Dec. 2, 1941. C. D. RYAN 2,265,007

FEEDING MECHANISM

Filed Oct. 29, 1940 3 Sheets-Sheet 1

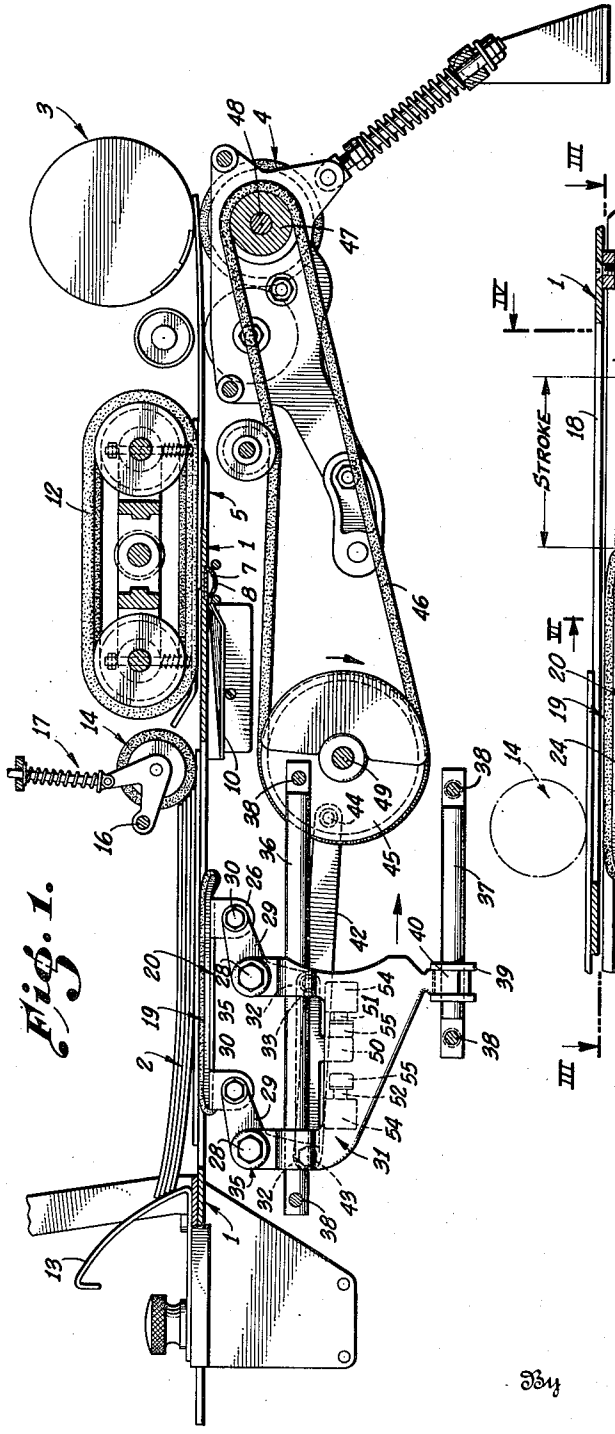


Fig. 1.

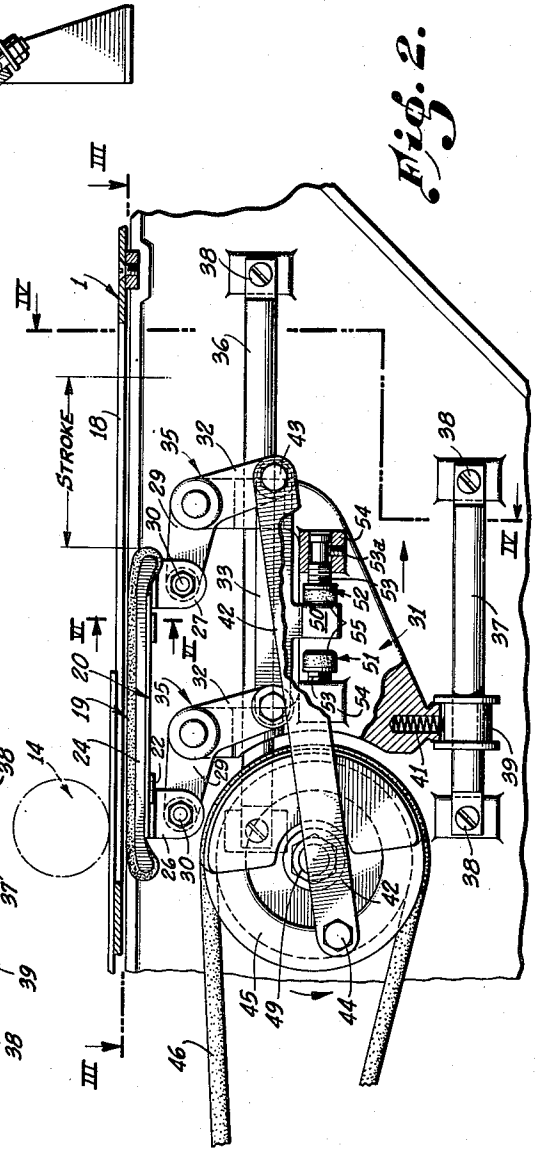


Fig. 2.

Inventor
COMMODORE D. RYAN,

By Lyon & Lyon

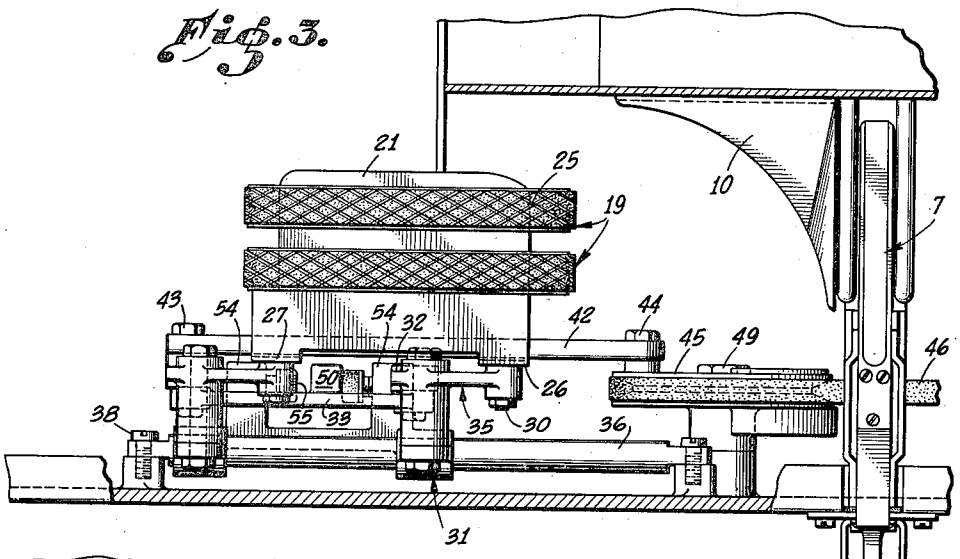
Attorneys.

Dec. 2, 1941. C. D. RYAN 2,265,007

FEEDING MECHANISM

Filed Oct. 29, 1940 3 Sheets-Sheet 2

Fig. 3.



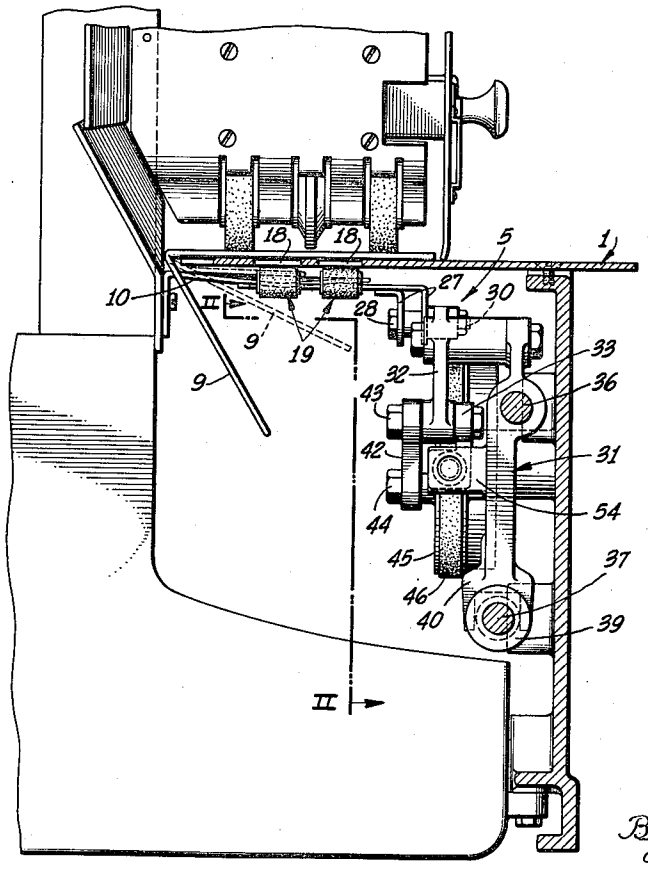


Fig. 4.

Inventor
COMMODORE D. RYAN,
By Lyon & Lyon
Attorneys.

Dec. 2, 1941. C. D. RYAN 2,265,007

FEEDING MECHANISM

Filed Oct. 29, 1940 3 Sheets-Sheet 3

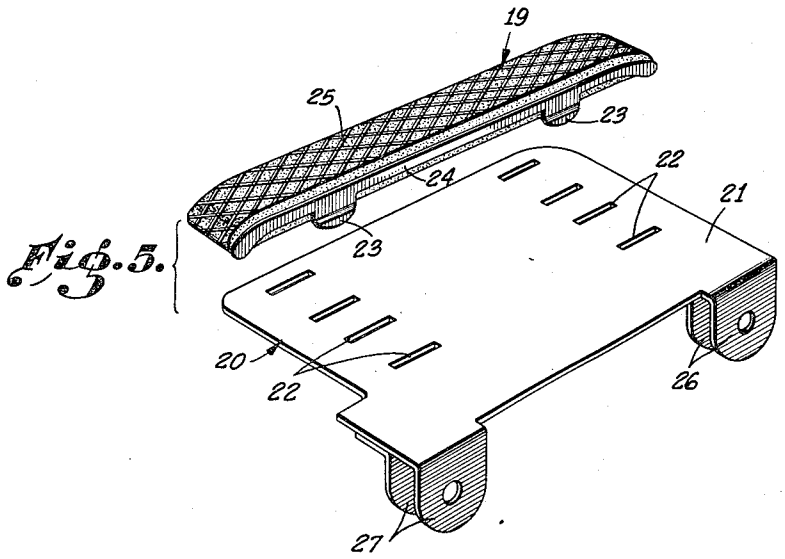


Fig. 5.

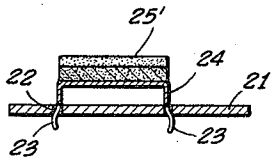


Fig. 8.

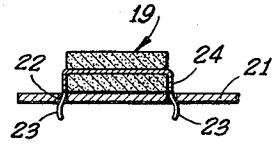


Fig. 6.

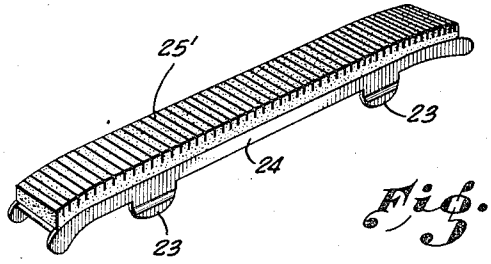


Fig. 7.

Inventor

COMMODORE D. RYAN,

By Lyon & Lyon Attorneys.

Patented Dec. 2, 1941

2,265,007

UNITED STATES PATENT OFFICE

2,265,007

FEEDING MECHANISM

Commodore D. Ryan, Los Angeles, Calif., assignor to National Postal Meter Company, Los Angeles, Calif., a corporation of California

Application October 29, 1940, Serial No. 363,257

12 Claims. (Cl. 271—44)

This invention relates to mechanisms for feeding articles one at a time, and is particularly useful in machines for treating flat objects, such as envelopes.

A typical example of a machine in which the present feeding mechanism may be used is a postage-printing machine for stamping postage on envelopes. In machines of this type for automatically stamping a large number of envelopes, it is customary to place a stack or tier of envelopes in a magazine, from the bottom of which stack or tier the envelopes are fed one at a time into the printing mechanism. It is customary to employ a moving conveyer for stripping the lowermost envelope from the stack, by frictional engagement of the conveyer against the underside of the envelope. Heretofore it has been common practice to employ a continuous belt suitably mounted on pulleys as the conveyer, a portion of the run of the belt being positioned below the stack of envelopes and raised into contact with the bottom envelope in the stack whenever a new envelope was to be fed from the stack. Belt conveyers of this type are sometimes disadvantageous because of the room required to mount the belt and the belt-supporting structure, which interferes with the designing of a compact machine. Belts are also sometimes objectionable for this service because they do not invariably afford a positive feed, and are subject to unduly rapid depreciation in service.

A broad object of the present invention is to provide a mechanism for stripping envelopes or the like from the bottom of a stack, which mechanism is relatively compact and can be positioned close to other elements of a machine so as to reduce the total dimensions, and particularly the length, of the machine in which it is incorporated.

Another object is to provide a particularly simple and reliable mechanism for stripping envelopes from the bottom of a stack.

Still another object is to provide a stripping mechanism that is unusually positive in its operation and is also relatively free from depreciation in service.

Another object is to provide a stripping mechanism in which the stripping elements which contact the envelopes or other objects to be stripped, are inexpensive and can be very quickly replaced.

Still another object is to provide a stripping and feeding mechanism for an envelope-sealing machine, which mechanism is capable of frictionally engaging envelopes on the flap side thereof symmetrically with respect to the longitudinal center line of the envelope, without interference with the envelope flaps, irrespective of the dimensions of the flaps, whereby straight line feed of the envelopes without skewing of the envelope is assured.

The manner in which the foregoing objects, together with other more specific objects and features of the invention, are obtained, will become apparent from the detailed description to follow, with reference to the drawings of a particular embodiment of the invention.

Briefly, my invention consists of a shoe or shoes in place of the usual conveyer belt, with a very simple mechanism for moving the shoes in a closed, substantially rectangular path, to advance the enevlopes or other objects from the bottom of a stack.

In the drawings:

Fig. 1 is a vertical sectional view through an envelope-feeding mechanism, in accordance with the invention;

Fig. 2 is a vertical sectional view of a portion of the machine shown in Fig. 1, the view being taken looking in the opposite direction, and substantially along the line II—II of Fig. 4;

Fig. 3 is a horizontal section, taken substantially in the plane III—III of Fig. 2;

Fig. 4 is a vertical section, taken substantially in the plane IV—IV of Fig. 2;

Fig. 5 is a perspective view of one feed shoe and the supporting feed plate therefor, the parts being shown separated;

Fig. 6 is a detail, vertical section, taken through the shoe and shoe-support along the line VI—VI of Fig. 2;

Fig. 7 is a perspective view of a shoe construction alternative to that disclosed in Fig. 5; and

Fig. 8 is a detail vertical section through the shoe of Fig. 7.

The following is a description of the mechanism which feeds envelopes and the like, one at a time, into the mail treating machine. Other aspects of this machine are particularly described in certain copending applications, as follows:

Commodore D. Ryan and Edward P. Drake, Serial No. 399,324, filed June 23, 1941, which is directed to the envelope trip and the mechanism controlled thereby.

Commodore D. Ryan, Serial No. 388,770, filed April 16, 1941, which is directed to apparatus for the handling of envelopes and the like.

Commodore D. Ryan and Edward P. Drake, Serial No. 413,120, filed October 1, 1941, which is directed primarily to the conveyor system of the mail treating machine.

Commodore D. Ryan and Edward P. Drake, Serial No. 413,121, filed October 1, 1941, which is directed primarily to the control system of the mailing machine for adjusting the machine either for stamping postage on envelopes or on tape.

Commodore D. Ryan and Edward P. Drake, Serial No. 413,122, filed October 1, 1941, which is directed to the envelope guiding, and a part of the envelope feeding mechanism of the mail treating machine.

Thus, the several above-noted applications disclose in its entirety the mail treating machine, with the exception of the meter (not shown herein) which prints postage on the envelopes or the tape, as the case may be. This meter is described in detail in the application of Sager et al., Serial No. 332,305, filed April 29, 1940, entitled "Mail treating machine."

Referring, first, to Fig. 1, there is disclosed a table 1 along which flat objects, such as envelopes, are adapted to be fed one at a time from a stack 2 to a printer head 3, the latter cooperating with a platen 4. When the objects being fed are envelopes, a sealer mechanism 5 may be provided between the stack 2 and the printer head 3 to seal the flaps of the envelopes.

The present invention resides in the mechanism for stripping the objects one at a time from the bottom of the stack 2 and delivering them to a conveyer system which carries them past the sealing mechanism 5 and/or the printer head 3.

The conveying, sealing and printing mechanism does not form a part of the present invention, and may be of various types. However, to simplify the explanation of the invention, a simple construction of conveying, sealing and printing mechanism will be described. Thus the sealer may include a moistening blade 7 positioned below the table 1 and having a slit 8 in the underside for delivering water to the gummed portions of the flaps of envelopes sliding therealong. The envelopes are moved from left to right along the table 1, with their flaps 9 depending downwardly, as shown in Fig. 4. A short distance ahead of the moistening blade 7 these flaps are intercepted by a folding vane 10 which deflects the flaps upwardly against the moistening blade 7. Later, as the envelopes are fed between the printer head 3 and the platen 4, the moistened flaps are pressed against the bodies of the envelopes, and sealed.

The stripping mechanism constituting the present invention feeds the envelopes from the stack 2 to a point on the table above the moistening blade 7, at which point they are engaged by a belt conveyer 12 positioned above the table and constantly rotated by a driving mechanism, not shown.

The stack of objects 2 is supported between a sloping wall member 13 at the rear end, and a stripping element 14 at the leading end. By virtue of the slope of the wall 13, the objects in the stack 2 are arranged in shingled relation, with the front edge of each of the objects in the lower part of the stack advanced slightly relative to the object thereabove. The stripping element 14 is pivotally supported on a stationary shaft 16 which in turn is supported on the frame of the machine, not shown. The stripping element 14 is urged downwardly by compression spring means 17 in a manner well-known in the art.

The portion of the table 1 underlying the stack 2 is provided with a plurality of longitudinal slots 18 (Fig. 4) through which a pair of feed shoes 19 are adapted to project to engage the lowermost object in the stack, and move it forwardly into engagement with the conveyer belt 12.

As shown in Fig. 5, the shoes 19 are mounted upon a feed plate 20 which is supported and moved by a mechanism to be described in detail later. It will be observed from an inspection of Fig. 5 that the feed plate 20 comprises a substantially flat blade 21 having slots 22 therein for receiving ears 23 on the shoes 19. These shoes 19 may be formed from elongated strips of sheet metal having their edges folded down, as indicated at 24 (Fig. 6) to define a channel section over which a rubber belt 25 is stretched. The side flanges 24 preferably project beyond the web of the channel at the ends to retain the belt 25 in place. Each shoe is attached to the feed plate 20 by simply pressing ears 23 thereof through the slots 22, the ears being so bent as to yieldably engage the sides of the slots, as clearly shown in Fig. 6. The surface of the belt 25 is roughened or has a pattern of grooves formed therein to increase the tractive qualities of the shoes.

An alternative shoe construction is shown in Figs. 7 and 8, in which the metal supporting portion of the shoe is substantially the same as that shown in Fig. 5, but the rubber tread 25' is in the form of a strip and is vulcanized or cemented to the metal shoe, instead of being formed as a belt looped around the shoe.

The feed plate 20 has a pair of spaced apart downwardly extending lugs 26 at its forward end and a similar pair of lugs 27 at its rear end. These lugs have holes therethrough for receiving pivot bolts 28, which bolts are secured to the outer ends of the upper arms 29 of a pair of bellcrank levers 35, which are fulcrumed by pivot bolts 30 on a carriage 31. The two bellcrank levers have downwardly extending arms 32 pivotally secured to the opposite ends of a link 33 so that the feed plate is supported for rocking movement on the pivot pins 30 while remaining parallel to the table 1.

The carriage 31 is reciprocated horizontally from left to right (with reference to Fig. 1) and the feed plate is raised by means of the bellcrank levers 35 into an upper position to engage the bottom object in the stack 2 during rightward movement of the carriage and lowered into a position clear of the bottom-most object in the stack 2 during the reverse movement of the carriage from right to left.

The carriage 31 is supported for this reciprocatory motion on a pair of rods 36 and 37 (Fig. 4), which rods are attached to the frame of the machine at their opposite ends by studs 38 (Fig. 1). The upper rod 36 is fitted in holes formed directly in the carriage 31. The lower rod 37 has slidably mounted thereon a spool-shaped bushing 39, which is engaged by a yoke 40 formed on the carriage 31. A compression spring 41 (Fig. 2) exerts a constant force between the carriage and the bushing 39 to provide a constant frictional resistance to motion of the carriage along the guide rods, for a purpose that will appear later. The use of the bushing and yoke construction also eliminates the necessity of having the lower and upper rods adjusted to exactly parallel positions, thereby facilitating manufacture by mass production methods.

The carriage 31 is reciprocated by a connecting rod 42 (Figs. 1 and 2), which is pivotally connected at its left end (with reference to Fig.

1) to the lower arm 32 of the rear bellcrank lever 35, by the same pivot screw 43 that connects this lever arm to the link 33. The other end of the connecting rod 42 is connected by a crank pin 44 to a pulley 45 which pulley is rotatably supported on a stationary shaft 49 and is rotated by a belt 46 from a pulley 47 on the shaft 48 of the printing platen 4. The shaft 48 is power-driven by a mechanism not shown. It will be apparent, therefore, that the pulley 45 is rotated in synchronism with the printing mechanism.

An adjustable stop mechanism is provided for limiting the rocking motion of the bellcrank levers 35 to a relatively small arc, so that the reciprocation of the connecting rod performs the dual function of rocking the bellcrank levers and reciprocating the carriage along the guide rods 36 and 37. Thus referring to Fig. 2, the link 33 is provided with a downwardly projecting lug 50 which is positioned between two adjustable bumpers 51 and 52, respectively, on the carriage 31. Thus the bumpers 51 and 52 each comprise a bolt 53, threaded into suitable projections 54 on the carriage 31 and having heads 55 of rubber or other suitable, shock-absorbing and noise-reducing material. Set screws 53*a* are provided for locking the bolt 53 in desired position of adjustment.

During operation, as the connecting rod 42 starts its forward motion (to the right in Fig. 1 and to the left in Fig. 2), it applies a forward force to the arms 32 of the bellcrank levers 35. This force tends to advance the entire carriage along the guide rods 36 and 37, but such motion is resisted both by the inertia of the carriage and its friction resistance (augmented by the spring 41) on the guide rods. As a result of these retarding influences on the carriage, the bellcrank levers are rocked to elevate the feed plate 20 through the slots 18 into engagement with the bottom object in the stack 2. This upward movement of the feed plate continues until the lug 50 encounters the bumper 51, whereupon the carriage is forced to slide forwardly along the rods 36 and 37. However, the frictional resistance to sliding movement of the carriage is sufficient to maintain the feed plate 20 in upper position, in which it continues to engage the bottom envelope to strip it from the stack and feed it along the table into engagement with the conveyor belt 12 (Fig. 1).

When the connecting rod 42 reaches the end of its forward stroke and starts back (to the left in Fig. 1 and to the right in Fig. 2), it tends to reverse the direction of movement of the carriage, and such movement is again resisted by inertia and friction, with the result that the bellcrank levers 35 are rocked to drop the feed plate 20 into its lower position, in which it is below the level of the table 1 and in which the lug 50 on the link 33 abuts against the bumper 52. Thereafter continued reverse movement of the connecting rod 42 carries the carriage back into starting position, ready to start another feeding cycle.

The upper and lower positions of the feed shoes 19 may be adjusted to exact requirements by adjustment of the bumpers 51 and 52, respectively.

It will be observed from Fig. 4 that the feed plate 20 is supported at its right edge on the reciprocating mechanism and extends toward the left therefrom. The feed plate 20, together with the feed shoes 19, is relatively thin in vertical dimensions, so that the envelope flaps 9 may be folded under the feed plate when said flaps are being directed to the sealer 7 by the deflecting vane 10. This feature permits the positioning of the envelope magazine and feeding mechanism very close to the sealer 7, which is very advantageous in that the envelopes have a shorter distance to travel along the table 1 past the sealer 7 to the printing head 3; therefore the conveyer 12 can be shorter, which reduces the friction in sliding the envelopes along the table and thereby considerably improves the timing in feeding the envelopes to the printing head, and also permits a very compact construction of the machine.

The feed plate supporting elements and the reciprocating mechanism are positioned a sufficient distance from the flap edge of the envelope-conveying table 1 so that envelopes having relatively wide flaps may be effectively fed to the sealer.

Another important advantage of this thin feed plate and feed shoe structure is that the feed shoes are positioned so that they operate on the envelope near its longitudinal center, regardless of the flap width. This insures straight line feeding without the cocking or twisting of envelopes so prevalent in other types of feed mechanisms.

Although for the purpose of explaining the invention a specific embodiment thereof has been described in detail, it is to be understood that various changes can be made from the particular structure shown, without departing from the invention, and the latter is to be limited only to the extent set forth in the appended claims.

I claim:

1. Apparatus for feeding flat objects one at a time from the bottom of a stack, comprising means for supporting a stack of objects, essentially rigid shoe means having an upper friction surface adapted to frictionally engage the lowermost object in said stack, and means for moving said shoe means to engage and strip the lowermost object from said stack, said shoe means comprising a supporting plate having slots therein and detachable friction means having clips adapted to be entered into said slots for yieldably retaining said friction elements on said plate.

2. Apparatus for feeding flat objects one at a time from the bottom of a stack, comprising means for supporting a stack of objects, essentially rigid shoe means having an upper friction surface adapted to frictionally engage the lowermost object in said stack, and means for moving said shoe means to engage and strip the lowermost object from said stack, said shoe means including a base member and a detachable friction member thereon, said friction member comprising a channel member of sheet metal having ears on the flanges of the channel adapted to extend through slots provided therefor in said base member for securing the friction member to the base member, and a belt member looped longitudinally over the web of said channel member, the flanges of said member extending beyond the web of the channel at the ends to retain said belt member thereon.

3. Apparatus for feeding flat objects one at a time from the bottom of a stock, comprising means for supporting a stack of objects, essentially rigid shoe means having an upper friction surface adapted to frictionally engage the lowermost object in said stack, and means for

moving said shoe means to engage and strip the lowermost object from said stack, said shoe means including a base member and a detachable friction member, said friction member including a channel member of sheet metal having ears projecting from the flanges of the channel into slots provided therefor in the base member, and a surface layer of yieldable material cemented to the outer face of the web of said channel section.

4. Apparatus for feeding flat objects one at a time from the bottom of a stack, comprising means for supporting a stack of objects, essentially rigid shoe means having an upper friction surface adapted to frictionally engage the lowermost object in said stack, and means for moving said shoe means to engage and strip the lowermost object from said stack, said shoe means comprising a plate member and supporting and moving means attached to said plate member adjacent one edge, said edge being spaced laterally from the object-contacting surface of said shoe.

5. An envelope sealing mechanism comprising a table for supporting a stack of envelopes, said table having an edge over which the flaps of the envelopes extend, shoe means movable through slots provided therefor in said table for engaging the underside of the bottom envelope in said stack and stripping it longitudinally from said stack along said table surface, means below said table in the path of movement of the flaps of envelopes being stripped from said stack for engaging said flaps and folding them upwardly toward the underside of said table, said shoe means comprising a flat plate member and means engaging said plate member at one edge only for reciprocating it to strip said envelopes, said shoe-supporting means being connected thereto on the side of the shoe remote from said table edge, whereby said shoe mechanism is clear of the flap of an envelope being carried by the shoe as the flap is folded upwardly by said folding mechanism.

6. A feeding mechanism including a table for supporting objects to be conveyed thereover, said table having an opening therein for a conveyer shoe, a conveyer shoe adapted to be reciprocated through a rectangular path including an advancing stroke at a level above and a retracting stroke at a level below the level of said table, a carriage, and means guiding it for reciprocating movement in a path parallel to said table, means for reciprocating said carriage in said path, means supporting said shoe on said carriage for vertical rocking movement on said carriage between said upper and lower levels, respectively, and means responsive to said carriage-reciprocating means for rocking said shoe upwardly in response to driving force applied to said carriage to advance it and for rocking said shoe downwardly in response to driving force applied to said carriage to retract it, in which said guiding means for said carriage includes a first longitudinal guide member, rigid means on said carriage slidably engaging said guide member, a second guide member offset from said first member but at least approximately parallel thereto, a member slidably fitted on said second guide member for longitudinal movement with respect thereto, and means on said carriage slidably engaging said last-mentioned slidable member for sliding movement with respect thereto in the common plane of said two guide members while preventing rotary motion of said carriage about said first guide member.

7. A feeding mechanism including a table for supporting objects to be conveyed thereover, said table having an opening therein for a conveyor shoe, a conveyor shoe adapted to be reciprocated through a rectangular path including an advancing stroke at a level above and a retracting stroke at a level below the level of said table, a carriage, and means guiding it for reciprocating movement in a path parallel to said table, means for reciprocating said carriage in said path, means supporting said shoe on said carriage for vertical rocking movement on said carriage between said upper and lower levels, respectively, means responsive to said carriage-reciprocating means for rocking said shoe upwardly in response to driving force applied to said carriage to advance it and for rocking said shoe downwardly in response to driving force applied to said carriage to retract it, in which said means for supporting said shoe on said carriage comprises a lever arm fulcrumed on said carriage, whereby said shoe is raised and lowered with respect to said carriage in response to oscillation of said lever means, and in which said means for reciprocating said carriage comprises a reciprocating driving member pivotally connected to said lever means, whereby oscillation of said driving member in either advancing or retracting direction simultaneously applies forces tending to reciprocate the carriage in its path and vertically shift said shoe with respect to said carriage, said carriage and said shoe having such relative masses that the inertia force resisting reciprocation of said carriage is greater than the inertia force resisting vertical movement of said shoe.

8. A feeding mechanism including a table for supporting objects to be conveyed thereover, said table having an opening therein for a conveyer shoe, a conveyer shoe adapted to be reciprocated through a rectangular path including an advancing stroke at a level above and a retracting stroke at a level below the level of said table, a carriage and means guiding it for reciprocating movement in a path parallel to said table, means for reciprocating said carriage in said path, means supporting said shoe on said carriage for vertical rocking movement on said carriage between said upper and lower levels, respectively, means responsive to said carriage-reciprocating means for rocking said shoe upwardly in response to driving force applied to said carriage to advance it and for rocking said shoe downwardly in response to driving force applied to said carriage to retract it, in which said means for supporting said shoe on said carriage comprises a lever arm fulcrumed on said carriage, whereby said shoe is raised and lowered with respect to said carriage in response to oscillation of said lever means, and in which said means for reciprocating said carriage comprises a reciprocating driving member pivotally connected to said lever means, whereby oscillation of said driving member in either advancing or retracting direction simultaneously applies forces tending to reciprocate the carriage in its path and vertically shift said shoe with respect to said carriage, and means for providing a predetermined, minimum frictional resistance to reciprocation of said carriage whereby the resistance to movement of the carriage in combination with the reciprocating force applied to said lever means, tends to rock said shoe vertically during the entire stroke of said carriage.

9. Apparatus for feeding objects laterally comprising: means for supporting objects; means for engaging said objects; means for shifting said engaging means alternately horizontally and vertically to repeatedly carry it through a closed path extending first upwardly, then horizontally in one direction, then downwardly, then horizontally in the reverse direction, back to the starting point; said shifting means comprising: a carriage, and means slidably supporting it for horizontal movement; an object-engaging element; bellcrank means pivotally mounted on said carriage and having horizontal arm means pivotally connected to said engaging element, said bellcrank means also having vertically extending arm means; a horizontally reciprocable actuating member pivotally connected to the vertically extending arm means, whereby initial movement of said reciprocating means in either direction rocks said bellcrank means to shift said engaging element vertically with respect to said carriage, and continued horizontal movement of said reciprocatory means thereafter acts to shift said carriage and engaging element as a unit horizontally.

10. Feeding mechanism for feeding envelopes one at a time from the bottom of a stack, comprising: means for supporting a stack of envelopes with their flaps extending downwardly; reciprocatory means positioned clear of the folding path of said flaps during movement of the flaps from downward position to position against the body of the envelope; relatively thin friction means extending laterally from said reciprocatory means into the folding range of said flaps for engagement with the bottom envelope of the stack at points thereon symmetrically disposed with respect to the longitudinal center line of the envelope, said friction means being so thin vertically as to be clear of the path of folding movement of the flap of the envelope; means for actuating said reciprocatory means to impart vertical and horizontal movement to said friction means to carry the latter through a closed path extending first upwardly, then horizontally in one direction, then downwardly, and then horizontally in the reverse direction back to the starting point, so that said friction means engages the bottom envelope during the upward and first horizontal movements; and means for folding said flap while it is being moved horizontally by said friction means.

11. Apparatus for feeding flat objects one at a time from the bottom of a stack, comprising means for supporting a stack of objects, essentially rigid shoe means having an upper friction surface adapted to frictionally engage the lowermost object in said stack, means for moving said shoe means upwardly below said stack into engagement with the lowermost object therein, thence laterally to strip said lowermost object from said stack, thence downwardly below the level of the bottom of said stack, and then rearwardly to the stamping position, and an adjustable stop means for adjustably limiting said upward movement of said shoe means.

12. A feeding mechanism including a table for supporting objects to be conveyed thereover, said table having an opening therein for a conveyer shoe, a conveyer shoe adapted to be reciprocated through a rectangular path including an advancing stroke at a level above and a retracting stroke at a level below the level of said table, a carriage and means guiding it for reciprocating movement in a path parallel to said table, means for reciprocating said carriage in said path, means supporting said shoe on said carriage for vertical rocking movement on said carriage between said upper and lower levels, respectively, means responsive to said carriage-reciprocating means for rocking said shoe upwardly in response to driving force applied to said carriage to advance it and for rocking said shoe downwardly in response to driving force applied to said carriage to retract it, and cooperating adjustable stop means on said carriage and said lever means, respectively, for accurately and positively adjusting the uppermost position of said conveyer shoe.

COMMODORE D. RYAN.