No. 825,989. PATENTED JULY 17, 1906.

W. S. TRUAX.

PAPER CUTTING MECHANISM.

APPLICATION FILED SEPT. 21, 1904.

3 SHEETS—SHEET 1.

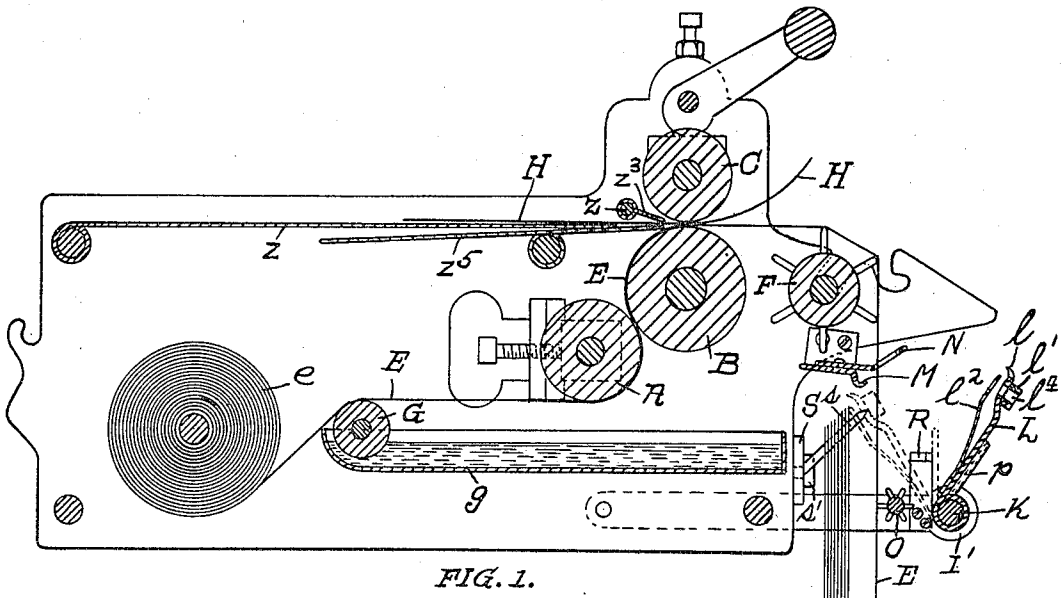


FIG. 1.

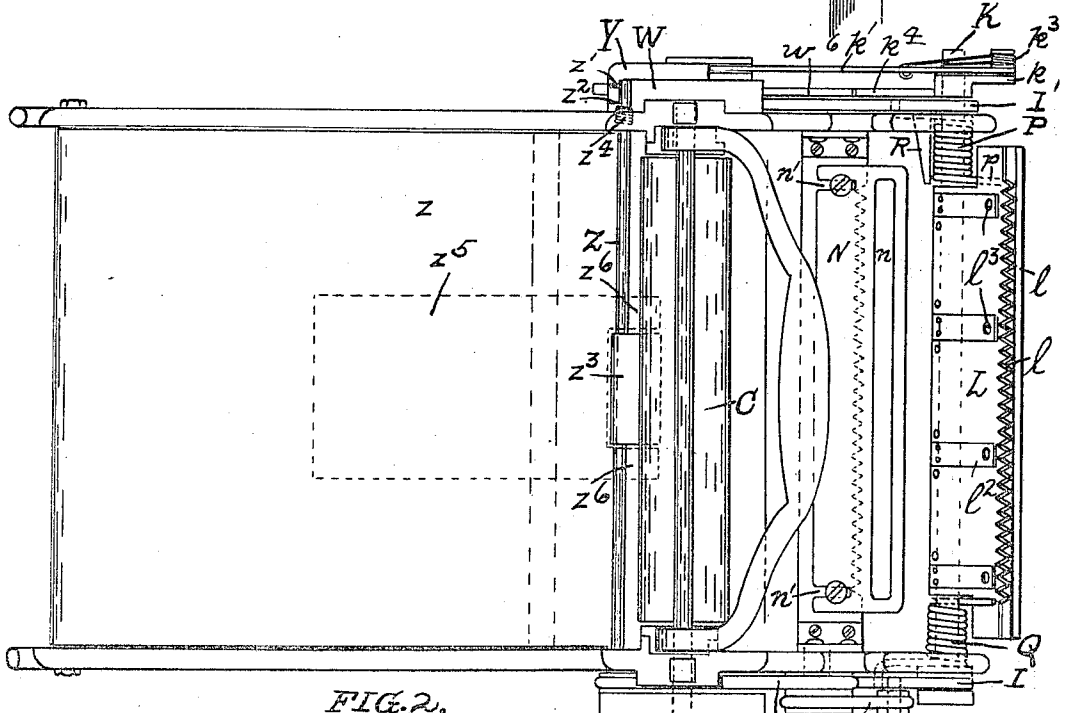


FIG. 2.

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3 SHEETS SHEET 2.

FIG. 3.

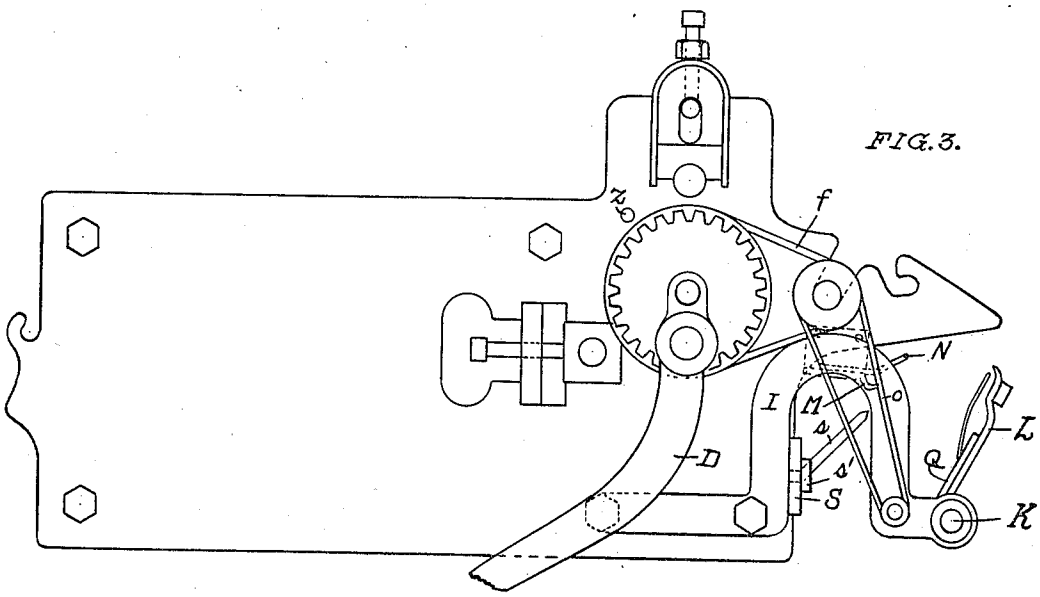
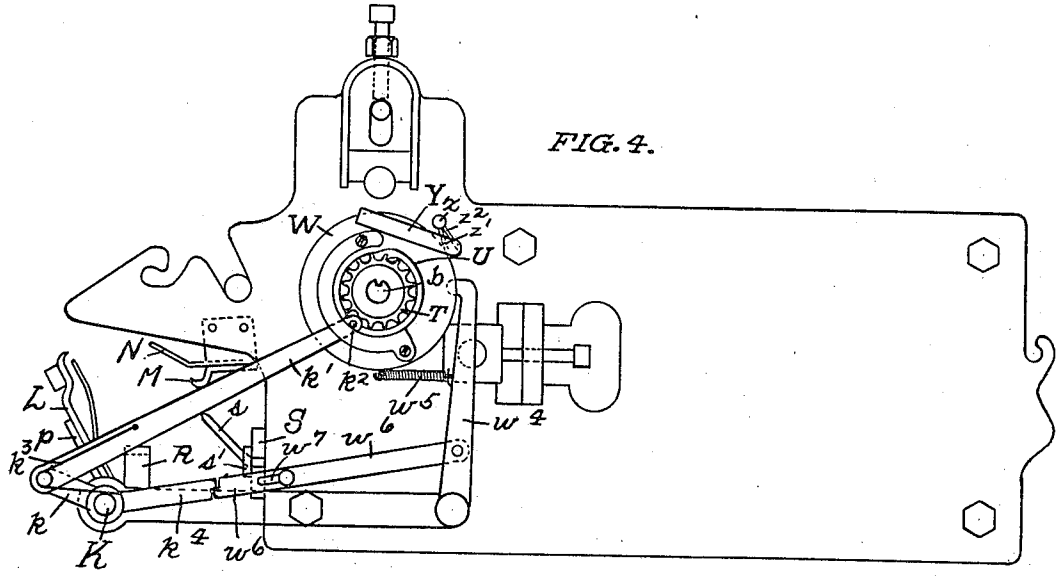


FIG. 4.



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3 SHEETS—SHEET 3.

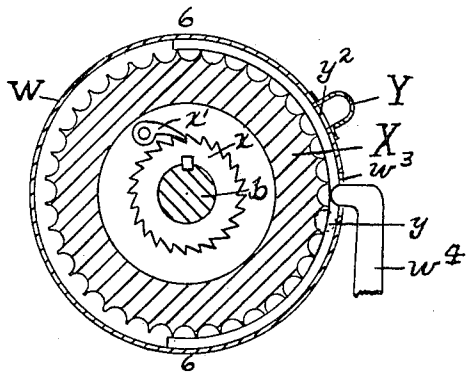


FIG. 5.

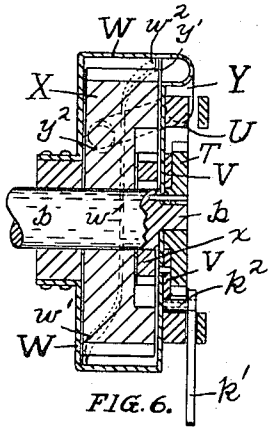


FIG. 6.

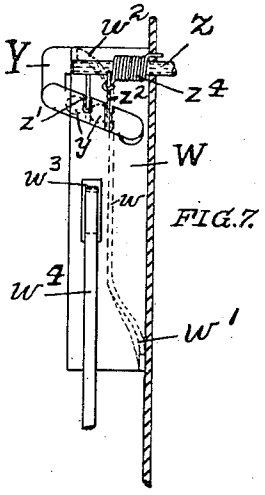


FIG. 7.

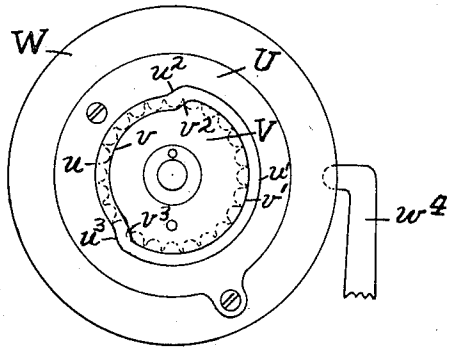


FIG. 8.

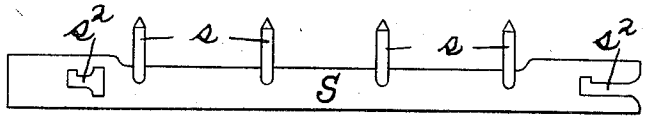


FIG. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

WILLIAM SIBLEY TRUAX, OF CINCINNATI, OHIO.

PAPER-CUTTING MECHANISM.

No. 825,989. Specification of Letters Patent. Patented July 17, 1906.

Application filed September 21, 1904. Serial No. 226,357.

To all whom it may concern:

Be it known that I, WILLIAM SIBLEY TRUAX, a citizen of the United States, residing at Cincinnati, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Paper-Cutting Mechanism, of which the following is a specification.

The object of my invention is to provide mechanism for cutting a continuous sheet or strip of paper into varying lengths, and especially adapted for use in conjunction with rotary letter-copying machines.

My invention consists in the combination and arrangement of parts hereinafter described and claimed.

In the drawings, Figure 1 is a longitudinal section of a rotary copying-machine equipped with mechanism embodying my invention; Fig. 2, a top plan view of the same with some parts removed; Figs. 3 and 4, elevations of opposite sides of the machine; Fig. 5, an enlarged section of the mechanism for controlling the operation of the cutter; Fig. 6, a section on line 6 6 of Fig. 5; Fig. 7, a rear elevation of Fig. 5; Fig. 8, a front view of Fig. 7 with parts removed, and Fig. 9 a front elevation of the piece for impaling the cut sections of paper.

The copying-machine is of a well-known type and consists in general of a series of rolls A, B, and C, operated by a crank-arm D. A continuous sheet of copying-paper E is drawn from a roll *e* through and between rolls A, B, and C, from which it passes to a flanged roll F, driven by a belt *f*. Before entering between rolls A, B, and C the copying-paper E passes over a dampening-roll G, which being partially submerged in water contained in pan *g* supplies moisture to the copying-paper. In use the letter or paper to be copied, H, is passed between rolls B and C, where its matter is copied upon paper E. So much of the mechanism illustrated in the drawings is old and well known for the purpose and operates to deliver the copying-paper E in the form of a long continuous sheet upon which have been imprinted copies of the letters or papers passed through rolls B and C in successive order. Under the present practice this continuous sheet must be cut or torn by hand to obtain the separate copies of the different letters. The primary object of my invention is to provide the above-described copying-machine or others similar thereto with mechanism for automatically severing and collecting the copies of the papers passed through the machine.

In carrying my improvement into effect I secure brackets I and I′ on each side of the frame of the machine and mount a rotatable shaft K in said brackets. To shaft K is rigidly secured a knife or cutter L, provided with teeth or serrations *l*. A stationary knife or cutter M is secured to the machine-frame just behind the path of the copying-paper E as it is delivered from flanged roll F in such manner as to coöperate with knife L to sever the copying-paper on operation of the latter. On top of knife M is secured a stripper or guide N, provided with a slot *n*, through which the copying-paper passes in its downward course from roll F. Slots *n*′ render the position of stripper N adjustable. To assist the travel of the copying-paper E and prevent bunching of the same, a second flanged roll O may be mounted in brackets I and I′ and driven by a belt *o*. A spring P is provided to press or throw the knife L toward knife M, while a weaker spring Q is provided to force said knives apart. In the path of the operative arm *p* of spring P is mounted a stop R, which intercepts arm *p* after a partial completion of the operative throw of the knife and relieves the knife from the pressure of the spring, the momentum of knife L being relied upon to carry it up to and slightly beyond knife M to sever the copying-paper between the two knives. After the completion of the operative stroke spring Q, being unresisted, will quickly throw the knife L back out of the path of the copying-paper E, and thus permit its continuous feed. In order to increase the momentum of knife L, it may be weighted by a bar *l*′.

It will be observed that stripper N is set to bring the inner edge of slot *n* a little outside of the vertical plane of the knife M, so that when the copying-paper is carried rearwardly to be severed it is bent at a sharp angle, which introduces a tension tending to draw the severed end away from knife M. Should the severed end of the copying-paper cling to knife L, the outer edge of the slot *n* strips it clear as the knife passes outwardly and leaves the copying-paper free to feed downwardly between the two knives. Behind knife M is secured a plate S, provided with impaling-pins *s*, and knife L is provided with springs l^2, perforated at l^3 to pass over pins *s*. Openings l^4 in knife L and bar *l*′

register with openings l^3 and are adapted to pass over the points of pins s and impale the severed sheet of copying-paper thereon. Upon withdrawal of the knife the springs l^2 hold the severed sheet on the pins long enough to prevent the suction of the knife from withdrawing said sheets. The plate S is preferably secured in position by means of T-shaped lugs s', which engage suitable notches s^2 in said plate, so as to permit the ready removal of the plate, to facilitate which the bracket I is arched, as shown.

At one side shaft K is prolonged and has secured thereto a crank-arm k, to which a coupling-rod k' is pivoted. The free end of rod k' carries a pin k^2, adapted to engage notches in a toothed wheel T, which is rigidly attached to the end of shaft b, upon which roll B is mounted. A spring k^3 is provided for pressing arm k' upwardly. Surrounding wheel T is a cam U, which closely approaches the wheel on side u and recedes therefrom on side u' far enough to permit the passage of pin k^2 around that portion of wheel T without engagement with the teeth. Behind wheel T is a stationary cam-plate V, shaped on concentric lines with cam U, so that the portion v is within the teeth and permits engagement of pin k^2 with the teeth on that side, while portion v' is slightly beyond the teeth and prevents engagement with the teeth on that side. The outer and inner surfaces of cam U and cam-plate V are joined, respectively, by inclined surfaces u^2 v^2 at the top and u^3 v^3 near the bottom, the effect of which is to facilitate the passage of pin k^2. The effect of this mechanism is that when pin k^2 is traveling in a recess in wheel T between portions u and v of the cam U and cam-plate V it is held in engagement with wheel T by cam U. When the pin reaches the inclined surface v^3 on cam-plate V, it is forced out of engagement with wheel T and is free to travel freely around wheel T until it reaches inclined surface u^2, where it is again forced into engagement with wheel T. It will be observed that when pin k^2 is in its engagement with wheel T forward rotation of shaft b throws the knife L back to operative position and that when said pin is forced out of engagement with wheel T by inclined surface v^3 the knife is free to make its operative stroke unless otherwise restrained. The knife L is so set with relation to pin k^2 that when the pin has reached its limit of movement away from shaft K the knife L is a little beyond the knife M, as indicated in dotted lines in Fig. 1.

Behind cam-plate V is mounted a non-rotatable casing W, in which is inclosed a grooved wheel X, loosely mounted on shaft b. At one side wheel X is recessed to contain a ratchet-wheel x, which is rigidly attached to shaft b and serves to drive wheel X in one direction by means of pawl x'. A channel Y, adapted to contain a series of balls y, communicates with the interior of casing W at the extreme top through opening y' and passing downwardly and around the casing again communicates with the interior thereof at a lower level on one side through opening y^2. A partition w is mounted in casing W around wheel X. Partition w is provided with an inclined end w', adapted to direct a ball carried in a groove in wheel X to the outside portion of the groove, where the ball is held by the main portion of the partition until the ball reaches the top of the casing, where the partition is again inclined at w^2 to force the ball out into channel Y through opening y'. Should the shaft b be reversed for any reason, the pawl x' rides idly over ratchet x and wheel T stops, so that a ball on wheel T cannot be carried backwardly and break the inclined end w' of partition w. Above channel Y is mounted a rotatable shaft Z, which passes across the frame of the machine above the table z, upon which the letter or paper H rests as it approaches and passes between rolls B and C. The shaft Z is provided with two stop-arms z' and z^2, arranged at an angle to each other at a distance apart about equal to the diameter of one of the balls y, and channel Y is provided with corresponding slots, through which the stop-arms z' and z^2 may swing to alternately stop the channel against the passage of a ball. A rider-lever z^3 is rigidly attached to shaft Z in such position as to normally lie in the path of paper H, where it is yieldingly held by a spring z^4 on shaft Z. The relation between rider z^3 and stop-arms z' and z^2 is such that when the rider is swung upwardly by the passage of the forward edge of paper H under it stop z' swings outwardly to unobstruct pipe Y, and thus release the ball held by it, while stop z^2 swings inwardly to obstruct the channel and intercept the released ball. As long as rider z^3 rides on paper H the ball will be held by stop z^2, but when the paper passes from under the rider the spring z^4 reverses the rotation of shaft Z, causing stop z^2 to swing outwardly to release its ball and stop z' to swing inwardly to intercept the next ball, when this mechanism is in its original position and ready for a repetition of the above action. Thus it will be seen that as each paper passes between the rolls B and C a ball will be released into a groove in wheel X at the time the end of that paper passes from under the rider z^3. In order to reinforce the rear end of paper H against bending downwardly to release the rider prematurely, a pivoted table z^5, with arms z^6 on either side of the rider, may be mounted under the path of paper H and so weighted as to cause sufficient upward pressure on the paper H to overcome the downward pressure of the rider.

Casing W is slotted at w^3 to receive the nose of a trip-arm w^4, which is normally held with its nose in slot w^3 in the path of a ball carried

by wheel X by means of spring w^5. A catch w^6 is pivoted to trip-arm and supported by a slot w^7, which permits slight longitudinal movement thereof, and a catch k^4 is attached to shaft K in such position as to engage catch w^5 when the knife L is thrown back for operation. The catches w^6 and k^4 are so set as to engage when pin k^2 is thrown out of engagement with wheel T, and thus restrain the operative stroke of knife L.

The relation between wheel X, roll B, and the position of knife M is such that by the time a ball released by the passage of the rear end of a paper H has been carried around by wheel X to contact with the nose of trip-arm w^4 the portion of copying-paper passing through the rolls near or under the rear end of the paper H has traveled to a position in front of knife M. Thus the ball contacting with the nose of trip-arm w^4 presses the latter outwardly to withdraw catch w^6 and release catch k^4. This releases shaft K, and consequently knife L, and the copying-paper is severed on a line at or near the line corresponding to the rear end of the corresponding paper H and impaled upon pins s on plate S. Upon the release of knife L, as above described, the pin k^2 is free to travel around wheel T as the knife L makes its operative stroke. When the limit of the operative movement of knife L is reached and said knife flies back under the influence of spring Q, the upward pressure of spring k^3, in conjunction with the backward pressure of spring Q, causes the pin k^2 to continue its travel around wheel T until inclined surface u^2 is reached, where the pin is forced into engagement with wheel T and knife L automatically thrown back and set for another operation. After serving to trip arm w^4, and thus operate knife L, the ball y travels upwardly in its groove in wheel X until the inclined end w^2 of partition w is encountered and the ball forced out into channel Y to be ready for another operation. Two or more balls y are preferably employed, since in copying short papers or letters it might happen that before one ball has performed its function and returned to the channel it would be necessary to start another ball into wheel X in order to operate knife L at the proper time.

While I have illustrated and described the preferred form of application of my invention, this is capable of variation without departing from the spirit of my invention. I therefore do not wish to be confined to the form of construction illustrated in the drawings nor to the application of my invention to any particular machine; but

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination with a machine adapted to feed paper in a continuous sheet, and in single sheets, of a cutter adapted to sever the continuous sheet; mechanism for operating the cutter; mechanism adapted to be set in motion by the single sheets, and an operative connection between the paper-operated mechanism and the cutter-operating mechanism, substantially as specified.

2. The combination with a machine adapted to feed paper in a continuous sheet, and in single sheets, of a cutter adapted to sever the continuous-sheet mechanism for operating the cutter; a rider adapted to ride on the single sheets and to be released by the passage of the same; and a connection between the rider and the cutter-operating mechanism whereby the release of the rider operates the cutter, substantially as specified.

3. The combination with a copying-machine of a cutter adapted to sever the copying-paper; mechanism for operating the cutter; mechanism adapted to be set in motion by the paper being copied; and an operative connection between the paper-operated mechanism and the cutter-operating mechanism, substantially as specified.

4. The combination with a copying-machine of a cutter adapted to sever the copying-paper; mechanism for operating the cutter; a rider adapted to ride on the paper being copied and to be released by the passage of the same; and a connection between the rider and the cutter-operating mechanism whereby the release of the rider operates the cutter, substantially as specified.

5. The combination with a rotary copying-machine adapted to feed the paper, of a cutter adapted to sever the copying-paper; mechanism for operating the cutter; a lever-arm mounted in the path of the paper being copied; and a connection between the lever-arm and the cutter-operating mechanism whereby the cutter is caused to operate by the passage of the paper through the machine, substantially as specified.

6. The combination with a rotary copying-machine of a cutter adapted to sever the copying-paper; mechanism for returning the cutter to its original position; and automatic mechanism for actuating the cutter-operating and returning mechanism, substantially as specified.

7. The combination with a rotary copying-machine of a cutter adapted to sever the copying-paper; mechanism for operating the cutter; mechanism for returning the cutter to its original position; and mechanism adapted to be set in motion by the paper being copied and actuate the cutter-operating and returning mechanism, substantially as specified.

8. The combination with a rotary copying-machine, of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; mechanism for returning the cutter to operative po-

sition; and tripping mechanism for releasing the cutter to make its operative stroke, substantially as specified.

9. The combination with a rotary copying-machine, of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; mechanism for returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; and automatic mechanism for operating the tripping mechanism, substantially as specified.

10. The combination with a rotary copying machine, of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; mechanism for returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; and a rider adapted to ride on the paper being copied and to operate the tripping mechanism when released by the passage of said paper, substantially as specified.

11. The combination with a rotary copying-machine, of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; mechanism for returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; a lever-arm mounted in the path of the paper being copied; and an operative connection between said lever-arm and said tripping mechanism, substantially as specified.

12. The combination with a copying-machine, of a movable and a stationary cutter mounted on opposite sides of the path of the copying-paper; a spring adapted to force the cutter through its operative stroke; mechanism for returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; a rider adapted to ride upon the paper being copied and to operate the tripping mechanism when released by the passage of said paper; and a stripper mounted above the stationary cutter and provided with a slot through which the copying-paper feeds to the cutters, substantially as specified.

13. The combination with a copying-machine of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; a spring tending to force the cutter through its inoperative stroke; mechanism for assisting said latter spring in returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; and a rider adapted to ride on the paper being copied and to operate the tripping mechanism when released by the passage of said paper, substantially as specified.

14. The combination with a copying-machine, of a cutter adapted to sever the copying-paper; a spring adapted to force the cutter through its operative stroke; a stop adapted to intercept the operation of said spring after a partial completion of the stroke of the cutter; a spring tending to force the cutter through its inoperative stroke; mechanism for assisting said latter spring in returning the cutter to operative position; tripping mechanism for releasing the cutter to make its operative stroke; and a rider adapted to ride on the paper being copied and to operate the tripping mechanism when released by the passage of said paper, substantially as specified.

15. The combination with a copying-machine of a cutter adapted to sever the copying-paper; a grooved wheel; a channel communicating with said wheel at a higher and a lower level; a ball in said channel adapted to travel in the grooves of said wheel, means for forcing a ball out of a groove in said wheel into said channel at the higher level; a stop adapted to release the ball into a groove of the wheel; means for operating the stop adapted to be set in motion by the passage of the paper to be copied through the machine; and tripping mechanism, for operating the cutter, mounted in the path of a ball carried by a groove in the wheel, substantially as specified.

16. The combination with rolls A, B and C of a rotary copying-machine, of a cutter adapted to sever the copying-paper; a grooved wheel mounted on shaft *b* of roll B; a channel communicating with said wheel at a higher and a lower level; a ball in said channel adapted to travel in the grooves of said wheel, means for forcing a ball out of a groove in said wheel into said channel at the higher level; a stop adapted to release the ball into a groove of the wheel; means for operating the stop adapted to be set in motion by the passage of the paper to be copied through the machine; and tripping mechanism, for operating the cutter, mounted in the path of a ball carried by a groove in the wheel, substantially as specified.

17. The combination in paper-cutting mechanism of a cutter; a grooved wheel; a channel communicating with said wheel at a higher and a lower level; a ball in said channel adapted to travel in the grooves of said wheel; means for forcing a ball out of a groove in said wheel into said channel at the higher level; means for releasing the ball into a groove of the wheel, and tripping mechanism for operating the cutter, mounted in the path of a ball carried by a groove in the wheel, substantially as specified.

18. The combination of a cutter; a spring adapted to force the cutter through its operative stroke; a weaker spring tending to force the cutter through its inoperative stroke; a coupling-rod k' adapted to return the knife through its inoperative stroke and carrying a pin k^2; a toothed wheel T adapted

to engage pin k^2; cam U and cam-plate V for forcing pin k^2 into and out of engagement with wheel T; and means for rotating wheel T, substantially as specified.

19. The combination of a cutter; a spring adapted to force the cutter through its operative stroke; a stop adapted to intercept the operation of said spring after a partial completion of the stroke of the cutter; a weaker spring tending to force the cutter through its inoperative stroke; a coupling-rod k' adapted to return the knife through its inoperative stroke and carrying a pin k^2; a toothed wheel T adapted to engage pin k^2; cam U and cam-plate V for forcing pin k^2 into and out of engagement with wheel T; and means for rotating wheel T, substantially as specified.

20. The combination in paper-cutting mechanism of a spring-actuated cutter; a rod k' for operating the cutter; pin k^2 on rod k'; toothed wheel T; cam U and cam-plate V; casing W containing grooved wheel X; partition w; catches k^4 and w^6 for setting the knife; trip-arm w^4 having its nose entering slot w^3 in casing w; channel Y containing balls y; shaft Z carrying stops z' and z^2, and means for operating shaft Z to release a ball y into a groove of wheel X, substantially as specified.

21. The combination with rolls A, B and C of a rotary copying-machine, of knives L and M; a rod k' for operating the knife L; a pin k^2 on rod k'; a toothed wheel T on shaft b; cam U and cam-plate V; casing W containing grooved wheel X mounted on shaft b; partition w; catches k^4 and w^6 for setting the knife L; trip-arm w^4 having its nose entering slot w^3 in casing w; channel Y containing balls y; shaft Z carrying stops z' and z^2; and rider z^3 for operating shaft Z, substantially as specified.

22. The combination with rolls A, B and C of a rotary copying-machine, of knives L and M; a rod k' for operating the knife L; a pin k^2 on rod k'; a toothed wheel T on shaft b; cam U and cam-plate V; casing W containing grooved wheel X mounted on shaft b; partition w; catches k^4 and w^6 for setting the knife L; trip-arm w^4 having its nose entering slot w^3 in casing w; channel Y containing balls y; shaft Z carrying stops z' and z^2; rider z^3 for operating shaft Z, and table z^5 for supporting the paper to be copied from below, substantially as specified.

23. The combination in paper-cutting mechanism of a movable cutter adapted to sever the paper; one or more impaling-pins set in the path of the cutter; an impaling-piece carried by said cutter and perforated to pass over the points of said pins; yielding plates having perforations registering with the perforations in the impaling-piece and set to precede said impaling-piece; and means for actuating the cutter, substantially as specified.

24. The combination with rolls A, B and C of a rotary copying-machine, of knives L and M; impaling-pins s; springs l^3 on knife L; a rod k' for operating the knife L; a pin k^2 on rod k'; a toothed wheel T on shaft b; cam U and cam-plate V; casing W containing grooved wheel X mounted on shaft b; partition w; catches k^4 and w^6 for setting the knife L; trip-arm w^4 having its nose entering slot w^3 in casing w; channel Y containing balls y; shaft Z carrying stops z' and z^2; rider z^3 for operating shaft Z, and table z^5 for supporting the paper to be copied from below, substantially as specified.

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