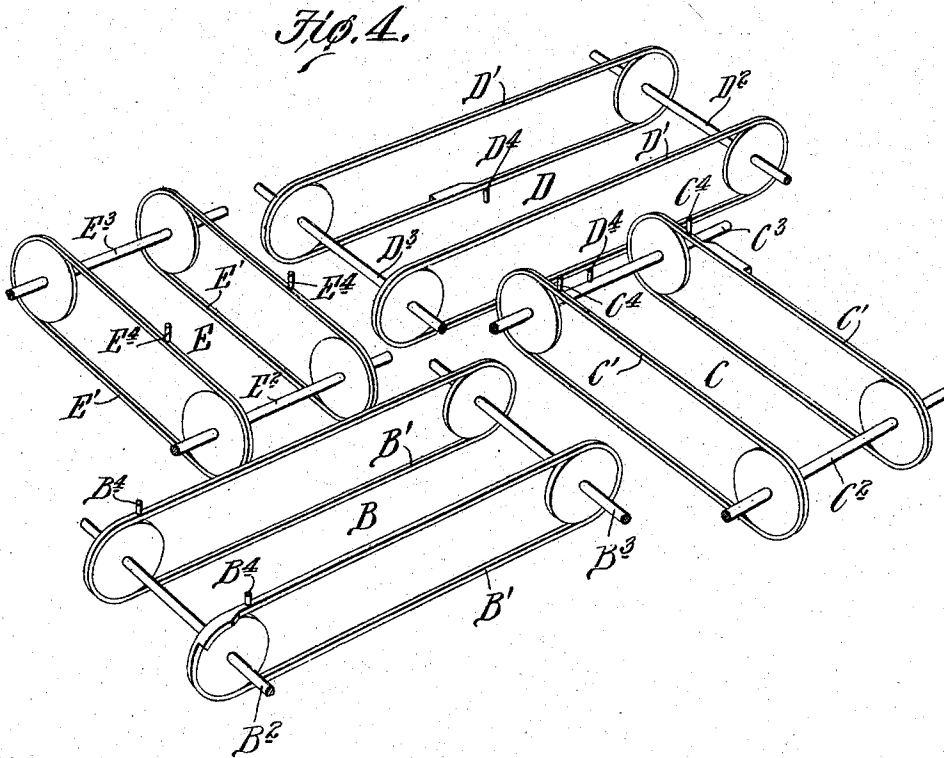
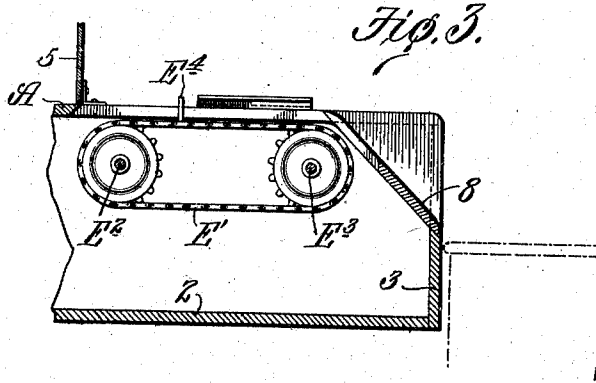


J. A. BYRNES.
MACHINE FOR OPENING SEALED ENVELOPS.
APPLICATION FILED MAR. 12, 1910.

965,868.

Patented Aug. 2, 1910.

3 SHEETS—SHEET 2.



Witnesses:
Geo. R. Radeau
Nello R. Church.

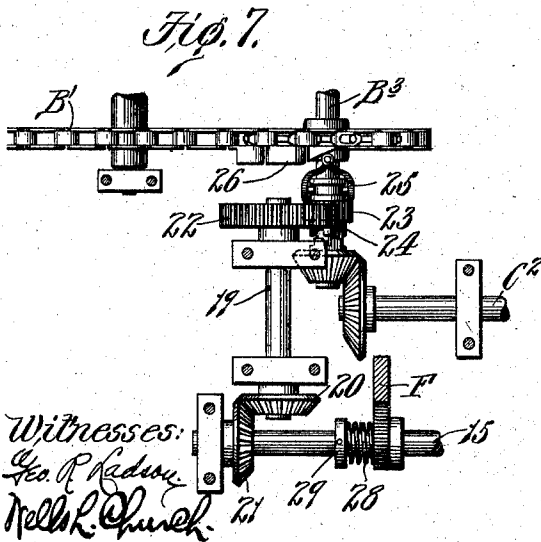
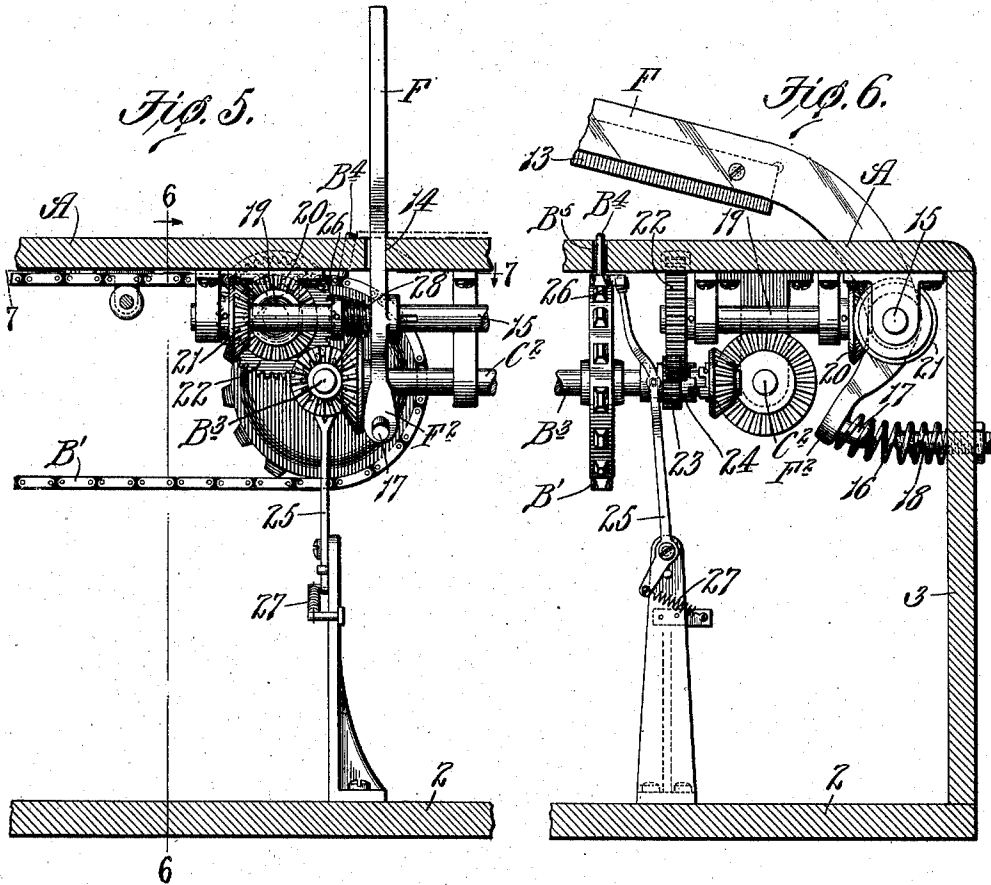
Inventor:
James A. Byrnes.
By Paul Backwell Atty.

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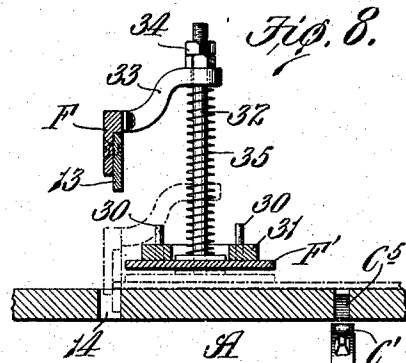
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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

JAMES A. BYRNES, OF ST. LOUIS, MISSOURI.

MACHINE FOR OPENING SEALED ENVELOPS.

965,868.

Specification of Letters Patent.

Patented Aug. 2, 1910.

Application filed March 12, 1910. Serial No. 548,965.

To all whom it may concern:

Be it known that I, JAMES A. BYRNES, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Machines for Opening Sealed Envelops, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to machines for opening sealed envelopes.

One object of my invention is to provide a machine of the character described which is so designed that it will automatically open different-sized envelopes without necessitating a re-adjustment of the parts of the machine.

Another object is to provide an envelop-opening machine of simple construction which will automatically sever the three edges of an envelop and deliver it to a certain point without displacing or disturbing the contents of the envelop.

Other objects and desirable features of my invention will be hereinafter pointed out.

Figure 1 of the drawings is a top plan view of an envelop-opening machine constructed in accordance with my invention; Fig. 2 is a front elevational view of said machine; Fig. 3 is a vertical sectional view taken on approximately the line 3—3 of Fig. 1; Fig. 4 is a diagrammatic view of the envelop-feeding mechanism; Fig. 5 is an enlarged vertical sectional view taken on approximately the line 5—5 of Fig. 1, looking in the direction indicated by the arrow; Fig. 6 is a vertical sectional view taken on approximately the line 6—6 of Fig. 5, looking in the direction indicated by the arrow; Fig. 7 is a horizontal sectional view taken on approximately the line 7—7 of Fig. 5, looking in the direction indicated by the arrow; and Fig. 8 is a vertical sectional view taken on approximately the line 8—8 of Fig. 1.

Referring to the drawings which illustrate the preferred form of my invention, A designates the bed-plate of the machine over which the envelopes are fed, and 1 designates legs or standards which support said bed-plate. A plate 2 is preferably arranged under the bed-plate so as to form a support for certain parts of the machine hereinafter described, and if desired, the space between said bed-plate and plate 2 can be inclosed by

vertical plates 3 and doors 4 which form a housing for the envelop-feeding mechanism and the mechanism that operates the cutting devices hereinafter described. A right-angular-shaped plate 5 is mounted on the bed-plate so as to form two vertical walls of a hopper in which a stack or pile of sealed envelopes are adapted to be arranged, as shown in Fig. 2, and an adjustable plate 6 which co-operates with the plate 5, forms the third wall of said hopper, the hopper being open at one side so that the envelopes can be introduced into the same easily. The lower edge of the plate 6 is spaced away from the top face of the bed-plate so as to form a slot through which the bottom envelop of the stack can be fed out of the hopper, and said plate is preferably mounted in such a manner that it can be adjusted vertically so as to vary the size of said slot. If desired, a weight 7 or spring-pressed clamping device can be arranged in the hopper for exerting downward pressure on the stack of envelopes.

The machine is provided with three knives or cutting devices which sever the two ends and the upper edge of an envelop, and also mechanism for intermittently feeding the bottom envelop of the pile to said cutting devices. Said envelop-feeding mechanism preferably consists of four endless conveyers B, C, D and E, shown diagrammatically in Fig. 4, and each consisting of a pair of endless sprocket chains or belts which travel over sprocket wheels or pulleys on a pair of horizontally disposed shafts, said chains or belts being provided with pins which project upwardly through slots in the bed-plate so as to engage the bottom envelop of the pile and feed it over the bed-plate.

In the construction herein shown, the conveyer B consists of a pair of endless sprocket chains B' that travel over sprocket wheels on shafts B² and B³, each of said chains being provided with a pin B⁴ that projects upwardly through a slot B⁵ in the bed-plate A, said pins being arranged diametrically opposite each other, as shown in Fig. 4, so that they will feed the envelopes in a straight path over the bed-plate. The conveyers C, D and E are of the same construction as the conveyer B and I have therefore used the reference characters C, D and E with suitable numerals added to designate the corresponding parts of said conveyers.

The conveyer B feeds the bottom envelop of the pile in the direction indicated by the

arrow *w* in Fig. 1 from the first position into the second position, the pins B^4 of said conveyer passing out of engagement with said envelop when it reaches the second position. A cutting device, which will be hereinafter described, severs the left hand end of the envelop and the envelop is then fed rearwardly in the direction indicated by the arrow *x* by the conveyer C, the pins of said conveyer C passing out of engagement with the envelop when it reaches the third position. After the upper edge of the envelop has been severed by a suitable cutting device the conveyer D feeds the envelop in the direction indicated by the arrow *y* in Fig. 1 into the fourth position. The opposite end of the envelop is then severed and the conveyer E thereafter feeds the envelop in a direction indicated by the arrow *z* into a discharge chute 8 at the rear of the bed-plate. The conveyers are connected together in such a manner that they operate simultaneously and continuously, the gears which are used for transmitting movement from one conveyer to the other being so proportioned and designed that all the conveyers complete one cycle of operations at the same time.

The machine herein shown is provided with an electric motor 9 which drives a belt 10 that passes over a pulley 11 on the shaft B^2 of the conveyer B, and the other shaft B^3 of said conveyer is provided with a gear that meshes with a gear on the shaft C^2 of the conveyer C, the other shaft C^3 of said conveyer C being driven by the sprocket chains which constitute the conveyer. The shafts C^2 and D^2 of the conveyers C and D are connected together by suitable gears, and the shaft E^2 of the conveyer E is provided with a gear that meshes with a gear on the shaft B^2 of the conveyer B, the shafts D^3 and E^3 of the conveyers D and E, respectively, being driven by the sprocket chains. It will, of course, be obvious that any other suitable source of power could be used for driving the conveyers, and, if desired, the conveyers can be operated manually, the shaft E^2 of the conveyer E being provided at one end with a non-circular extension 12, as shown in Fig. 1, for receiving a crank or other suitable operating device.

The machine is provided with three cutting devices which I have designated by the reference characters F, G and H arranged in the manner shown in Fig. 1 so that they will sever the upper edge and both ends of the envelop while it is being fed over the base plate or table of the machine. As all of said cutting devices are of practically the same construction, I will only specifically describe the cutting device F which is illustrated in Figs. 5 to 8, inclusive. Said device consists of an arm or lever provided

with a knife 13 that is adapted to pass downwardly through an opening 14 formed in the bed-plate A and thus shear off the left hand end of the envelop which comes to rest in such a position that its left hand end projects into the path of movement of said cutting device. The arm or lever F is splined to a rock shaft 15, and said arm is provided with a depending portion F^2 against which an expansion spring 16 bears for exerting upward pressure on said arm and restoring it to normal position after it has been depressed, as hereinafter described. The spring 16 surrounds a guide pin 17 on the extension of the lever F, and an adjustable guide pin 18 is mounted in the stationary part of the frame of the machine, said guide-pin 18 also serving as a stop to limit the downward movement of the cutting device. The arm F is depressed once at each cycle of operations of the machine, and the means herein shown for depressing said arm consists of a short shaft 19 provided with a gear 20 that meshes with a gear 21 on the rock shaft 15 and having a pinion 22 that meshes with a pinion 23 loosely mounted on the shaft B^3 of the conveyer B, a clutch being provided for connecting the pinion 23 to the shaft B^3 and disconnecting it therefrom. As shown clearly in Fig. 6, the pinion 23 is connected to a sleeve 24 having clutch teeth that cooperate with clutch teeth on a member which is rigidly connected to the shaft B^3 . A lever 25 is employed for shifting said clutch members into and out of engagement with each other so as to cause movement to be imparted to the rock shaft 15 which carries the arm F, said lever 25 being moved in one direction by means of a cam 26 on the conveyer B, and in the opposite direction by means of a spring 27, as shown in Fig. 6. When the cam 26 engages the upper end of the lever 25 and actuates said lever, the gear 23 will rotate with the shaft B^3 and thus cause the arm F to be depressed but as soon as said cam passes out of engagement with the lever 25 the spring 27 will return it to normal position and thus disconnect the gear 23 from the shaft B^3 . In view of the fact that the cutting device 13 on the arm F cooperates with one edge of the slot 14 in the table to produce a shearing cut, I prefer to arrange a coiled expansion spring 28 between the arm F and a collar 29 on the rock shaft 15 to which said arm is splined, said spring 28 operating to hold said arm against one edge of the slot in the bed-plate through which it passes. It will, of course, be understood that the conveyers C and D are also provided with cams similar to the cam 26 for operating the clutch-controlling levers of the mechanism which operate the cutting devices G and H.

Clamping plates F' , G' and H' cooperate

with the cutting devices F, G and H, respectively, so as to securely clamp the envelop against the bed-plate while said cutting devices are operating on same. The clamping plate F', which is shown in detail in Fig. 8, is provided with guide-pins 30 that pass through a stationary guide 31, and said plate is also provided with a shank 32 that passes upwardly through a bracket 33 on the arm F of the cutting device that coöperates with said clamping plate. An adjustable stop or nut 34 is mounted on the shank 32 above the arm 33, and a spring 35 is mounted on said shank between the under side of the arm 33 and the upper side of the clamping plate F'. When the cutter-carrying arm F is depressed the clamping plate F' will also be forced downwardly and thus hold the envelop tightly against the bed-plate while the knife 13 is passing through same. When the arm F is moved upwardly the bracket 33 thereon will engage the stop 34 on the shank 32 of the clamping plate and thus cause said plate to release the envelop which can thereafter be fed into its third position.

The operation of the machine is as follows: A pile of sealed envelops is arranged in the hopper on the bed-plate and the power which operates the machine is then turned on. The pins or projections on the conveyer B feed the bottom envelop of the pile transversely of the cutting device F, said pins passing out of engagement with said envelop when the left-hand end of same comes into alinement with said cutting device. After said envelop comes to rest, the cam 26 on the conveyer B shifts the lever 25 and thus causes the cutting device F to move downwardly and sever the left hand end of the envelop, the clamping plate F' being forced tightly against the envelop by the downward movement of the cutting device. As soon as the cam 26 passes out of engagement with the clutch-controlling lever 25 the cutting device and clamping plate move upwardly and thus release the envelop. The conveyer C then feeds the envelop transversely of the cutting device G and when the upper edge of said envelop comes into alinement with said cutting device, said device and the clamping plate G' that coöperates with same move downwardly into engagement with the envelop. After the cutting device G has severed the upper edge of the envelop and returned to its elevated position, the envelop is moved transversely of the cutting device H by the conveyer D. The cutting device H then severs the right hand end of the envelop and the conveyer E thereafter feeds the envelop into the discharge chute 8 with its uncut lower edge presented downwardly so that the contents of the envelop will not drop out of same.

It will thus be seen that I have produced

a machine in which a cut envelop enters the discharge chute and an uncut envelop is fed out of the hopper at each cycle of operations of the machine. Furthermore, said machine will handle envelops of different size without necessitating a readjustment of parts of the machine or assorting of the envelops. The machine is of simple construction and is not liable to get out of order, and as it severs three edges of the envelop and delivers it to a certain point without disturbing the contents of same it materially reduces the labor of opening mail.

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

1. An envelop-opening machine, comprising a plurality of cutting devices arranged at approximately right angles to each other, and an envelop-feeding mechanism designed in such a manner that it will feed an envelop progressively to said cutting devices and cause the envelop to come to rest intermittently after the major portion thereof has passed one of said cutting devices.

2. An envelop-opening machine, comprising a cutting device, means for feeding an envelop across the path of said cutting device and leaving it in such a position that said cutting device can remove one end of the envelop, a second cutting device for removing one of the longitudinal edges of the envelop, means for feeding the envelop across the path of movement of said second cutting device and leaving it in such a position that said second cutting device can remove one of the longitudinal edges of said envelop, a third cutting device, and means for feeding the envelop across the path of movement of said third cutting device and leaving it in such a position that said third cutting device can sever the opposite end of the envelop.

3. An envelop-opening machine, comprising two independent cutting devices that extend in the same general direction and which are adapted to sever the opposite ends of an envelop, a cutting device arranged at approximately right angles to the cutting devices first referred to for severing one edge of the envelop, and a feeding mechanism that causes an envelop to travel across the paths of movement of said cutting devices and come to rest intermittently before it has passed completely beyond the cutting device whose path it has just crossed.

4. An envelop-opening machine, comprising cutting devices for severing both ends and one of the longitudinal edges of an envelop, said devices being arranged angularly relatively to each other, and a feeding mechanism that progressively engages one end, one edge, and the opposite end of an envelop and moves it into position to be operated on by said cutting devices.

5. An envelop-opening machine, comprising mechanism for feeding an envelop from a pile, a cutting device arranged in such a manner that it will sever the end of the envelop which is nearest the pile, a second cutting device, means for feeding the envelop in a direction at approximately right angles to its former movement and into such a position that said second cutting device can sever the rear edge of same, a third cutting device, and means for moving the envelop across the path of movement of said third cutting device so that it can sever the remaining uncut end of the envelop.

6. An envelop-opening machine comprising mechanism for removing the bottom envelop of a pile from the ones above it and severing both ends and one edge of the envelop and feeding it to a discharge chute with its uncut edge presented downwardly.

7. An envelop-opening machine, comprising a cutting device, means for feeding the major portion of an envelop past said cutting device into such a position that said cutting device can operate on one end of same, a second cutting device arranged at approximately right angles to the one first referred to, means for feeding the major portion of the envelop past said second cutting device so that it can operate on one edge of the envelop, a third cutting device arranged at approximately right angles to said second cutting device, and means for feeding the major portion of the envelop past said third cutting device so that it can operate on the opposite end of the envelop.

8. An envelop-opening machine comprising a table or bed-plate on which a pile of sealed envelops can be arranged, a cutting device arranged adjacent to one end of the envelops in said pile, means for feeding the envelops transversely of said cutting device so as to bring the other ends of said envelops into alinement with said cutting device, a second cutting device arranged at approximately right angles to the one first referred to, means for feeding the envelops transversely of said second cutting device so as to present one edge of the envelops to

same, a third cutting device which extends in the same direction as the one first referred to, and means for feeding the envelops transversely of said third cutting device so that it can operate on the other ends of the envelops.

9. An envelop-opening machine comprising a plurality of conveyers arranged at approximately right angles to each other so that they will intermittently feed an envelop first in one direction, then in a different direction and thereafter in still a different direction, and means for severing the ends and one edge of the envelop between said intermittent feeding movements.

10. An envelop-opening machine comprising means for feeding the bottom envelop of a pile from the ones above it, means for clamping said envelop and severing the end that is nearest the pile, means for feeding said envelop into a different position, and means for thereafter clamping said envelop and severing one of the longitudinal edges of same.

11. An envelop-opening machine comprising a bed plate or table, a plurality of endless conveyers arranged under said table at right angles to each other and provided with pins or projections which pass upwardly through slots in the table, cutting devices arranged adjacent the ends of some of said conveyers and extending transversely thereof, and clamping members that coöperate with said cutting devices.

12. An envelop-opening machine comprising conveyers which are adapted to feed an envelop into a number of different positions, cutting devices for operating on said envelop, operating mechanism for said cutting devices, and means controlled by said conveyers for causing said cutter-operating mechanism to become operative.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this ninth day of March 1910.

JAMES A. BYRNES.

Witnesses:

WELLS L. CHURCH,
GEORGE BAKEWELL.