May 20, 1958 J. DE MAINE 2,835,090

WORKPIECE STRIPPING DEVICE

Filed Aug. 25, 1953 4 Sheets-Sheet 1

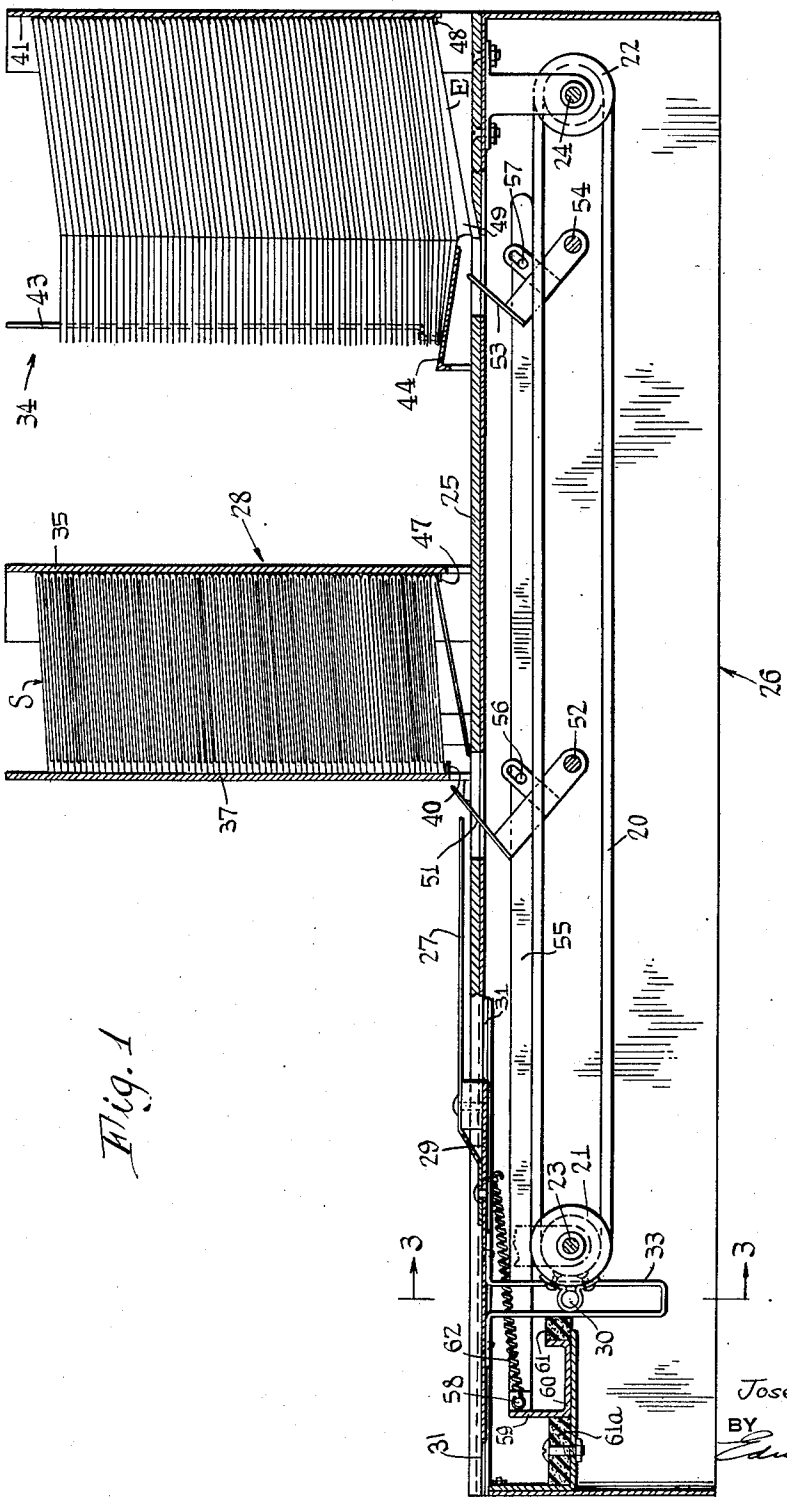


Fig. 1

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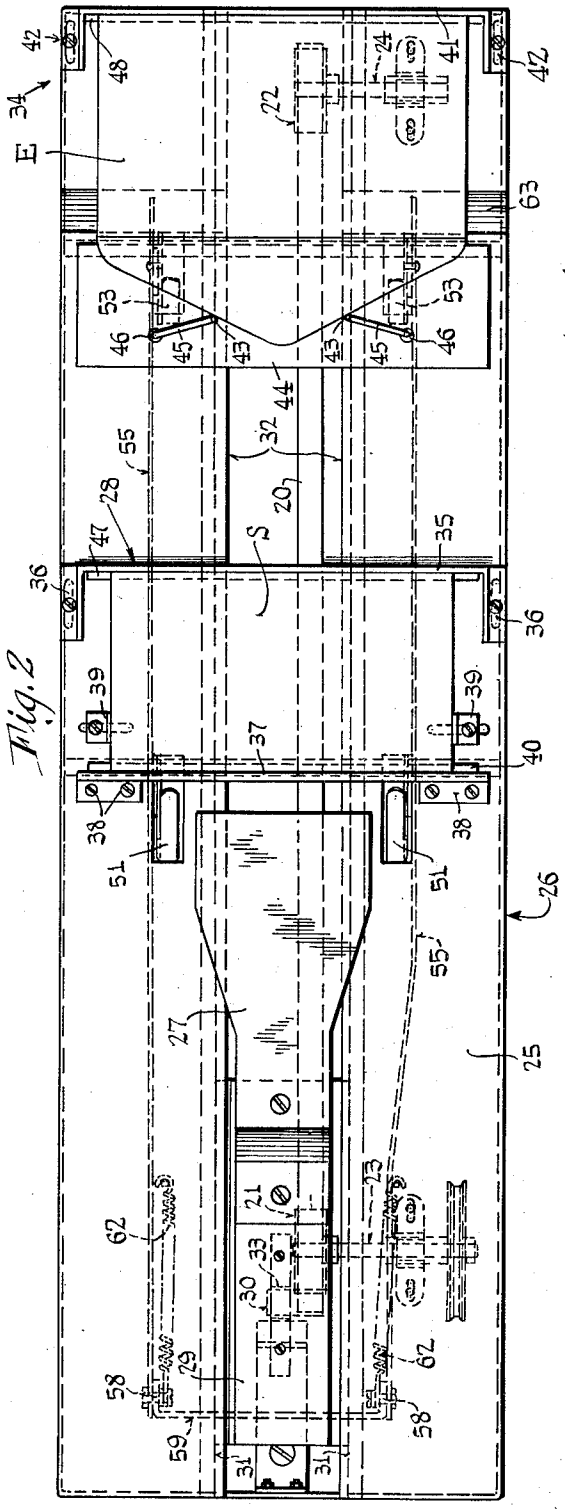


Fig. 2

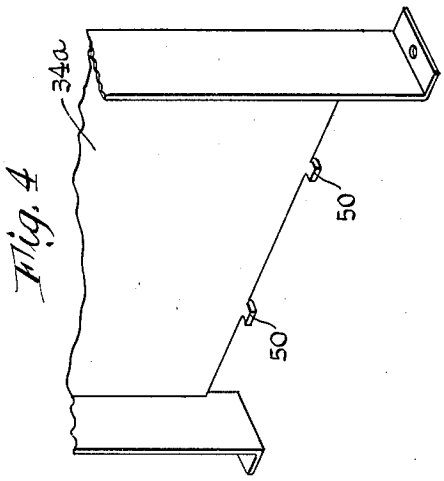


Fig. 4

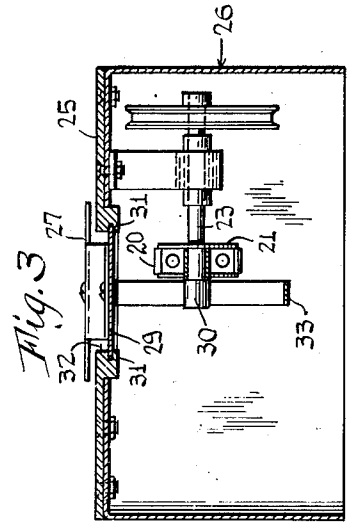


Fig. 3

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Fig. 5

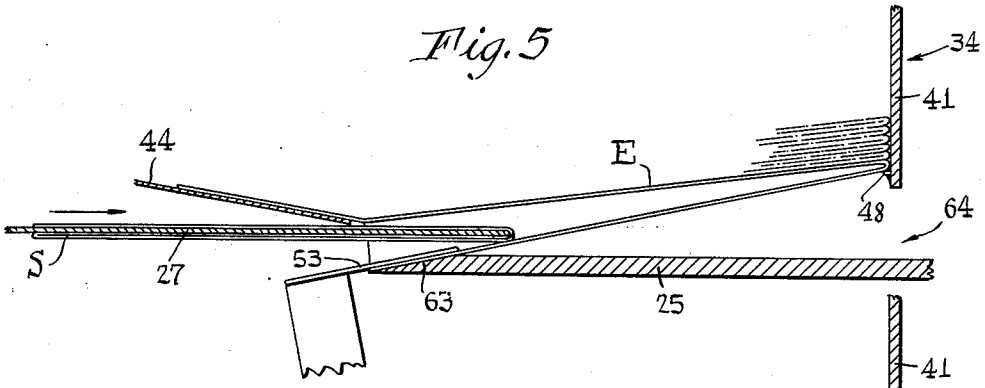


Fig. 6

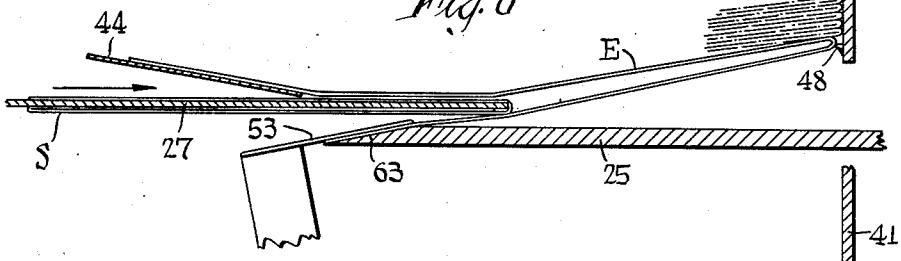


Fig. 7

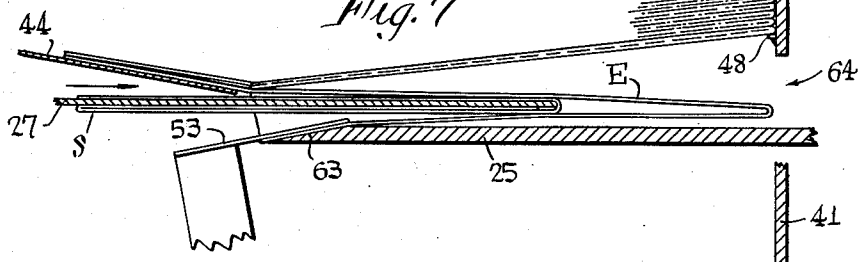
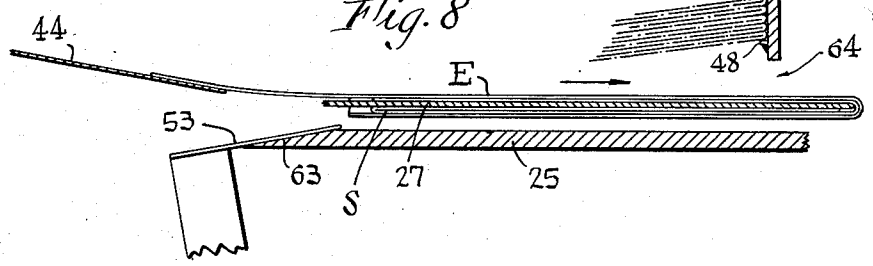


Fig. 8



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Fig. 9

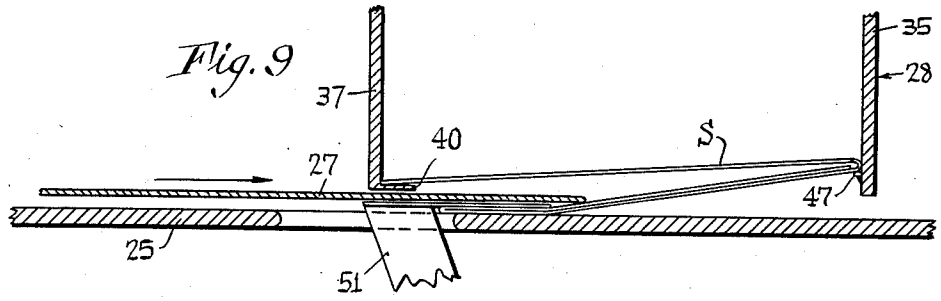


Fig. 10

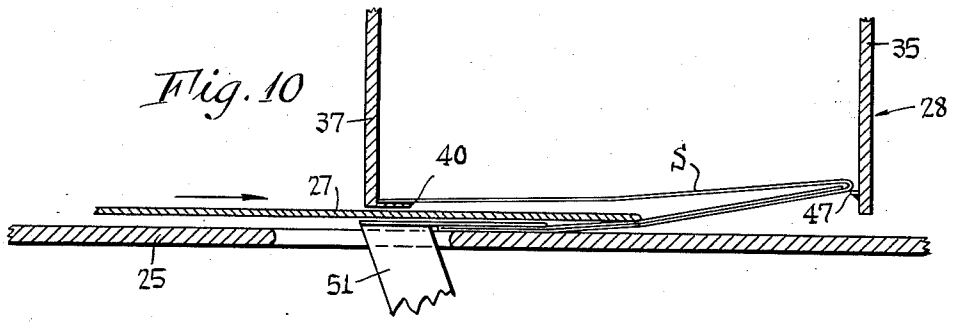


Fig. 11

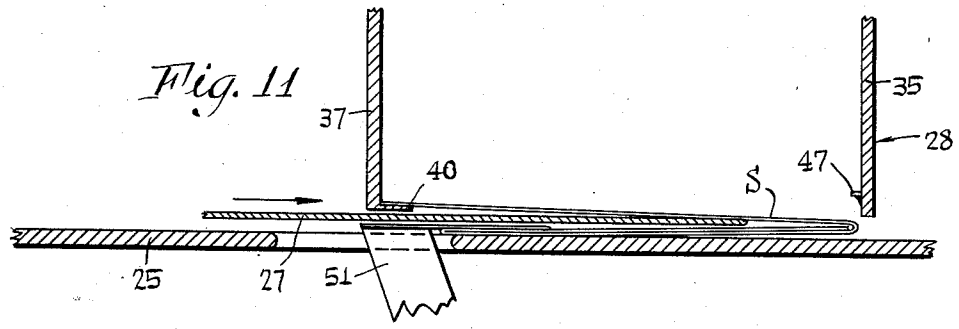
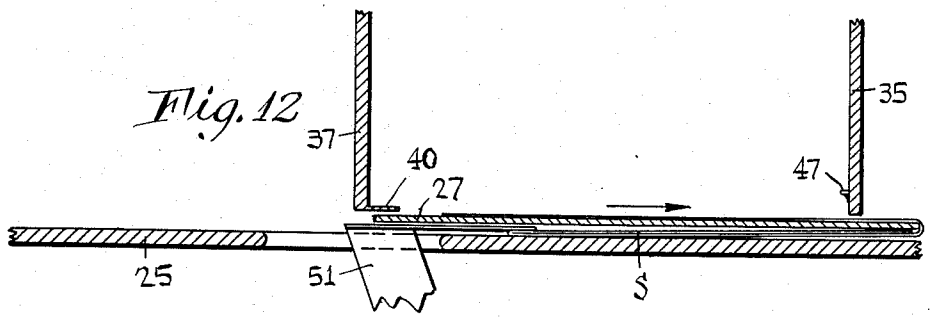


Fig. 12



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WORKPIECE STRIPPING DEVICE

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Application August 25, 1953, Serial No. 376,297

5 Claims. (Cl. 53—189)

This invention relates to envelope stuffing and more particularly to stripping the ultimate workpiece or folded element, such as an envelope or folded sheet, from a stack of such folded elements during each cycle of operation. The stripping operation of this invention is also particularly adapted for use with a stuffing machine of the type disclosed in Thompson Patent No. 2,384,506.

In said Thompson patent a reciprocating ram passes within an open fold portion in the lowermost folded sheet of a stack of sheets and, upon engaging the closed fold end thereof, the sheet is stripped and moved by the ram beyond yieldable separator fingers positioned in the path of the closed fold end. The fingers are arranged to obstruct feeding of the above adjacent sheet which might otherwise result through frictional contact with the moving sheet. Upon passing beyond the separator fingers, the folded sheet is moved by the ram into an open mouthed envelope, the lowermost of a stacked supply of envelopes, and, upon engaging the envelope end, the envelope moves with the ram beyond another set of separator fingers to a collecting position.

It is an object of the present invention to provide a marginal restraint for the ultimate workpiece of a stack of folded workpieces, and to separate the workpiece from the stack by a force exerted through the open end and against the interior surface of the folded workpiece, and having a component normal to the workpiece so as to separate it from the next adjacent workpiece.

In the present invention it is also an object to provide for stripping the ultimate workpiece from a stack of folded workpieces by causing relative movement between a ram and the stack, having at least a component normal to the ultimate workpiece while the ram moves edgewise adjacent the end of the stack.

It is another object to effect stripping of the end workpiece from a stack by ram engagement with the workpiece in a manner which will substantially displace the end workpiece from contact with the stack before the workpiece is advanced by the ram.

It is another object of the invention to stack folded workpieces in a manner which will maintain the closed fold end of the ultimate workpiece substantially spaced from the path of the ram, and the opposite or open end of the workpiece substantially in the plane of the ram for entry thereby, whereby stripping of the end workpiece from the stack is effected as the ram enters between the fold portions, engages the inner surface of the lower fold portion, and advances beyond the initial point of engagement. Particularly, it is an object to stack folded work pieces, in a manner which will maintain the folded or closed end of the lowermost workpiece elevated above the path of the ram and above the opposite or open end of said workpiece, whereby stripping of the lowermost workpiece from the stack is effected as the ram enters between the fold portions, engages the inside upper surface of the lower fold portion, and advances beyond the initial point of engagement.

It is another to support a restricted marginal portion of

the folded or closed end of the lowermost workpiece of a stack of workpieces at an elevated position above the normal plane of ram movement and the open end of the workpiece in the plane of ram movement, and to effect stripping of the supported portion of the lowermost piece from its support as the ram advances beyond the initial point of engagement with the elevated portion of the lowermost piece.

Still another object of the invention is the stuffing of envelopes with folded sheets in a manner such that a folded sheet is inserted into the open envelope mouth of the ultimate envelope of a stack simultaneously with the separation of the ultimate envelope from the next adjacent envelope, and restraining the envelope against movement laterally of the stack until the sheet has been fully inserted into the envelope.

With the above and other objects in view, which will appear as the description proceeds, the invention resides in the combination and arrangement of parts and in the details of construction hereinafter described and claimed, it being understood that various changes in the precise embodiment of the invention herein disclosed may be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawings a preferred embodiment of the invention is shown wherein:

Fig. 1 is a longitudinal sectional view through an envelope stuffing machine.

Fig. 2 is a plan view of Fig. 1.

Fig. 3 is a cross sectional view taken along the line 3—3 of Fig. 1.

Fig. 4 is a perspective view showing a modified arrangement of the end support for the envelope or folded sheet.

Figs. 5 through 8 are operational views showing the movement of a ram passing an insert into the open mouthed envelope, as in Fig. 5; the stripping of the envelope from its support while the insert movement continues to the end of the envelope, as in Figs. 6 and 7; and finally the ejection of the stuffed envelope, as in Fig. 8.

Figs. 9 through 12 show a series of operational views similar to Figs. 5–8, but for the stripping and advancement of a folded sheet.

Referring now to the drawings in detail, the stuffing machine operates in the same manner as the machine disclosed in the aforesaid Thompson patent and includes a driven belt 20 carried by pulleys 21, 22, which pulleys are supported on shafts 23 and 24 respectively. The shafts are supported within suitable bearings suspended beneath a deck 25 of a housing 26 which generally encloses the operating mechanism of the device.

A ram 27 is adapted to move along a horizontal plane above the surface of the deck 25 toward a magazine 28 having a supply of folded sheets S therein to effect the pickup and conveyance of the lowermost sheet, then the insertion of said sheet into an open mouthed envelope E upon the further advance of the ram. Said ram is secured to a slide 29 which is freely guided in horizontally disposed ways 31—31 arranged at either side of an opening 32 running longitudinally through the deck 25.

A yoke 33, secured to the slide 29, extends downwardly therefrom adjacent the belt 20 and has a drive connection with said belt through a pin 30 which is secured to the belt and extends within the yoke 33. Hence the belt, upon being driven, will cause the yoke 33 and ram 27 to move alternately forward and backward in a reciprocating order.

Above the deck the said magazine 28 and an envelope magazine 34 are provided for the support of the sheets and envelops respectively. The sheet supporting magazine comprises a rear wall 35 secured to the deck 25, as at 36. A front wall 37 is also secured to the deck 25, as at 38. Adjustable side guides may also be provided, as shown at 39—39.

The envelope magazine **34** comprises a rear wall **41**, secured to the deck, as at **42**, similar to the magazine **28**, but does not require a front wall. Instead, adjustable guide rods **43** extend vertically upward from an envelope flap supporting platform **44**. Said guide rods have crank arms **45** which are arranged for pivotal adjustment about fixed centers **46—46**. Free movement of the ram is permitted through space at the lower portion of the magazine walls and beneath the flap supporting platform **44**.

The support of the lowermost sheet of a stack of folded sheets is provided by means of a shelf or ledge **40** arranged perpendicular to the inner front wall **37**. An extended end of one fold of the said lowermost folded sheet normally rests on the ledge **40**. Another shelf or ledge **47** is provided on the inner surface of the rear wall **35** but is located at a plane above the plane of the ledge **40** and provides a support for the folded or closed end of the lowermost folded sheet.

With regard to the support of the envelopes, the flap portion of the lowermost envelope lies on platform **44** but the opposite end of the envelope will rest on a shelf or ledge **48** projecting from the inner surface of the rear wall **41**. The position of the ledge **48** is in a plane above the plane of the top or face of the envelope at the mouth position **49** thereof. If desired, the ledge **47** or **48** may comprise a plurality of short projections as indicated at **50** on the substitute rear wall **34***a* shown in Fig. 4.

Means is also included for entering and spreading the open end of the folded sheet and for opening the mouth of the envelope prior to the movement of the ram **27**. Said means includes a pair of claws **51**, pivotally mounted at **52** below the sheet magazine **28**, and a pair of claws **53**, pivotally mounted at **54**, below the envelope magazine **34**. Connecting bars **55—55** are joined with the claws **51** and **53** at **56** and **57** respectively. The bars **55** continue toward the left or front wall of the machine housing and are pivotally joined at **58** with a crossbar **59**. Said crossbar **59** has a leg **60** which carries a cushion **61** projecting in the path of the yoke. Said crossbar **59** is also normally urged to the right, as viewed in Fig. 1, by means of springs **62—62**, whereby, upon movement of the ram toward the magazines **28** and **34**, the bars **55—55** will be urged in the same direction to effect rocking of the claws **51** and **53** to the right into operative position. A cushion **61***a* is also positioned in front of the leg **60** and cooperates with the cushion **61** in absorbing shock which develops when the yoke **33** effects return movement of the crossbar **59** and bars **55—55**.

As stated, the invention relates to stripping of the ultimate folded sheet or envelope from the stack of either folded sheets or envelopes, and the figures which best disclose this operation in particular will be found to be Figs. 5 to 12. Figs. 5 to 8 relate to the stripping of an envelope E and show a conveying and force producing agency such as the ram **27** as it comes from the previous station carrying a sheet S to be stuffed into the envelope at the same time that the envelope is stripped from its stack. In Fig. 5 the ram **27** is shown as entering the open mouth of the envelope after the mouth has been opened by the claws **53**. Said claws also cause the back wall of the envelope to be held firmly against a portion **63** of the deck **25**. With the closed end of the envelope resting on the ledge **48**, at a plane above the plane of the ram, the back wall of the envelope is inclined upwardly from the point of claw grip to the ledge **48**. As the ram advances and the leading end thereof reaches the inside surface of the back wall of the envelope, Fig. 5, the continued movement of the ram will effect a camming action against the inclined envelope wall and exerts a force thereagainst to move the closed end of the envelope downwardly, the same from the ledge, and separate it from the next adjacent envelope while stripping, as is about to occur in Fig. 6. By the time the ram has advanced to the position of Fig. 7, the envelope will have been entirely stripped from the ledge and will now be positioned in the plane of the ram opposite an

opening **64** in the rear wall **41** and substantially out of contact with the next envelope in the stack. The ram movement will then continue without further envelope movement until, upon reaching the closed end of the envelope and thus completing the insertion of the folded sheet, it removes the envelope from the grip of the claws **53**. Envelope feed by means of the ram movement then continues until the yoke driving pin **30** reaches a position at the right end of the belt **20**, at which time the envelope will have advanced beyond the wall **41**. Upon reversal of the ram drive the envelope, with folded sheet therein, will have flown from the end of the ram by momentum or may be stripped in any suitable manner.

In the arrangement according to this invention, the lowermost envelope is withdrawn downwardly from the stack while the next lowermost envelope remains captive within the magazine with the closed end thereof supported by the narrow margin-engaging ledge **48**. In contrast, when the lowermost envelope is moved from beneath the stack in the Thompson machine, frictional drag against the next lowermost envelope occurs, sometimes to a degree which is sufficient to cause the above adjacent envelope to move with the envelope being withdrawn by the ram.

From the immediately foregoing detailed description taken in connection with Figs. 5 to 8, it can be seen that what occurs during stripping of the envelope E from the stack is a relative displacement between the ram and the body of the stack in a direction normal to the bottom envelope of the stack. While the ram is actually guided in a straight line, this line is at an angle to the bottom envelope of the stack, so that, in the form of the invention illustrated, this displacement is a substantial component of the ram movement and occurs simultaneously with the movement of the ram laterally of the stack.

In Figs. 9 through 12, the several steps of the stripping of the lowermost folded sheet from a stack of sheets is shown in a manner similar to the stripping of the envelope, but inasmuch as the operation is substantially identical to that described for envelope stripping, further description is not believed necessary.

What is claimed is:

1. In combination in an envelope stuffing machine having a horizontally movable workpiece conveying member; means for supporting a stack of superimposed folded workpieces having one opened end and an opposite closed end, the open end of the lowermost workpiece being disposed in the path of the conveying member and the closed end thereof being supported above the path of the conveying member, means entering the open end to effect spreading and clamping of the lower portion of the workpiece, the conveying member upon entering the open end of the folded workpiece engaging the lowermost inner surface thereof to effect stripping of the closed end from its support and then effecting withdrawal of the workpiece from the clamping means during conveyance of the workpiece.

2. In an envelope stuffing machine, the combination with a horizontally movable ram and means for supporting an envelope at the flap end thereof with its mouth open in the path of the ram, of a support upon which rests the end opposite the flap, said support being positioned above the path of the movable ram to maintain the envelope in an inclined position, and means movable into the envelope mouth to effect spreading and clamping of the rear wall of the envelope whereby, as the ram passes through the mouth of the envelope the inclined inside rear wall thereof will be engaged and deflected downwardly by the ram to effect stripping of said envelope from its support, then convey the envelope in the direction of the ram movement to an ejecting position.

3. An envelope stuffing machine including in combination, a horizontally movable ram; a magazine for supporting a stack of open flapped envelopes and comprising front guide members and back guide members engaging

the flap and bottom edges of the envelopes respectively; means for supporting the open flap portion of the lowermost envelope; means movable within the mouth of the lowermost envelope to spread said mouth to embrace the plane of ram movement and to effect clamping of the rear wall thereof; and a shelf extending inwardly from the back guide and at a plane above the plane of the ram to support the lowermost envelope at the rear edge thereof and with the envelope body in an upwardly inclined position, the ram, upon moving through the open envelope mouth engaging the lowermost inclined inner surface of the envelope to effect stripping of said bottom envelope edge from the shelf and moving said envelope from the stack.

4. An envelope stuffng machine including in combination a horizontally movable ram; a magazine for supporting a stack of folded sheets arranged with a long top fold providing a marginal overhang adjacent an open edge of the sheet; said magazine comprising front guide members and back guide members engaging the overhang and the folded or closed edges of the sheets respectively; means for supporting the overhand of the lowermost sheet; means movable beneath the overhang and between the portions of the folded sheet to effect spreading and clamping of the lower portion of the open end thereof while embracing the plane of ram movement; and a shelf extending inwardly from the back guide and at a plane above the plane of the ram to support the lowermost sheet at the closed edge thereof and with the lower portion of the sheet in an upwardly inclined position, the ram, upon moving through the opening at the overhang edge of the sheet engaging the inclined upper surface of the lower portion of the spread sheet to effect

stripping of the closed edge of the sheet from the shelf and moving said sheet from the stack.

5. An envelope stuffing machine comprising a horizontally movable sheet conveying ram; means for supplying sheets to said ram one at a time to be conveyed thereby; a magazine for supporting a stack of open flapped envelopes including means for supporting the open flap of the lowermost envelope; means movable within the mouth of the lowermost envelope to spread said mouth to embrace the plane of ram movement and to grip the envelope and retain it frictionally against movement; a shelf extending inwardly from the magazine above the plane of ram movement to support the lowermost envelope of the stack by its closed margin with the envelope body in a position inclined upwardly towards said margin; and means to reciprocate the ram in said path, the ram, upon receiving and moving a sheet through the envelope effecting stripping of said bottom envelope from the shelf by engagement with the inclined inner surface of the lowermost wall of the envelope, moving the folded sheet into completely inserted position in the envelope, and ejecting the filled envelope from the stack.

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