, with the pawl 41 in the path of movement of the stop or lug 40 and the knife 38 held inactive under action of its spring. When the end of the pad 12 is reached, however, it will be apparent that the arm 57 will be free to drop under action of gravity, the elbow 58 passing into the longitudinal groove 62, and the end 59 of said lever thereupon closing the circuit which includes the solenoid 47.

The solenoid 47 thus being energized, the armature 46 thereof will at once be attracted in an upward direction, causing the end of the arm 45 to impinge against the lower end of the arm 43 and withdraw the pawl 41 from the path of movement of the lug or stop 40. The knife 38 is now free to revolve under action of the spring, and will revolve with great rapidity to cut the tape between the pads 12 and 12′, and may continue to revolve until the pad 12′ has reached the elbow 58 of the arm 57 and operated to raise said arm and break the circuit, whereupon the solenoid 47 becomes deënergized, and the spring 50 serves to depress the arm 45 and therewith the arm 43 to return said pawl 41 to the path of movement of the lug or stop 40 on the sleeve 25.

The groove 62 in the plate 61 being of exceedingly narrow width, it will be apparent that the interposition of even a single sheet of comparatively thin paper between the plate 61 and the elbow 58 of the arm 57, will serve to support the latter and hold the end 59 of said arm 57 out of electrical contact with the contact point or post 60. Therefore, it will be apparent that even when single sheets are to be taped, the device of my invention will insure proper timing of the operation of the severing or cut-off mechanism. In other words, actuation of my cut-off mechanism is properly timed irrespective of the thickness of the pads or other work passing underneath the same.

It will be furthermore apparent that the force of the spring 34 might be sufficient, under ordinary circumstances, to cause the stop or lug 40 on the sleeve 25 to exert pressure against the end of the pawl 41 great enough to frictionally overcome the initial force of the armature 46 when the solenoid 47 is energized. On this account, I provide what I have termed the stirrup 44, through the foot-piece of which loosely passes the rod 45, thereby permitting free initial movement of the armature 46 and the development of considerable momentum therein prior to engagement between the upper end of the arm 45 and the lower end of the arm 43, wherefore the latter is moved upwardly under the impulse of a sudden blow, the momentum insuring the application of forces sufficient to insure immediate withdrawal of the end of the pawl 41 from the stop or lug 40.

Many modifications of minor details of my improved cut-off mechanism for book taping machines will doubtless readily suggest themselves to those skilled in the art to which it appertains, and I therefore do not desire to limit my invention to the specific construction herein shown and described.

I claim as new and desire to secure by Letters Patent:

1. In a machine of the character described, the combination, with means for advancing spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a normally checked spring-actuated cutter, electro-magnetic means for releasing said cutter, means for restoring said cutter to a checked condition after each operation thereof, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

2. In a machine of the character described, the combination, with means for advancing through the machine a continuously moving train of spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a normally checked spring-actuated cutter, electro-magnetic means for releasing said cutter, means for restoring said cutter to its checked condition after each operation thereof, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

3. In a machine of the character described, the combination, with means for advancing spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a normally checked spring-actuated cutter, means for releasing said cutter, an electric circuit and an electro-magnet therein for actuating said releasing means, means actuated through the instrumentality of the advancing units successively for intermittently making and breaking said circuit, and means for restoring said cutter to its checked condition while said circuit is broken.

4. In a machine of the character described, the combination, with means for advancing through the machine a continuously moving train of spaced and severably-connected work units, of means for severing the con-

necting medium between adjacent units which comprises a normally checked spring-actuated cutter, means for releasing said cutter, an electric circuit and an electro-magnet therein for actuating said releasing means, means actuated through the instrumentality of the advancing units successively for intermittently making and breaking said circuit, and means for restoring said cutter to its checked condition while said circuit is broken.

5. In a machine of the character described, the combination, with means for advancing spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a normally checked spring-actuated cutter, means for releasing said cutter, a normally closed electric circuit and an electro-magnet therein for actuating said releasing means, means actuated by each advancing unit in turn for breaking said circuit, and means for restoring said cutter to its checked condition while said circuit is broken.

6. In a machine of the character described, the combination, with means for advancing through the machine a continuously moving train of spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a normally checked spring-actuated cutter, means for releasing said cutter, a normally closed electric circuit and an electro-magnet therein for actuating said releasing means, means actuated by each advancing unit in turn for breaking said circuit, and means for restoring said cutter to its checked condition while said circuit is broken.

7. In a machine of the character described, the combination, with means for advancing spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a revoluble spring-actuated cutter, means for checking said cutter under action of its spring, electro-magnetic means for releasing said checking means, means for continuing the revolution of said cutter after the severing operation until again checked in its initial position, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

8. In a machine of the character described, the combination, with means for advancing through the machine a continuously moving train of spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a revoluble spring-actuated cutter, means for checking said cutter under action of its spring, electro-magnetic means for releasing said checking means, means for continuing revolution of said cutter after the severing operation until again checked in its initial position, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

9. In a machine of the character described, the combination, with means for advancing spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a revoluble spring-actuated cutter, means for checking said cutter under action of its spring, electro-magnetic means for releasing said checking means, a continuously rotating element and means frictionally driven thereby for continuing the revolution of said cutter after the severing operation until again checked in its initial position, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

10. In a machine of the character described, the combination, with means for advancing through the machine a continuously moving train of spaced and severably-connected work units, of means for severing the connecting medium between adjacent units which comprises a revoluble spring-actuated cutter, means for checking said cutter under action of its spring, a continuously rotating element and means frictionally driven thereby for continuing the revolution of said cutter after the severing operation until again checked in its initial position, and means actuated through the instrumentality of the advancing units successively to intermittently energize said releasing means.

11. In a machine of the character described, the combination, with means for advancing a train of severably-connected work units, of a cutter for severing the connecting medium between adjacent units, means for actuating said cutter, means for checking said cutter against movement, an electro-magnet, and connecting means between the core of said magnet and said checking means for releasing the latter, said checking means including means for permitting independent initial movement of said core.

12. In a machine of the character described, the combination, with means for advancing a train of severably-connected work units, of a cutter for severing the connecting medium between adjacent units, a spring for actuating said cutter, means for checking said cutter against movement under action of its spring, an electro-magnet for releasing said checking means, and a lost-motion connection between the core of said magnet and said releasing means whereby the former has initial movement independently of the latter upon energizing said magnet.

13. In a machine of the character de-

scribed, the combination, with means for advancing a train of severably-connected work units, of a cutter for severing the connecting medium between adjacent units, means for actuating said cutter, means for checking said cutter against movement, an electro-magnet for releasing said checking means, and yielding means tending to retain the core of said magnet in position to render said checking means operative when said magnet is deënergized.

In testimony of the foregoing I have hereunto set my hand in the presence of two witnesses.

LEONARD J. FROHN.

Witnesses:
L. REISMAN,
LUELLA F. LITTLE.