Oct. 30, 1928. 1,689,703

M. VIDAVER

LETTER OPENER

Filed Aug. 21, 1926 2 Sheets-Sheet 1

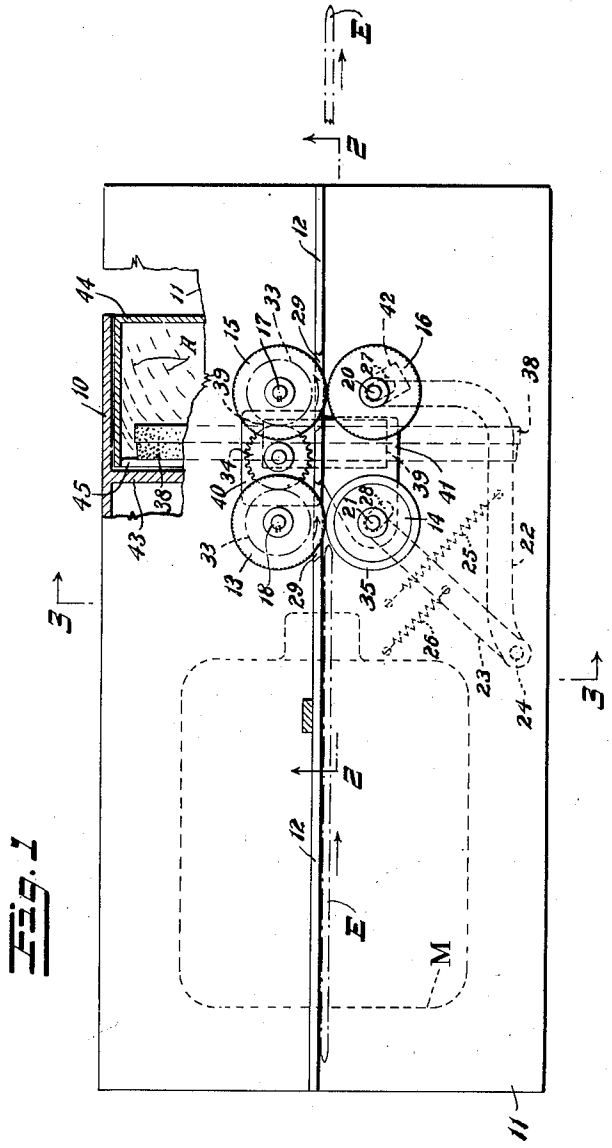


Fig. 1

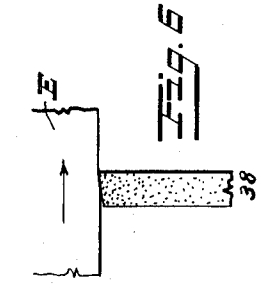


Fig. 6

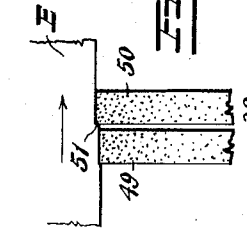


Fig. 5

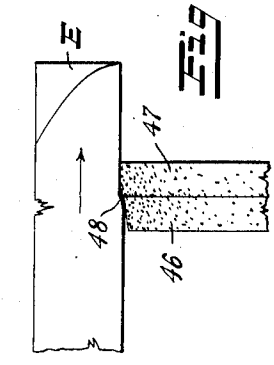


Fig. 4

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Fig. 3

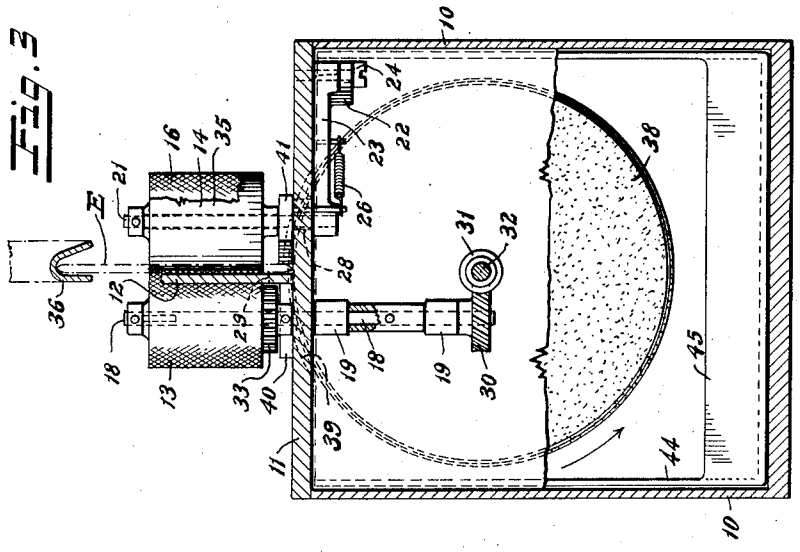
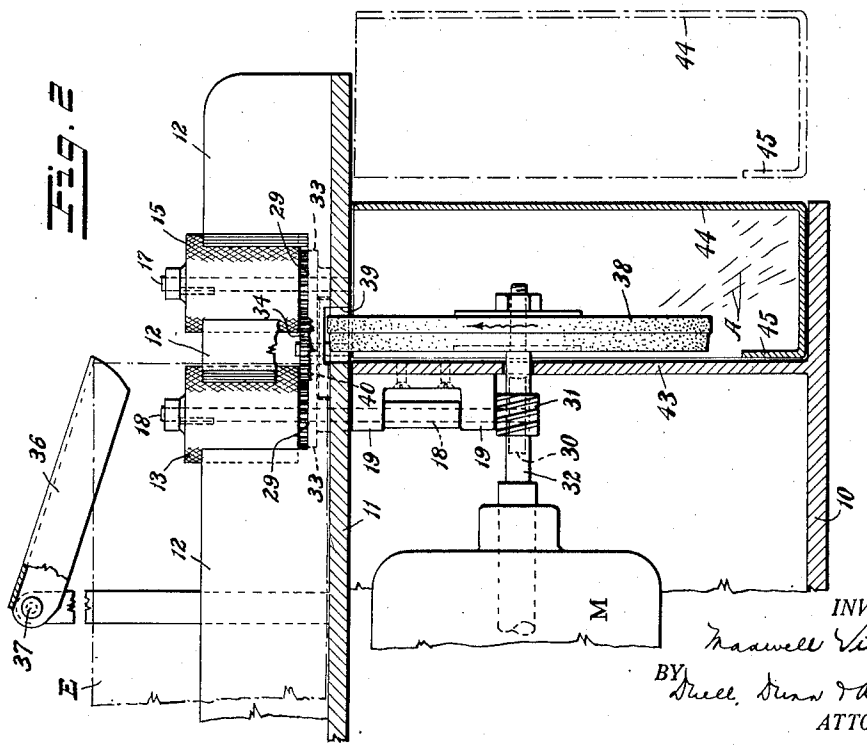


Fig. 2



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Patented Oct. 30, 1928. 1,689,703

UNITED STATES PATENT OFFICE.

MAXWELL VIDAVER, OF NEW YORK, N. Y.

LETTER OPENER.

Application filed August 21, 1926. Serial No. 130,599.

This invention relates to improvements in machines for opening packages of various descriptions and is especially adapted, in some of its aspects, for opening envelopes such as used for mailing letters, etc., and the invention is disclosed herein in connection with an envelope opening machine.

It is the general object of the invention to provide an improved machine of the class mentioned which will operate effectively and expeditiously to open envelopes or like packages, operating silently and with small power consumption while being simple in construction and arrangement, with few parts, and being inexpensive in production cost.

A further object is to provide an improved opening mechanism wherein a grinding or abrading operation is utilized in opening the envelope or package.

A further object is to provide an improved machine of the class mentioned wherein the dust or small particles incident to the grinding operation is, by means of a simple improved arrangement, retained in a compartment and prevented from being spread about the room.

Still another object of the invention is to provide a simple and improved mechanism for positioning envelopes or like packages and for guiding and feeding them in correct position onto a grinding wheel to open the packages.

Another object is to provide an improved automatic shutter arrangement to cover the aperture through which the grinding wheel projects, and to provide a safety cover for the rotating surface of the grinding wheel.

Other objects will be in part pointed out in connection with the following detailed disclosure of certain illustrative but preferred embodiments of the invention, and will be in part obvious in connection with said disclosure.

The invention accordingly comprises the features of construction, combination of elements, and arrangement of parts, which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the claims.

For a more complete understanding of the nature and objects of the invention, reference is had to the following detailed description and to the accompanying drawings, in which—

Figure 1 is a plan view of an envelope opening machine embodying the invention, parts being broken away and in section to enhance the disclosure.

Fig. 2 is a fragmentary vertical sectional view taken approximately on the line 2—2 of Fig. 1.

Fig. 3 is a transverse vertical section approximately on the line 3—3 of Fig. 1, parts being broken away and other parts being shown in elevation.

Fig. 4 is a detailed elevation showing the grinding wheel in the act of grinding or cutting the edge of an envelope.

Figs. 5 and 6 are views similar to Fig. 4, showing modified forms of the grinding wheel.

Referring to the drawing for a detailed description of the embodiment of the invention there shown, a casing forming a base for and supporting various elements of the mechanism is indicated generally at 10 and is preferably in the form of a box-like enclosure forming a housing for the driving motor M, and for other operative elements.

A feed table or bed plate 11 forms the top of the casing providing a support over which an envelope or other package or article is passed to bring it into cooperative relation with the opening tool. A back supporting and guiding plate 12 is positioned above the feed-table, being disposed at an angle to the latter substantially in upright position and forming a support against which the side face of an envelope may rest during the passage of the envelope through the machine. This arrangement supports the envelope for feeding movement substantially in vertical edgewise position, as indicated in dot and dash lines at E in Figs. 1, 2, and 3.

Feed rolls 13, 14, 15, 16 are mounted for rotation on substantially vertically positioned shafts or spindles, one of which, as indicated at 17, is mounted in the feed table 11, and another, as indicated at 18, extends through and below the feed table, being rotatably mounted

in bearings 19 to provide a drive shaft for the rolls. The drive shaft 18 is positioned for driving connection with the driving motor shaft. The other two spindles 20 and 21 are carried respectively by swinging brackets 22 and 23, which are pivotally mounted at 24 beneath the feed table, tension springs 25, 26 being provided to urge the rolls 14 and 16 respectively toward and into contact with the rolls 13 and 15. The feed rolls are thus arranged in two pairs to resiliently grip the envelope which is being fed thereby. Slots 27, 28 are provided in the feed table through which the swinging roll shafts 20, 21 extend. The bites or contact lines between the feed rolls are positioned substantially in the plane of the face of the back plate against which the envelopes are positioned, and the back plate is cut away or notched, as indicated at 29 to permet projection of the roll faces. As will be seen in Fig. 2, the back plate is continuous at its lower edge so as to provide a continuous support against which the lower edges of the envelopes rest as they are fed forwardly by the feed rolls.

The driving mechanism for the feed rolls includes the drive shaft 18, to the lower part of which is secured a worm wheel 30 in mesh with a worm 31 mounted on the motor shaft 32. The feed roll 15 is driven from the roll 13 by a gear train including the gears 33 on the respective roll shafts 17 and 18 and an intermediate idler suitably mounted on a stud between the two rolls. The other two feed rolls 14 and 16 are driven frictionally by the rolls 13 and 15 respectively.

The feed rolls are preferably provided with friction gripping surfaces so as to exert a firm feeding grip upon the envelopes. For this purpose both rolls of each pair may be rubber-surfaced, but preferably one roll only is surfaced, this being one of the rolls of the following pair which is provided with a rubber surface as indicated at 35, while the companion roll is roughened or knurled as shown in Figs. 2 and 3. The following rolls may both be knurled as shown.

An envelope positioning and guiding member in the form of a presser bar 36 is pivoted at 37 to a suitable support which may be attached to the back plate 12, preferably being channeled, as shown, for the reception of the envelope edges. This presser bar is biased as by gravity into contact with the envelope edges so as to press the envelopes into contact with the feed table adjacent the grinding or cutting wheel to assist in correctly positioning it for the grinding action and guiding it into the grip of the feed rolls. It is important that the lower edge of the envelope be maintained close against the feed table in order that it may occupy the proper position with reference to the grinding wheel, and this presser bar is designed particularly for accomplishing this function.

The grinding or abrading wheel 38 is mounted upon the motor shaft which preferably rotates at a high rate of speed, something like 2000 R.P.M. being considered an effective speed. The grinding wheel may be made of any well known abrading substance such as emery, carborundum, or the like, and is preferably quite coarse. The feed table is provided with a slot 39 extending therethrough to permit passage of the grinding face of the wheel 38, which preferably extends for a slight distance above the upper face of the feed table as shown in Fig. 2 in order that it may engage with the lower edges of the envelopes to cut them off and open the envelopes as they are fed through the machine. The direction of rotation of the grinding wheel as indicated by the arrow in Fig. 2, is such as to tend to carry or urge the envelopes against and into contact with the back plate 12.

Behind the back plate 12, the slot 39 is closed by means of a stationary plate 40 secured to the feed table, and upon this plate the idler gear 34 may be mounted.

At the opposite or front side of the back plate 12 the wheel slot 39 is covered by a movable cover plate 41 which is attached to and carried by the swinging bracket 23, which carries the roll shaft 21. The cover plate 41 is shaped at its edge to rest against the adjacent face of the back plate 12 so as to make a tight joint, providing a seal for the slot 39 when the cover plate is in closed position. Cover plate 41 also forms a closure for the elongated slot 28, through which the roll shaft 21 extends. The cover plate 41 is shaped at its edge to rest against the adjacent face of the back plate 12 so as to make a tight joint, providing a seal for the slot 39 when the cover plate is in closed position. Cover plate 41 also forms a closure for the elongated slot 28, through which the roll shaft 21 extends. The slot 27 for the roll shaft 20 may be similarly closed by a small cover plate 42 shown in dotted outline in Fig. 1 and being mounted upon the swinging bracket 22 for movement therewith. All openings through the feed table are thus sealed against exit of the fine dust which is caused by the grinding action of the wheel upon the envelopes.

The grinding wheel 38 is housed in a closed compartment below the feed table, which is arranged to function as a receptacle for the grinding dust. The dust incident to the grinding operation is thus kept in the sealed compartment and escape thereof to the operative parts of the mechanism and to the room is thus effectively avoided.

A wall or partition 43 is positioned in close proximity to one lateral face of the grinding wheel, while considerable space is provided at the opposite face thereof into which the dust is deposited. A removable box or container 44 is arranged to fit snugly

into the grinding wheel compartment between the feed table and the base of the casing 10 and may be provided with an upstanding retaining wall 45 positioned adjacent the partition 43. The box 44, therefore, when slid into position as shown in Fig. 2 in full lines, completes the grinding wheel compartment and forms a receptacle for accumulations of grinding dust which may, therefore, be removed for proper disposal by removal of the box 44.

Due to the arrangement of the wheel close against the partition 43, the grinding dust will be projected outwardly away from said partition, and will be deposited in the box or container 44 mostly adjacent the outer wall thereof opposite the partition 43. This disposition of the grinding dust is probably due to the centrifugal or whirling action of the air and dust within the closed compartment caused by rotation of the grinding wheel. This fanning action prevents the dust from being deposited in any considerable amount in the space between the grinding wheel and the partition 43, and causes it to be deposited toward the outer wall of the removable receptacle as indicated diagrammatically by broken lines A, Figs. 1 and 2.

The cutting or grinding surface of the grinding wheel 38 may be varied in form, those forms shown in Figs. 4, 5, and 6 being found particularly satisfactory for the purpose of opening ordinary paper envelopes. In the embodiment of Fig. 4 the peripheral surface of the wheel is formed in two distinct peripheral zones, one zone being formed to provide an inclined or conical surface 46, inclined toward or facing the advancing envelopes, and being positioned at the forward side of the wheel, or that side thereof nearest the advancing envelopes, thus providing the leading surface against which the envelope is first engaged during the feeding movement thereof. The other zone of the grinding wheel is formed to provide the following peripheral surface 47, which is preferably cylindrical. These two surfaces 46 and 47 are preferably closely adjacent each other, the diameter of the cylindrical surface 47 being slightly greater than the greatest diameter of the conical surface 46 so as to provide a step or shoulder 48 between the two surfaces, thus providing a narrow annular grinding surface faced toward the advancing envelope and against which the edge of the envelope engages during feeding thereof, thus removing a narrow strip at the edge so as to effect opening. The conical or inclined grinding surface 46 thus functions as a guiding surface to guide the edge of the envelope into contact with the grinding edge 48, and at the same time it functions to perform the initial grinding action upon the envelope edge. The greater part of the cutting is probably effected by the shoulder 48 as the envelope is fed thereagainst, but some of the cutting may be performed by the cylindrical surface 47.

Two cylindrical surfaces 49 and 50, as shown in Fig. 5, may be employed, in which case there may be two grinding wheels placed closely side by side, the surface 49 being slightly less in diameter than the surface 50, so as to provide an annular cutting surface or step 51 between the two cylindrical surfaces. The peripheral surface 49 may be positioned to project slightly above the upper surface of the feed table 11 so as to present an additional annular cutting surface at the forward edge of the grinding wheel. In this case, therefore, the cutting will be accomplished by the two annular grinding faces which both face toward the advancing envelope. Some cutting may, of course, be accomplished by the cylindrical peripheries of the two parts of the grinding wheel.

The grinding wheel may also be formed, as shown in Fig. 6, with a single conical grinding face, facing toward the advancing envelope and against which the envelope is fed to remove by grinding action a narrow strip at the edge of the envelope.

The operation of the mechanism is to a large extent embodied in the foregoing detailed description, and will therefore be clearly understood, but for clearness may be summarized as follows: The envelopes are held preferably in a bunch with the face of the inner envelope against the adjacent face of the back plate 12, the envelopes being positioned on edge and fed by sliding them off the bunch one at a time by hand so the leading edges thereof enter the bite of the feed rolls 13—14. Entry of each envelope between the leading feed rolls causes roll 14 to move slightly away from roll 13, thus moving the shutter or cover 41 and uncovering the cutting surface of the grinding wheel to access by the envelopes. The shutter, however, opens only sufficiently to permit passage of the envelope between the edge thereof and the adjacent face of the back plate 12, the envelope entering into the space caused by this opening to maintain the seal of the aperture 39 during passage of the envelope and preventing escape of the grinding dust. When the envelope passes the leading rolls the shutter closes by action of the spring 26 and remains closed until the entry of the next envelope. During the grinding action upon the envelope the grinding surface moves across the envelope edge towards the back plate 12, thus tending to deflect the edge from its original plane and slightly under the lower edge of the back plate, the effect being that the envelope edge is cut on the bias, that is, at an inclination to the plane of the envelope. By means of the arrangement described, tests with a large number of envelopes have demonstrated that the opening is effected without injury to the contents

even when the contents is in the form of a single unfolded sheet such as a check inserted into the envelope as far as it will go toward the edge of the envelope which is ground away. The grip, or bite of one pair of the feed rolls is arranged in juxtaposition with the plane of the front or envelope guiding and supporting surface of the guide plate 12, and by means of the yielding mounting of the roll 14 or 16, together with the resilient surface 35, each envelope as it is being fed against the abrader is constantly yieldingly urged against said guiding and supporting surface, thus maintaining the envelope edge as it is moved into contact with the abrading surface in most advantageous position to be ground or cut away; preferably both pairs of rolls are arranged with their grips positioned as described, as clearly shown in Fig. 1.

The two pairs of feed rolls are preferably arranged so as to grip the envelope or similar article being fed thereby, both forwardly and rearwardly of the point of engagement of the envelope with the surface of the abrading wheel, as shown in Figs. 1 and 2; that is the bites of the pairs of feed rolls are positioned both forwardly and rearwardly of the abrader, thus gripping the envelope at spaced parts thereof positioned both forwardly and rearwardly of the point on the edge thereof that is being cut or ground by the abrading surface. This arrangement of the feed rolls assists materially in retaining the envelope in correct position for cooperation with the abrader for the most effective opening action and also assists materially in preventing the contents of the envelope from settling down to the lower edge under the vibratory and other effects of the cutting action. It will, therefore, be seen that the arrangement mentioned lessens any tendency of the envelope contents coming into injurious contact with the abrading surface.

Due to the simple mechanism employed the machine operates silently and smoothly with very small power consumption, and is inexpensive in production costs. The feeding is rapid, the opening of 100 or more envelopes per minute being readily accomplished, and the opening operation is certain, there being practically no failure.

Since certain changes may be made in the above construction and different embodiments of the invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the following claims are intended to cover all of the generic and specific features of the invention herein described, and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

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

1. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture in the feed table, mechanism for feeding an envelope into engagement with said projecting edge of the grinding wheel, a covering and sealing mechanism for said aperture, and automatic mechanism including a member positioned in the path of a fed envelope and controlled thereby to adjust said sealing mechanism to permit contact of the envelope with the grinding wheel.

2. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture of said feed table, mechanism for feeding envelopes into engagement with said projecting edge of the grinding wheel, a sealing cover plate for said aperture interposed in the path of the fed envelope, and automatic mechanism controlled by an advancing envelope to adjust said cover plate to permit engagement of an envelope with the grinding wheel, said cover plate being positioned to contact with the envelope being fed for maintaining the aperture sealed.

3. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture in said feed table, cooperating feed rolls adjacent said feed table to feed envelopes into engagement with said projecting edge of the grinding wheel, means for mounting one of said feed rolls so as to be moved by engagement thereof by an envelope, and a sealing closure for said aperture operated by said movable roll to move it into position to permit access of the envelope to said grinding wheel.

4. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture in said feed table, cooperating feed rolls adjacent said feed table to feed an envelope into engagement with said projecting edge of the grinding wheel, a swinging bracket for mounting one of said feed rolls so as to be moved by engagement thereof by an envelope and being biased into engagement with a companion feed roll, and a closure for said aperture carried by said bracket.

5. In a machine of the character described, in combination, a rotary grinding wheel, a supporting and guiding plate for supporting and guiding an envelope with an edge thereof in contact with the grinding surface of said wheel, said grinding wheel rotating in a direction to tend to carry an envelope in engagement therewith against said supporting and guiding plate, and a pivoted guiding

member contacting with the edge of an envelope and biased to urge the envelope into contact with said grinding wheel.

6. In a machine of the character described, in combination, a feed table, feed rolls for feeding envelopes, a rotary grinding wheel against which the edges of the envelopes are fed individually in endwise direction to open them one at a time, and a guiding and positioning member individually engaging each envelope being fed at the edge thereof opposite to its wheel engaging edge to position it with reference to the grinding wheel.

7. In a machine of the character described, in combination, a feed table, an envelope guiding or feed plate upstanding from said feed table, feed rolls above the feed for feeding envelopes, a rotary grinding wheel against which the edges of the envelopes are fed individually in endwise directions to open them one at a time, a guiding and positioning member individually engaging the edge of each envelope being fed to position the envelope for cooperation with the grinding wheel, and yielding means including one of said feed rolls positioned at the front side of said guiding plate for yieldingly pressing the feeding envelope against said guiding surface.

8. In a machine of the character described, in combination, a feed table, a guiding or feed plate for guiding an envelope in a path, an abrader having a moving part thereof positioned in said envelope path so as to engage an envelope edge moving therein and envelope gripping feed rolls having their grips positioned both forwardly and rearwardly of the point of intersection of said path with said abrader.

9. In a machine of the character described, in combination, a feed table, a guiding or feed plate for guiding an envelope in a path, an abrader having a moving part thereof positioned in said envelope path so as to engage an envelope edge moving therein and envelope gripping feed rolls having their grips positioned both forwardly and rearwardly of the point of intersection of said path with said abrader, said feed plate extending between said feed rolls adjacent said abrader which moves in a direction tending to carry the envelope into engagement with said feed plate.

10. In an envelope opener, in combination, a rotary abrader having part of its abrading surface of conical formation and part approximately of cylindrical formation, with a shoulder between said abrading surfaces, and means for guiding an envelope and feeding it with an edge thereof advancing against said conical abrading surface and against said shoulder.

11. In an envelope opener, in combination, a rotary abrader having a stepped abrading surface, feeding mechanism for feeding envelopes one at a time with an edge thereof advancing against said stepped abrading surface, and a guiding and positioning member individually engaging each envelope at the edge thereof opposite to the abrader engaging edge to position it for cooperation with the abrader.

12. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture in the feed table, mechanism including a feed roll for feeding an envelope into engagement with said projecting edge of the grinding wheel, a seal for said aperture, positioned in the path of the envelope and a connection between said seal and said feed roll to automatically adjust the seal to permit access by the envelope to said wheel when an envelope is in engagement with said feed roll.

13. In a machine of the character described, in combination, a supporting bed for an advancing envelope, a grinding wheel with its edge projecting into an aperture in said supporting bed, an envelope guide plate adjacent said bed for guiding an envelope in endwise movement into the plane of said wheel to bring the envelope edge into contact therewith, a sealing cover plate for said aperture interposed in the path of an envelope, and automatic mechanism including a member engageable by an advancing envelope to adjust said cover plate to permit engagement of the envelope edge with the grinding wheel.

14. In a machine of the character described, in combination, a feed table, a grinding wheel with its edge projecting into an aperture in said feed table, envelope gripping feed members positioned for gripping the envelopes both forwardly and rearwardly of said grinding wheel, a movable sealing closure for said aperture forming a shield for said projecting wheel edge, and mechanism automatically operated by said envelope to move said closure so as to clear the wheel to access by said envelope.

15. In a machine of the character described, in combination, a feed table, an envelope guiding or feed plate having its guiding surface positioned at an angle to the plane of said feed table, envelope feed rolls mounted adjacent said feed table, and having the grip thereof arranged in juxtaposition with the plane of said guiding surface, an abrading member having a traveling abrading surface positioned adjacent to said feed rolls and adjacent to a part of said guiding surface, against which abrading surface the edges of the envelopes are fed to open said envelopes, and yielding means including one of said feed rolls for yieldingly pressing the feeding envelope against said guiding surface adjacent to said abrading surface.

16. In an envelope opener, in combination, a rotary abrader having its peripheral abrading surface of stepped formation providing a

plurality of stepped cutting surfaces and envelope gripping feed rolls for feeding the envelopes longitudinally with their edges directed against said stepped abrading surface whereby the stepped parts of said surface effect cutting action upon the envelope edge so as to open said envelope, said rolls having their grips positioned both forwardly and rearwardly of said abrader.

17. In an envelope opener, in combination, a rotary abrader having its peripheral abrading surface of stepped formation providing a plurality of stepped cutting surfaces, and envelope feeding means for feeding the envelopes longitudinally with their edges directed against said stepped abrading surface whereby the latter effects opening cutting action upon the envelope edges.

In testimony whereof I affix my signature.

MAXWELL VIDAVER.