Jan. 5, 1960 W. RITZERFELD ET AL 2,919,640

PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 1

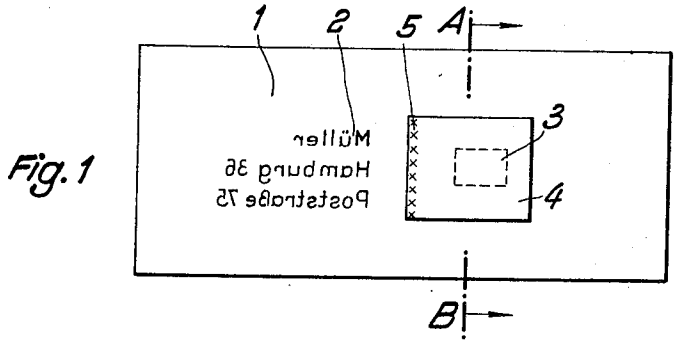


Fig. 1

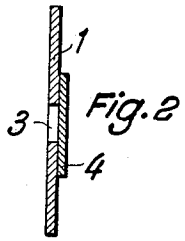


Fig. 2

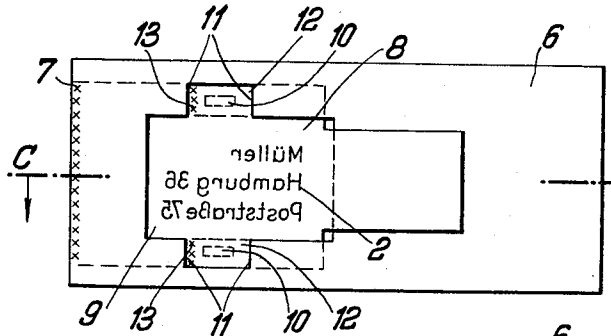


Fig. 3

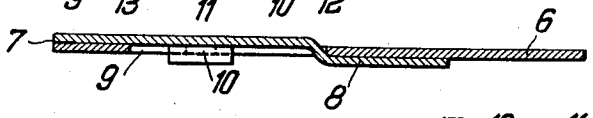


Fig. 4

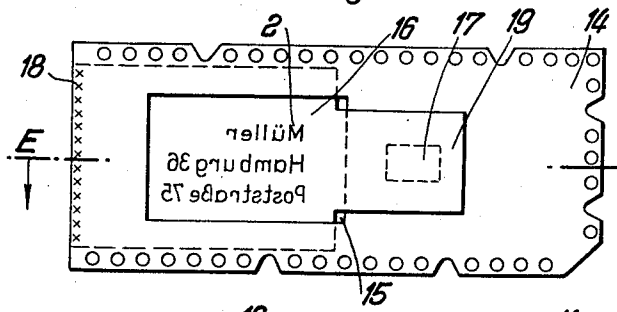


Fig. 5

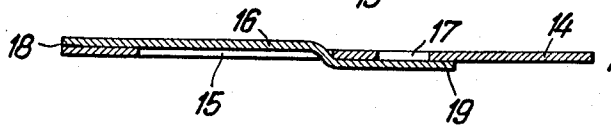


Fig. 6

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Jan. 5, 1960 W. RITZERFELD ET AL 2,919,640

PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 2

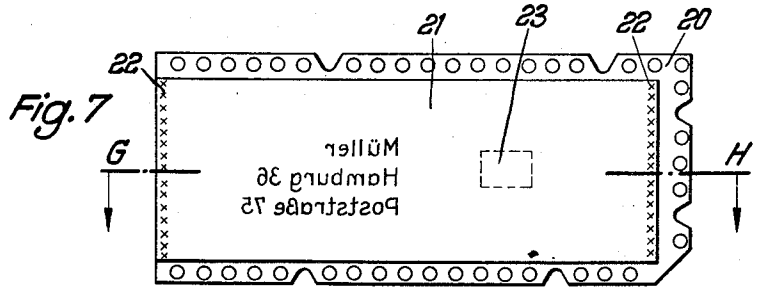


Fig. 7

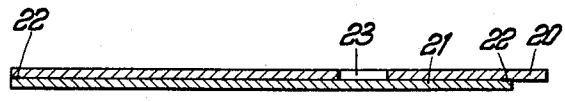


Fig. 8

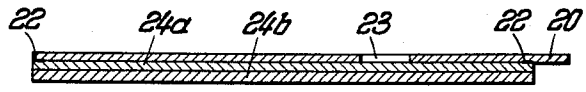


Fig. 9

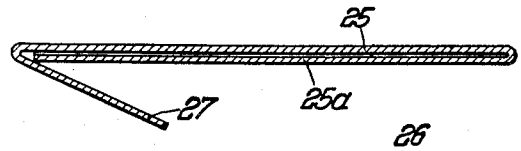


Fig. 10

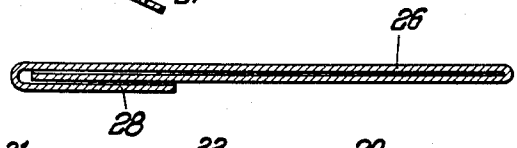


Fig. 11

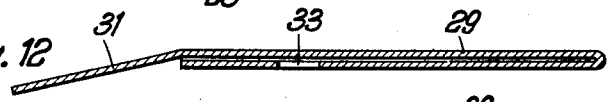


Fig. 12

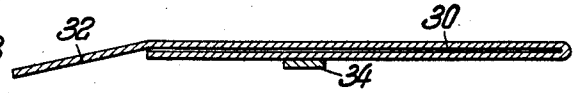


Fig. 13

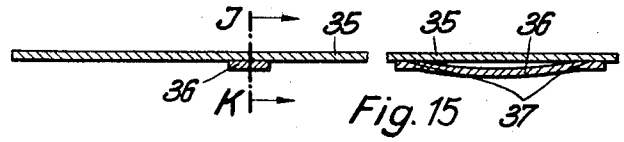


Fig. 14

Fig. 15

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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 3

Fig. 16

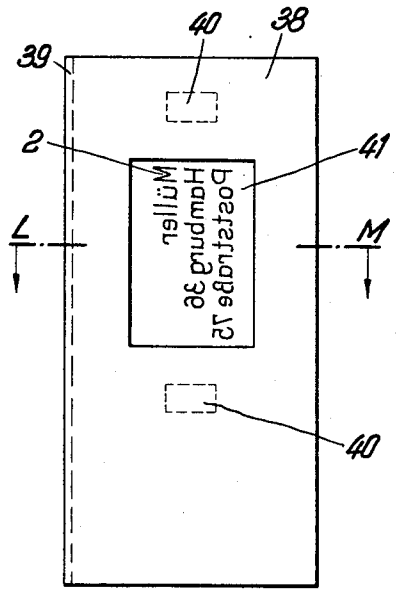
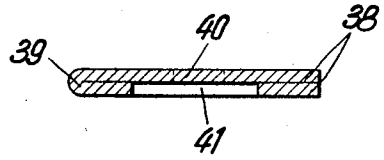


Fig. 17



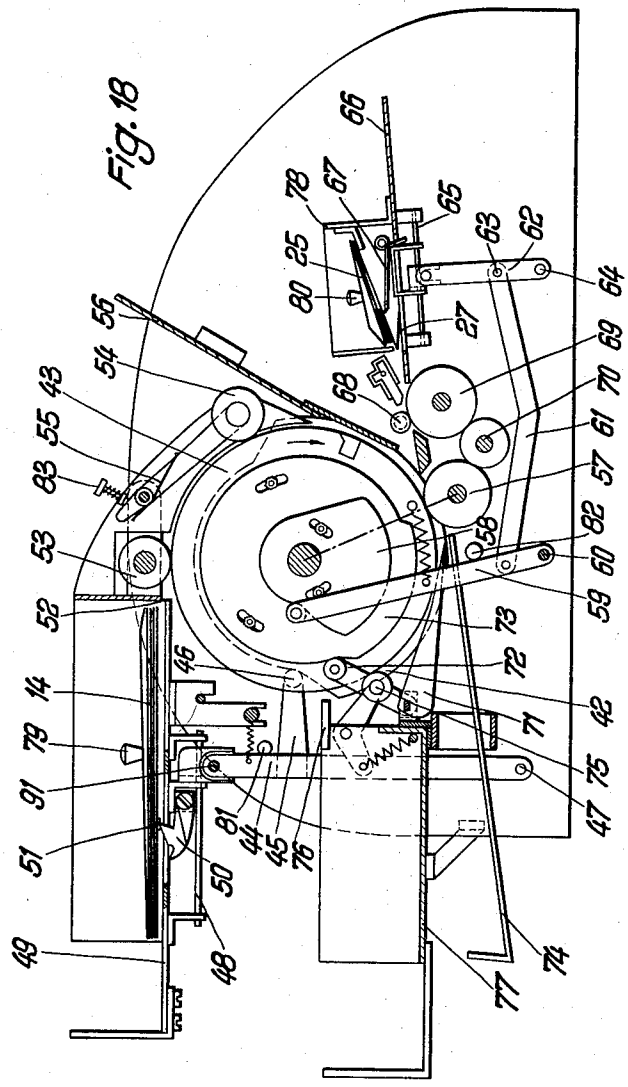
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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 4

Fig. 18



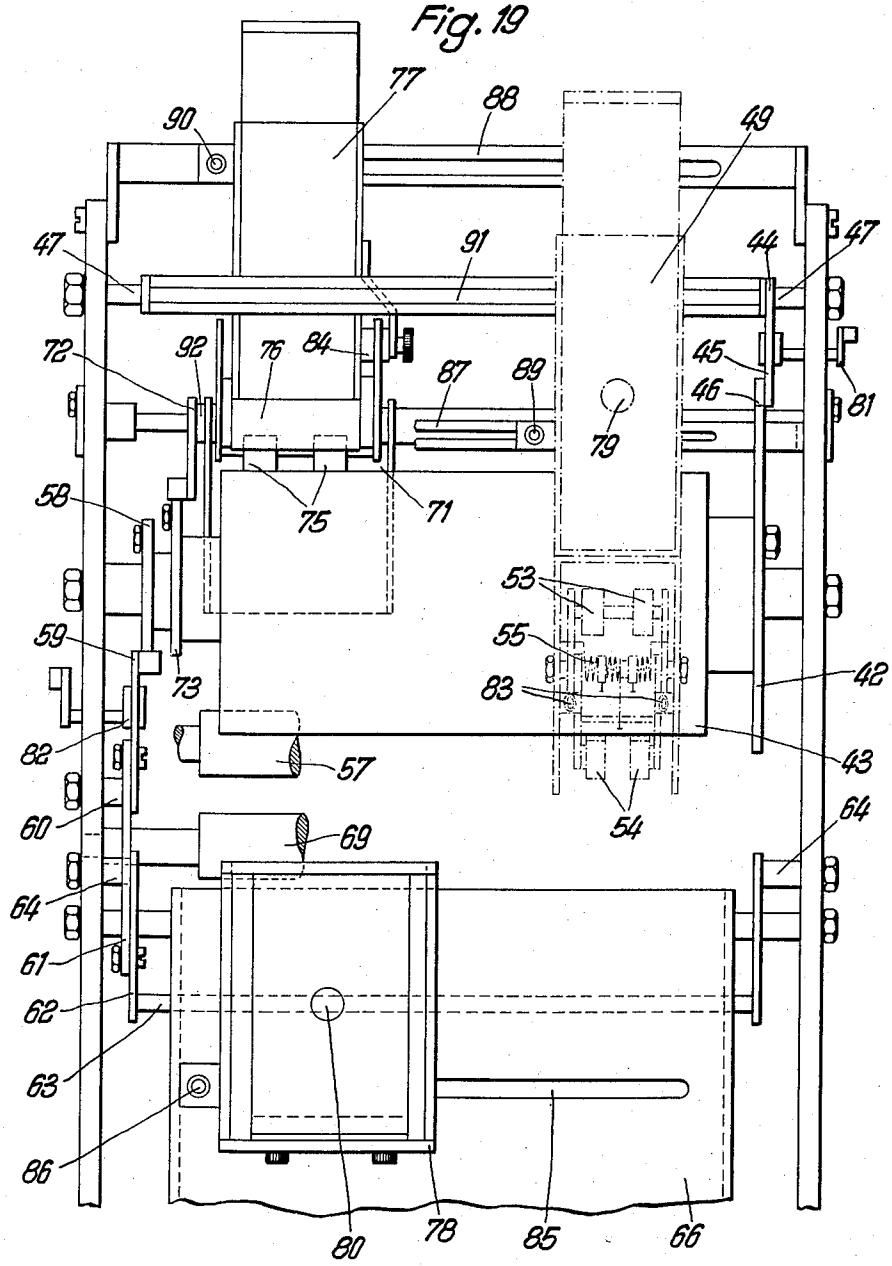
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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 5

Fig. 19



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Jan. 5, 1960 W. RITZERFELD ET AL 2,919,640

PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 6

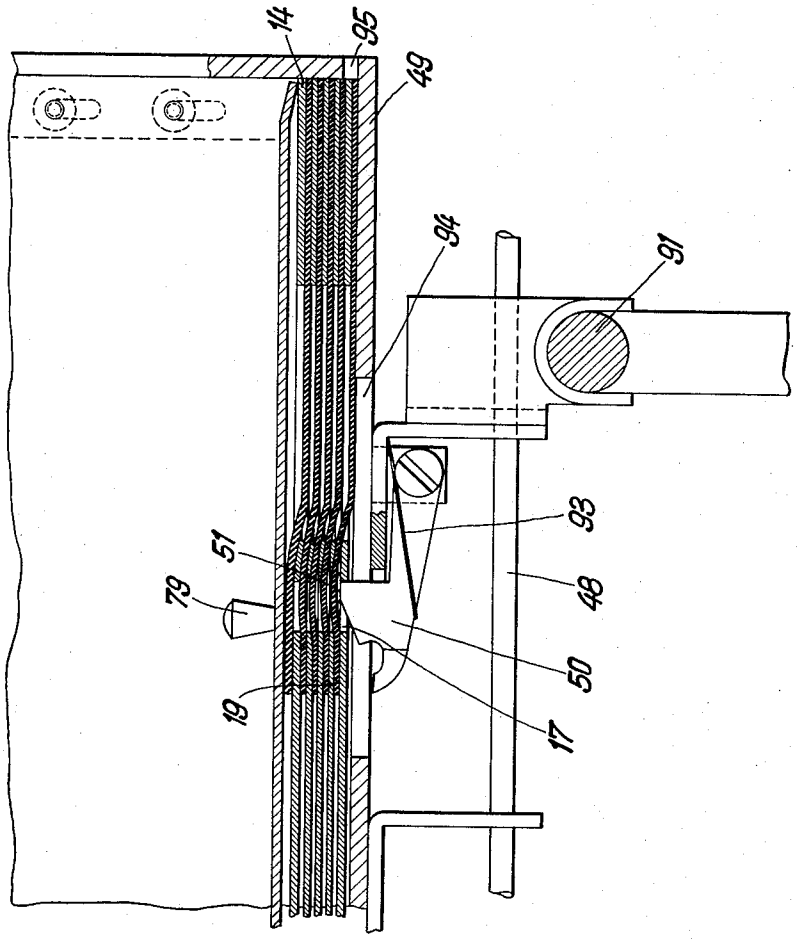


Fig. 20

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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 7

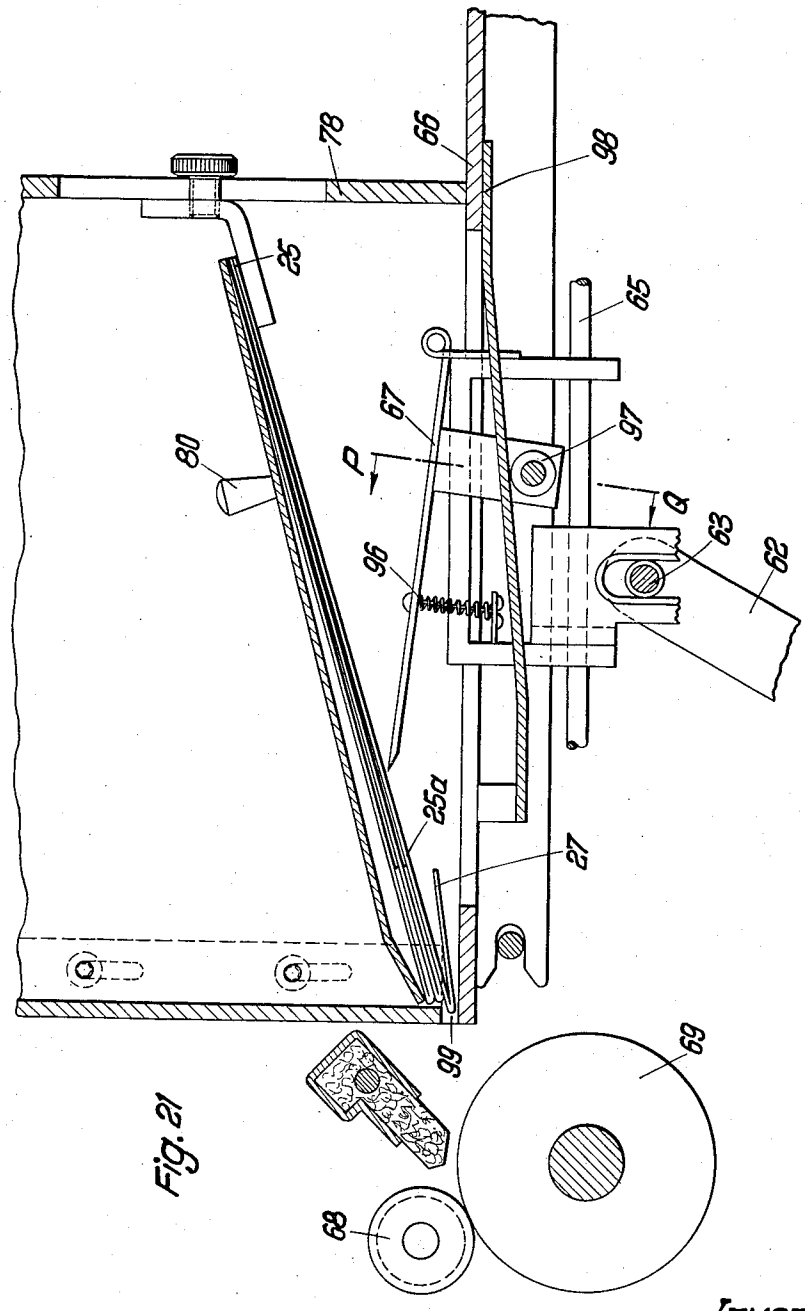


Fig. 21

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Jan. 5, 1960 W. RITZERFELD ET AL 2,919,640
PRINTING DEVICE AND FLAT STACKABLE ELEMENTS
Filed Feb. 14, 1957
11 Sheets-Sheet 8

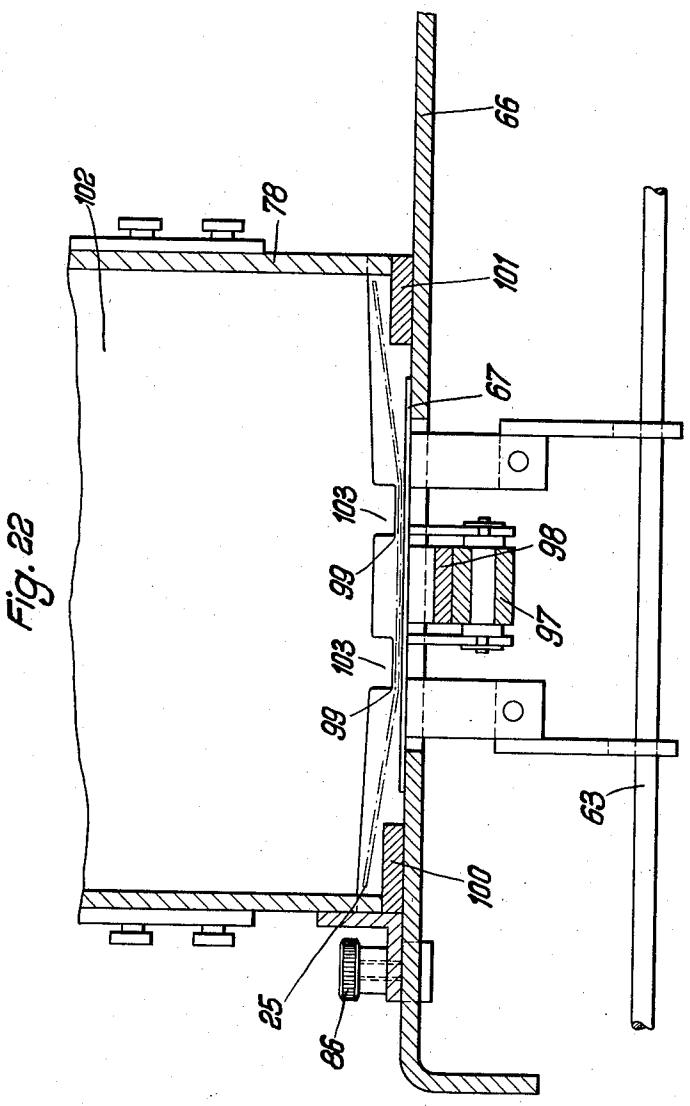


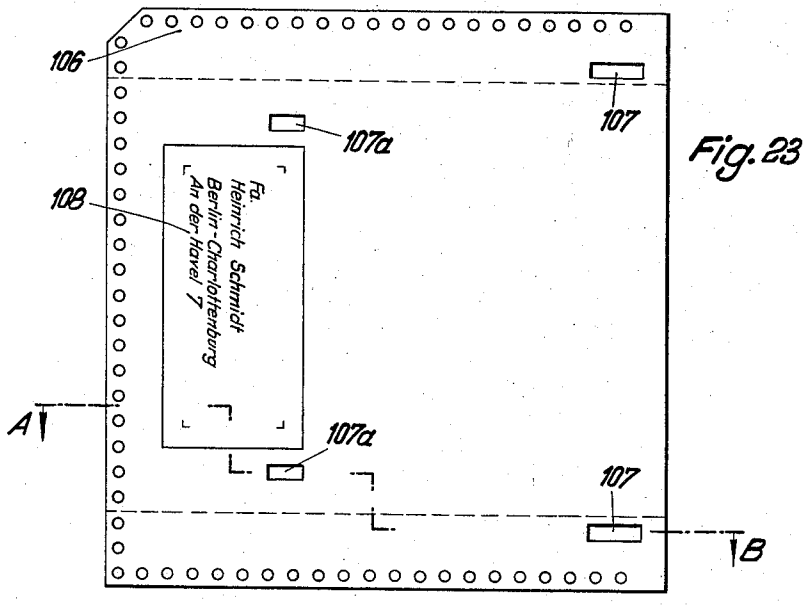
Fig. 22

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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 9



section A-B

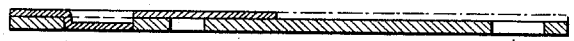
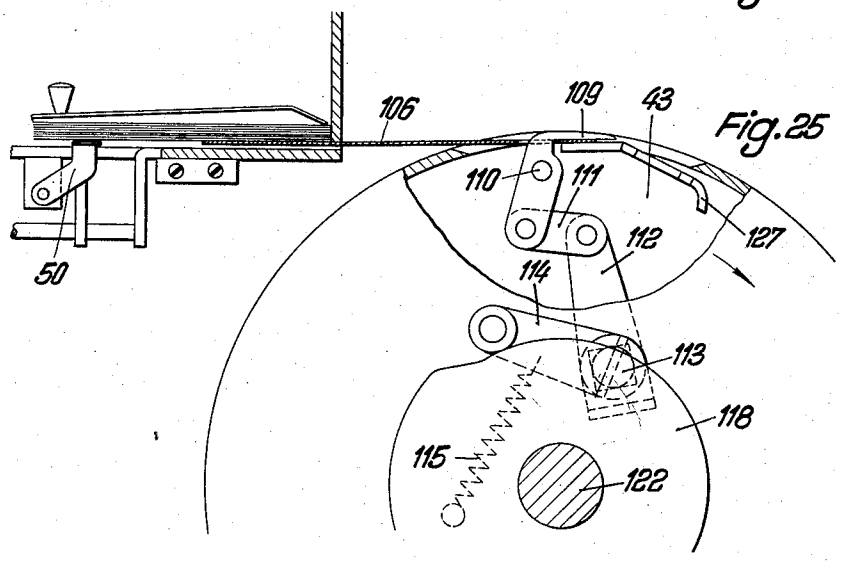


Fig. 24



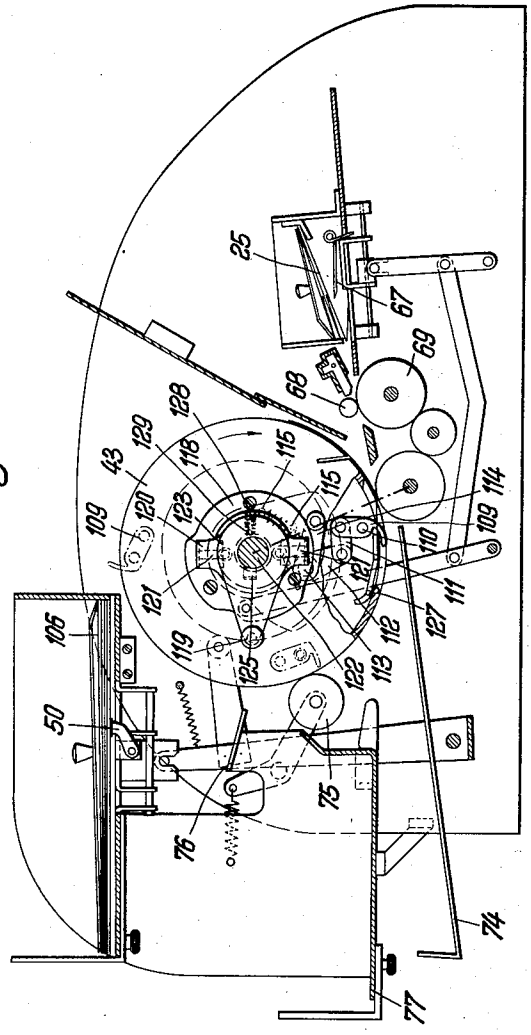
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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 10

Fig. 26



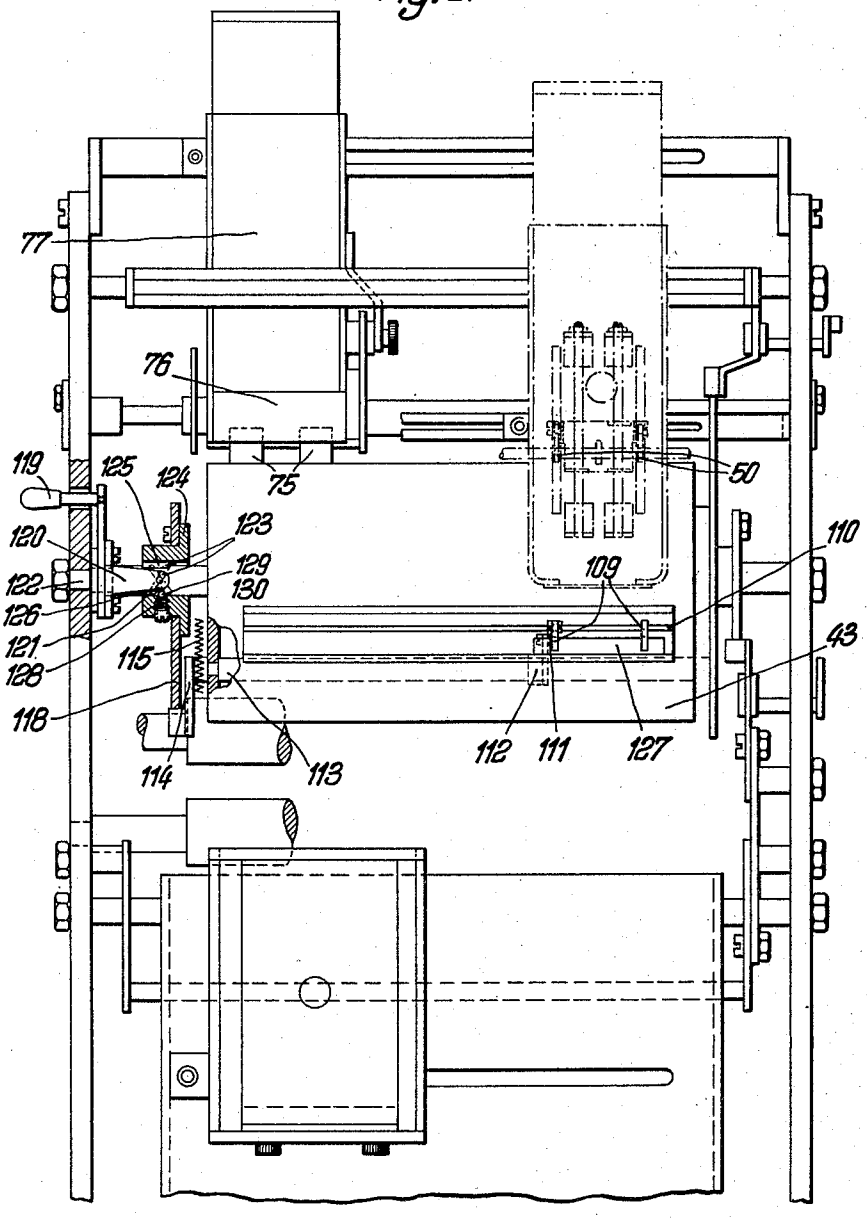
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PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Filed Feb. 14, 1957 11 Sheets-Sheet 11

Fig. 27



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United States Patent Office 2,919,640
Patented Jan. 5, 1960

2,919,640

PRINTING DEVICE AND FLAT STACKABLE ELEMENTS

Wilhelm Ritzerfeld, Berlin-Dahlem, and Gerhard Ritzerfeld, Berlin-Grunewald, Germany

Application February 14, 1957, Serial No. 640,120

Claims priority, application Germany February 16, 1956

10 Claims. (Cl. 101—53)

The present invention refers to printing devices, and more particularly to printing devices in which printing forms are used which constitute or are part of individual flat stackable elements to be consecutively fed into the printing device for consecutively printing the contents of the individual printing forms on individual imprint-receiving elements fed separately and consecutively into the same device. A specific example of this type of printing devices is an addressing machine.

The invention also refers to flat stackable elements adapted to be used as printing forms or to carry the latter so as to be consecutively fed into a printing device of the type set forth.

It is one main object of this invention to provide for a flat stackable element which can serve as a printing form or can be attached to a printing form, and which includes means for interengagement with feeding means forming part of a printing device, so that each of a plurality of such elements may be fed singly from a stack of elements to the printing means of a printing device.

It is another object of this invention to provide for a flat stackable element of the type set forth and comprising at least two layers of material, one of which includes the means for interengagement with a feeding device while the other layer serves to protect a flat element of identical type superimposed on this second layer from being engaged by the feeding means engaging the first-mentioned element by separating the superimposed flat element from the feeding means.

Another main object of the invention is to provide for a printing device comprising magazine means and feeding means for at least one type of flat stackable elements as set forth arranged in such a manner that at least one type of flat stackable elements is automatically and consecutively fed to the printing means of the device.

A further object of the invention is to provide for a printing device of the type set forth which is composed of comparatively simple and sturdy elements which assure reliable and efficient operation.

With above objects in view, a flat stackable element according to the invention includes a separating layer and a projecting shoulder on one side of the separating layer adapted to be engaged by a feeding member from the side remote from the protective layer so that the feeding member is separated by the separating layer from another identical stackable element which is in a stack of these elements superimposed immediately upon the protective layer of the first-mentioned element.

In another embodiment of the invention, a printing form is attached to a supporting layer with a portion of the printing form covering an opening in the supporting layer so that an edge of this opening is adapted to be engaged by a feeding member and said portion of the printing form serves as separating layer, while another opening in the supporting layer located opposite to the printing portion of the printing form makes the latter accessible through the second opening for carrying out the printing operation.

In still another embodiment of the invention, flat stackable elements of the general type set forth include means forming a shoulder projecting from one layer of material forming part of the flat element so that this shoulder is adapted to be engaged by a feeding member while the layer of material is the separating layer.

A printing device according to the invention comprises in combination, a printing drum and a pressure roller cooperating with the printing drum along a printing line; the device further comprises at least one magazine means for stacking a set of flat stackable printing elements having a protective layer and a projecting shoulder on one side of the protective layer, feeding means including a reciprocable feeding member adapted to engage the shoulder of the outermost flat printing element and to feed the same to the printing drum while the protective layer of the outermost printing element separates the feeding member from the printing element adjacent to the outermost element, engaging means for engaging the fed printing element and for holding the same on the printing drum during rotation of the same and linkage means connecting the feeding means and the printing drum for operation in timed sequence with respect to each other.

In another preferred embodiment of the invention a printing device of the type set forth comprises second magazine means and second feeding means for handling flat stackable imprint-receiving elements in the same manner as the printing elements, with linkage means connecting the second feeding means also with the printing drum for operation in timed sequence.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing, in which:

Fig. 1 is a printing form card in plan view, carrying reproduceable lettering in reverse;

Fig. 2 is a cross-section taken along line A—B of Fig. 1;

Fig. 3 is a plan view of a printing element with a printing form attached thereto;

Fig. 4 is a cross-section taken along C—D of Fig. 3;

Fig. 5 is a plan view of a card having perforations along its edges and a printing form attached thereto;

Fig. 6 is a cross-section taken along line E—F of Fig. 5;

Fig. 7 is a plan view of a card having perforations along its edges and a printing form attached thereto along two opposite edges;

Fig. 8 is a section taken along line G—H of Fig. 7;

Fig. 9 is also a section taken along line G—H of Fig. 7, however showing a permanent printing form added as a third layer;

Fig. 10 is a section through an envelope with its flap partly open;

Fig. 11 is a similar section through an envelope with its flap in closed position;

Fig. 12 is a section through an envelope with its flap wide open and including a slot for feeding;

Fig. 13 is a section through an envelope having a strip of material attached for forming a shoulder;

Fig. 14 is a section through a flat printing element with a strip of material attached for forming a shoulder;

Fig. 15 is a cross-section taken along line J—K of Fig. 14;

Fig. 16 is a plan view of a printing element showing reproduceable lettering in reverse and forming an integral unit with a protective layer;

Fig. 17 is a cross-section taken along line L—M of Fig. 16;

Fig. 18 is a side view of a rotary duplicating machine including addressing devices, the left side wall being omitted for showing the inner mechanism;

Fig. 19 is a top view of the printing device according to Fig. 18;

Fig. 20 is a fractional side view of the device according to Fig. 18, illustrating the feeding means for printing elements according to Figs. 1 to 9 and 14;

Fig. 21 is another fractional side view of the machine according to Fig. 18, illustrating on a larger scale the feeding means as provided for envelopes or the like according to Figs. 10 to 13;

Fig. 22 is a fractional section of the device shown in Fig. 18, the section being taken along line P—Q of Fig. 21, for illustrating details of the feeding means for envelopes;

Fig. 23 is a plan view of a printing element including openings adapted to be engaged by feeding means and in addition including separate openings adapted to be engaged by clamping means for holding the printing element on the printing drum;

Fig. 24 is a cross-section through the printing element according to Fig. 23;

Fig. 25 is a fractional view of the means for feeding the printing elements to the printing drum and of the means for clamping the elements to the drum;

Fig. 26 is a side view of a printing device, the left side wall being omitted in order to show the inner mechanism; and

Fig. 27 is a top view of the device according to Fig. 26.

In the embodiment of the invention as illustrated by Figs. 1 and 2, a printing element for printing addresses comprises a card **1** which constitutes the printing form since it carries reproduceable lettering **2** in reverse. It is provided with a cutout or opening **3** which is covered by a cover flap **4** attached to the card **1** as shown at **5**. As will be described later, an edge of the opening **3** is adapted to be engaged by a feeding member **50** from the side opposite to the flap **4** which serves as separating layer preventing the feed member **50** from engaging the adjacent printing element in a stack of elements. Therefore, whenever the feed member **50** engages one printing element of a stack, only this one element will be removed from the stack and fed to the printing device of which the feed member **50** is a part.

Figs. 3 and 4 show another printing element **6** constituting an addressing card to which the printing form with reversed reproductive lettering **8** is attached at **7**. The card or support layer **6** has an opening or cutout **9** which is so located that the printing portion **2** of the printing form is not obstructed by the material of the card **6**. This offers the advantage that the lettering **2** does not rub against an adjacent or following printing form during the automatic feeding operation. During the actual printing operation the imprint-receiving sheet is pressed against the printing form in such a way that the reproductive area **2** contacts the sheet through the opening **9** for making the desired imprint. The card or support layer **6** has two additional cutouts or openings **10** which are covered by a portion of the printing form **8**. For this purpose the printing form **8** is cut in four places marked **11** so that flaps **12** are obtained which are pulled from the side of the card **6** where the printing form **8** is attached, to the other side and folded down so as to be attached at **13** to the card **6** and to cover the openings **10**. The two openings **10** are adapted to be engaged by two feed members **50** which will be described further below. By providing two openings **10** and two feed members the printing element **6** is sure to be maintained in straight position during the feeding operation. It should be noted that the cementing areas **7** and **13**, respectively, holding different edges of the printing form **8**, are located on opposite sides of the support layer **6**.

Figs. 5 and 6 show a printing element comprising a card or support layer **14** having a number of perforations along its outside edges and a cutout or opening **15**. A printing form **16** with reverse reading reproductive lettering **2** is attached by cementing at **18** to the card **14** so that the lettering **2** is opposite the opening **15** and accessible through this opening during the printing operation. The card **14** has a second opening **17** which is adapted to be engaged by a feeding member **50**. An extension or flap **19** of the printing form **16** is pulled through the opening **15** from one side of the card to the other and spread over the latter so as to cover the opening **17**. In this manner the flap **19** serves as a separating layer to separate the feed member **50** when engaging the opening **17**, from engaging the adjacent printing element. The free end **19** of the printing form is purposely not attached to the card **14** so that the flap may yield a little when the feed member **50** engages the element. It is generally advisable to attach printing forms with reverse lettering only at one side, i.e. along one edge facing in the feeding direction whereby a satisfactory imprint is favored and wrinkling of the printing form is avoided.

The use of cards with marginal perforations as shown in Figs. 5 and 6 as supporting layers of printing elements offers the advantage that whenever certain printing elements are needed out of a great plurality thereof, the selection of specific cards carrying a specific lettering, is greatly simplified.

Figs. 7 and 8 show a card or supporting layer **20** also having marginal perforations and having attached to it a printing form **21** carrying a reverse reading reproductive lettering and attached by cementing along two opposite edges **22**. The card **20** has an opening or cutout **23** adapted to be engaged by a feed member **50** while the printing form **21** acts as protective layer for separating the feed member **50** from an adjacent printing element.

The same type of a card **20** as illustrated by Figs. 7 and 8 may also be provided, as shown in Fig. 9 with a permanent printing form **24** which may consist of a paper foil **24***a* which in turn is connected with a metal foil **24***b*. This metal foil may be treated by an electrolytic process, but instead of the just-mentioned combination of paper and metal foil other printing foils made only of metal or synthetic resin may be used which may be treated for lithographic reproduction.

Figs. 10 and 11 illustrate in cross-section envelopes **25** and **26**, respectively. In the case of Fig. 10, where the flap **27** of the envelope is partly open, the envelope, being also a flat stackable element, can be fed by means of a feeding member **67** engaging the envelope by reaching into the space between the layer **25***a* and the flap **27**. In this case, the flap **27** constitutes the projecting shoulder adapted to be engaged by the feeding means. In the case of Fig. 11 where the flap **28** is folded tight against the envelope **26** the free edge of the flap **28** serves as shoulder for engagement by the feeding means.

Figs. 12 and 13 show also envelopes **29** and **30**, respectively, with their flaps **31**, **32**, respectively, stretched out in fully open position. In order to make these envelopes adapted for automatic feeding, the envelope **29** has a cutout or opening **33** in one of its two layers so that the opening **33** is adapted to be engaged by a feed member **50**. When the envelope is closed, the flap **31** covers the hole **33**. In the case of Fig. 13 a separate strip of material **34** is attached to one layer of the envelope so that one edge of the strip **34** constitutes a shoulder adapted to be engaged by a feed member. When the envelope **30** is closed the free edge of the flap **32** will fit exactly against the second edge of the strip **34**.

Figs. 14 and 15 illustrate a printing form **35** carrying a reverse reading reproductive lettering and has attached to it a strip of material **36**, cemented at its two opposite ends **37** so as to constitute a shoulder adapted to be engaged by a feed member **50** which may enter between the strip **36** and the printing form **35** so that the latter

acts as a separating layer separating the feed member from an adjacent printing element. It should be noted that envelopes may also be provided with a strip 36 as shown in Fig. 15.

In the case of Figs. 16 and 17 a printing form and a protective layer are one integral piece. The printing form 38 is provided on one side with a reverse reading reproductive lettering 2 and is folded back upon itself along the edge 39. The folded back portion has a large opening 41 which is located so that the lettering 2 is accessible through the opening 41. The folded back portion which contains the opening 41 serves at the same time as the protective layer of this printing element because it covers two cutouts or openings 40 in the first portion of this element. In this embodiment the reproductive printing surface of the printing form 38 is particularly well protected against rubbing during feeding operations because the printing surface is located at the bottom of the opening 41.

It should be understood that the essential features of the various printing elements and envelopes as examples of flat stackable elements are more or less interchangeable and can be varied to suit prevailing conditions. In particular, the position of the means offering a shoulder adapted to be engaged by a feed member, with respect to the reproductive printing surface of the printing form may be varied without departing from the basic idea of this invention. In certain cases the printing elements or other flat elements may be stacked with the above-mentioned shoulder located on the lower side of each individual element so that the feed member has to engage from underneath and remove from the stack always the lowermost element. In certain other cases the arrangement may be reversed so that the feed member removes from the stack always the uppermost element.

It is particularly of advantage to use address cards having the features described above i.e. a feeding shoulder or an opening with an edge constituting a feeding shoulder, and a second layer serving as a protective layer in the feeding operation, said cards being also provided with a reverse reading reproductive lettering. Such lettering can be placed on such a card directly for instance by typing with interposition of a hectographic ink sheet; otherwise a different type of reverse reading printing form may be attached to such an address card to form a unit. In this case the separate printing form might be either of the hectographic type or it may be a printing form requiring inking in the printing process and from which the lettering is reproduced directly or indirectly according to the lithographic process.

It should be noted also, that printing elements according to this invention and with the means making them adapted for being engaged by a feed member of the printing device may be made of comparatively thin material so that substantially larger quantities of these elements can be stacked without creating a stack of excessive height. A magazine of given size can hold many more of these elements than was possible with known devices in this class. For instance, a single layer of material used for the printing element may be only .004" thick.

As far as the feeding of imprint-receiving elements, particularly envelopes, is concerned, known feeding systems were based on the use of rather complicated and expensive suction-type feeding means because no other means for reliable feeding were known to the art. On the basis of the present invention, even the just-mentioned type of elements can be fed reliably with very simple means. Even airmail envelopes of thin paper material can be handled satisfactorily.

Figs. 18 to 22 illustrate a printing device according to the invention. This device comprises an automatic feeding section for instance for address cards 14 which is shown in greater detail in Fig. 20, the address cards being shown for instance in Fig. 5. The device further comprises an automatic feeding section for imprint-receiving elements, for instance of envelopes 25 (see Fig. 10), pay envelopes or the like as illustrated by Fig. 18. Address cards, for instance those marked 14 in Fig. 5, are fed automatically in the following manner: attached to the printing drum 43 is a cam disc 42 which is engaged by a cam follower 46 attached to a T-shaped lever 44, 45 turnable about a pivot 47. During rotation of the drum 43 an oscillating movement of the lever 44 is effected which is transmitted as a reciprocating movement at 91 to the feeding device. The feeding device is moveable along a guide rod 48 mounted underneath the bottom 49 of a magazine and comprises a feed member 50 that is turnable in a direction transverse to the guide rod 48 and is backed by a spring 93 tending to move the member 50 into its operative position in which it projects with its engaging tip 51 through a slot 94 into the magazine slightly above the inner surface of the bottom 49. If a stack of address cards 14 is stacked in the magazine as shown in Fig. 20, the engaging tip 51 engages the opening 17 of the lowermost card or printing element 14 so that during the feeding stroke of the feed member 50 this lowermost printing element 14 is moved through an outlet slot 95 of the magazine towards the printing drum 43 and is taken over by a pair of feed rollers 53. The card 14 is then engaged between the rollers 53 and the drum 43 and carried by the drum 43 into engagement with a second pair of feeding rollers 54. Both pairs of rollers 53 and 54 are pressed by springs 55 against the drum 43 and are thereby adapted to hold the printing elements in engagement with the printing drum only for the purpose of feeding them towards a guide plate 56 which leads the elements to a printing line N—O which is located where the printing drum 43 is engaged by the pressure roller 57.

The imprint-receiving elements as, for instance, envelopes 25 (Fig. 10) or the like are automatically fed into the printing device in the following manner: Attached to the printing drum 43 is a second cam disc 58 which is engaged by a cam follower attached to a lever 59 turnable about a pivot 60 and connected through a link 61 to a second lever 62 turnable about a pivot 64. The lever 62 engages at 63 the feeding device for the imprint-receiving elements. During rotation of the drum 43 the cam 58 causes the linkage 59, 61, 62 to oscillate which movement is converted into a reciprocating movement of the feeding device along a guide bar 65 mounted underneath a plate 66 forming the bottom of a magazine 78. The feeding device comprises a flat feed member 67 which is adapted to engage the lowermost envelope 25 of a stack thereof placed in the magazine 78, and more particularly the forward edge of the member 67 enters into the space between the partly opened flap 27 of the lowermost envelope 25 so that during the feeding stroke of the feeding device the lowermost envelope is moved out of the magazine 78 through an outlet slot 99 towards the printing drum and into engagement with a pair of feed rollers 68, 69. These rollers are driven from the printing drum and/or the pressure roller 57 by means of an intermediate roller 70 and move the fed envelope to the printing line N—O. It is evident that due to the cam discs 42 and 58 being attached in a selected relative position to the drum 43, the address cards 14 carrying the printing form and the envelopes 25 are caused to arrive and to meet at the printing line N—O in the desired relative position for producing the desired imprint in the desired area of the surface of the envelope.

After the address card or printing element 14 and an envelope 25 have passed through the printing line a separator member 71 projecting into the path of the jointly moving card and envelope separates these two elements from each other. For this purpose the separator 71 is operated by a lever 72 which engages with a cam follower a third cam disc 73 attached to the drum 43. The envelope 25 lands on the delivery plate 74 while

the card 14 is engaged by a pair of rollers 75 resiliently engaging the drum 43 and is moved thereby over a guide plate 76 into a collecting tray 77.

The stack of address cards or printing elements 14 in the magazine 49, and likewise the envelopes or imprint-receiving elements 25 in the magazine 78 are weighted down by plates 79 and 80, respectively. The three magazines or trays 49, 77 and 78, respectively, are removably attached to the printing device so that after their removal the machine can also be used as a regular rotary duplicating machine. The leverage 44, 45, 46 can be moved into an inoperative position by a crank 81, and similarly the lever 59 can be made inoperative by a crank 82. The pairs of feed rollers 53 and 54 can be moved into an inoperative position by means of the control screws 83. The pair of rollers 75 can be swung away by turning an excenter button 84. The cam discs 42, 58 and 73 can be adjusted angularly with respect to each other and the drum 43 whereby the location of the imprint on the imprint-receiving element can be predetermined.

As shown in Fig. 19, the magazine 78 is movable in transverse direction on the plate 66 along slots 85. For locking the magazine 78 in a selected position a clamping screw 86 is provided. Also, the magazine 49 and the collecting tray 77 are movable in transverse direction along supporting bars 87 and 88, respectively. Clamping screws 89 and 90, respectively, are provided for locking the magazine and tray in a selected position. The magazine 49 is shown in Fig. 19 in a transversely displaced position only for the sake of clarity of the drawing. It is evident that for regular operation of the printing device, the magazine 49 is placed in a position substantially in line with the magazine 78 and the tray 77.

Fig. 20 shows the automatic feeding device for the address cards 14 or printing elements at a larger scale. The engaging hook-shaped tip 51 of the feed member 50 is forced by a spring 93 through a slot 94 in the bottom plate of the magazine 49 into an opening 17 of the lowermost card 14 in the magazine, as was already mentioned above. The second layer 19 of the card 14 acts as a separating layer and prevents the adjacent or superimposed card 14 from being taken along by tip 51 when the lowermost card is moved out of the magazine by feed member 50 whose tip 51 engages the edge of opening 17. The height of the slot 95 forming the outlet from the magazine 49 is adjustable so that at any time it permits only one printing element 14 to pass through the slot 95. When the feeding device starts its return stroke, the engaging tip 51 of the member 50 is guided by its inclined rear face engaging the edge of opening 18 to turn feed member 50 until tip 51 moves out of the opening 17 of the just-fed card and swings slightly downward so that it may slide along the rear portion of the lowermost card 14 and then along the surface of the adjacent or superimposed card 14 until it can move up again under the action of the spring 93 to pass into the hole 17 of the just mentioned next card which is now the lowermost card. In case conditions are different, the tip 51 may slide past the opening 17 during the last portion of the return stroke and move into the opening 17 only shortly after the beginning of the next feeding stroke.

Fig. 21 illustrates the automatic feeding device for imprint-receiving elements or envelopes 25 or the like at a larger scale. For the purpose of obtaining a faultless feeding operation, the feed member 67 is made turnable. A spring 96 forces the member 67 against the lower layer of the lowermost envelope 25 and thereby facilitates the engagement of the member 67 by entering into the space between the partly opened flap 27 of the envelope 25. A roller 97 mounted on the member 67 engages a slanting guide bar 98 so as to roll along the latter while the feeding device together with the member 67 travels within a slot in the plate 66, the member 67 being controlled in such a manner that its forward end may pass through the outlet slot 99 of the magazine 78. The height of the slot 99 is to be chosen in such a manner that at any time only one element or envelope 25 can pass through it. The second layer of the envelope 25 (see Fig. 10) acts as a separating layer and prevents an adjacent or superimposed envelope 25 from being taken along while the lowermost envelope is being fed. After the feeding stroke is completed the member 67 moves back into its starting position.

As is shown in Fig. 22, the envelopes 25 are forced by strips 100 and 101 arranged laterally in the magazine 78 and by the weight plate 80 to bend or bulge downwardly. The adjustable front plate 102 of the magazine 78 is shaped at its lower edge in accordance with the above mentioned bending or bulging of the envelopes 25 and is provided with two projections 103 which determine the height of the slot 99. By these means a satisfactory turning down of the flap 27 of the envelope into an open position is assured.

As is illustrated by Fig. 23, the address card or printing element 106 is provided with two cutouts or openings 107 which are located near to the forward edge of the card and parallel with each other, but outside the area occupied by the printing form 108 carrying a reverse reading reproductive lettering. In addition, the card 106 is provided with two cutouts or openings 107*a* which serve for feeding the card and are adapted to be engaged by a feed member as described above. These openings 107*a* are covered by the printing form 108 on the side on which the printing is done.

In the printing device as shown by Figs. 25 to 27, a feed member 50 feeds the cards 106 in a manner similar to the one described above towards the printing drum and into the path of a hook-shaped gripper member 109 which is mounted on the shaft 110 in the drum 43 for turning movement. The gripper 109 is shown in Fig. 26 in engaging position, and in dotted lines in inoperative position and in an intermediate positon ready for engaging a printing element 106. The free end of the gripper 109 is connected by a link 111 to a lever 112 turnable about a pivot 113 mounted in the drum 43. The lever 112 is rigidly connected with a second lever 114 which carries a cam follower engaging a stationary cam disc 118 mounted around the shaft 122 of the drum 43. The leverage comprising the members 109, 111, 112 and 114 is under the action of a spring 115 tending to move the gripper 109 into its operative or engaging position. The spring also maintains the engagement of the cam follower of lever 114 with the cam 118. Due to the action of the just-mentioned cam control the hook-shaped gripper 109 engages the card 106 in the position shown in Fig. 25 by passing through the opening 107 and pressing down on the upper surface of the card 106 so as to hold it on a supporting portion slightly recessed from the drum surface. After this, the printing drum 43 continues its revolution with the gripper 109 holding the card 106 firmly on the drum and transporting the card by engaging the edge of opening 107 until the drum carries the card to the printing line N—O which is passed by the card in synchronism with an envelope 25 or other imprint-receiving element which has been fed to the printing line by the feed member 67 and the feed rollers 68 and 69. After the printing operation the envelope 25 or the like lands on the collecting plate 74. The card 106, however, is released from the drum by a backward swing of the grippers 109 into their inoperative position located outside of opening 107 before the card is engaged by the pair of rollers 75. The backward swing of the grippers 109 is effected by the rise of the cam 118 in the particular position of the drum. The card 106 is then moved through the engagement between the drum 43 and the roller 75 past the guide plate 76 into the collecting tray 77. After the gripper 109 has passed the area of the collecting tray 77, the gripper is swung due to the action of the cam arrangement again into its engaging position in which

it was at the beginning of the operational cycle just described.

The printing device according to Figs. 26 and 27 is also provided with means permitting a number of consecutive printing operations to be carried out with one and the same printing elements. For this purpose the cam **118** is moved transversely so that the cam follower at the end of lever **114** does not project on its circular path during rotation into an area occupied by the cam **118**. This movement is effected by turning a crank **119** turnable about the axle **122** of the printing drum. The crank **119** is connected with at least one projecting member **120** which turns only together with the crank. Slide pieces **121** are arranged for sliding in grooves **123** extending at an angle to the axle **122** within a bushing **124**. A spring **125** prevents the bushing **124** and the cam disc **118** from turning. Due to this arrangement the bushing **124** and the cam disc **118** move in axial direction along the axle **122** when the crank **119** is turned, until the bushing **124** is temporarily locked in position by a spring loaded ball **129** engaging a corresponding notch **126**. Now the spring **115** holds the gripper **109** in its operative position engaging the card **106** and clamping it on the supporting member **127**. If the lever **119** and with it the member **120** are turned in the opposite direction, the cam **118** is moved back into its normal position in which it is held by the ball **129** engaging a notch **130** under the action of the spring **128**.

It should be noted that in the element **106** the printing portion of the form **108** is depressed into the pertaining opening, so that the lettering is protected.

It is to be understood that the printing devices according to the invention can be constructed and used in various ways. The feeding of stacked printing elements is carried out most efficiently by the automatic feeding device described and adapted to feed the individual printing elements of the type disclosed in consecutive order. The imprint-receiving elements can be fed in a similar manner automatically and consecutively from a stack and in timed relationship with the feeding of the printing elements and with the rotation of the printing drum. However, it is likewise possible to feed the imprint-receiving elements by hand. Finally, the automatic feeding devices can be temporarily made inoperative and, if necessary, the various magazines and collecting trays may be removed so that the printing device can be used as a regular duplicating machine.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of printing devices and flat stackable elements differing from the types described above.

While the invention has been illustrated and described as embodied in an addressing machine and in flat printing and imprint-receiving elements, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a separating layer and a projecting shoulder on one side of the separating layer; a first feeding means including a first reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the separating layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the fed printing element and for holding the same on said printing drum during rotation of the same; a second magazine means for stacking a set of flat stackable imprint receiving elements having a separating layer and a projecting shoulder on one side of the separating layer; a second feeding means including a second reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat imprint receiving element and to feed the same to said printing drum; and linkage means connecting said first and second feeding means and said printing drum for operation in timed sequence and including control cam means for controlling said first and second feeding means, means connecting from control cam means with said printing drum for rotation therewith along a circular path in a timed sequence and including means for holding said cam means in a plurality of positions angularly displaced with respect to said drum, actuating means arranged so as to project into said path to be engaged by said control cam means at a selected point of said path in relation to a selected position of said printing drum during the rotation thereof, and linkage elements connecting said actuating means with said first and second feeding means, respectively, so that said feeding means are operated when said printing drum is in said selected position, and so that the timed sequence between the operation of said drum and the operation of said feeding means can be selected by setting said control cam means to different angularly displaced positions.

2. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a protective layer and a projecting shoulder on one side of the protective layer; a first feeding means including a first reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the protective layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the fed printing element and for holding the same on said printing drum during rotation of the same; a second magazine means for stacking a set of flat stackable imprint receiving elements having a protective layer and a projecting shoulder on one side of the protective layer; a second feeding means including a second reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat imprint receiving element and to feed the same to said printing drum, said reciprocable feeding member including a reciprocable carrier member and a gripping member supported by said carrier member for angular movement between an engaging position in which said gripping member engages said projecting shoulder during a feeding stroke of its reciprocating movement, and a disengaged position in which said gripping member is out of engagement with said projecting shoulder during a return stroke, and means tending to move said gripping member into its engaging position, said gripping member being formed with a guide edge portion remote from the axis of its angular movement, said edges portion being adapted to slide along the exposed surface of the outermost flat stackable element whereby said gripping member is moved into its disengaged position during said return stroke; and linkage means connecting said first and second feeding means and said printing drum for operation in timed sequence.

3. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said

printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a separating layer and a projecting shoulder on one side of the separating layer; a first feeding means including a first reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the separating layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the fed printing element and for holding the same on said printing drum during rotation of the same; a second magazine means for stacking a set of flat stackable imprint receiving elements having a separating layer and a projecting shoulder on one side of the protective layer; a second feeding means including a second reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat imprint receiving element and to feed the same to said printing drum, said reciprocable feeding member including a feeding element movable in opposite directions while in contact with the outermost stackable element for engagement with said shoulder and for disengagement therefrom, respectively, said element being additionally movable transversely to said reciprocating movement so that at the beginning of its feeding stroke it is in a starting position of said transverse movement and moves into its end position of said transverse movement gradually during its feeding stroke in the course of which it engages said shoulder, and returns to said starting position during the return stroke of said reciprocating movement.

4. A printing device as set forth in claim 3 wherein said feeding element is a flat member having a forward edge facing toward said printing drum, and a rear edge parallel therewith, said flat member being tiltable about an axis substantially parallel with and adjacent to said rear edge.

5. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a separating layer and a projecting shoulder on one side of the separating layer; a first feeding means including a first reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the separating layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the fed printing element and for holding the same on said printing drum during rotation of the same, said engaging means including at least one holding element adapted to hold one of said flat printing elements on said printing drum by reaching from one side of said printing element through an opening thereof said holding element being turnably mounted on said printing drum for movement between a holding position in which it is adapted to pass through the opening in the printing element for holding said flat printing element for movement with said printing drum, and a disengaged position in which it is swung towards the interior of said printing drum so as to release said printing element, and actuating means for actuating said holding element and being mounted on said printing drum for rotation therewith along a circular path, control cam means stationarily mounted so as to project into said path to be engaged by said actuating means at a selected point of said path in relation to a selected position of said printing drum during the rotation thereof, and linkage elements connecting said actuating means with said holding element, so that said holding element is operated when said printing drum is in said selected position, said control cam means and said actuating means being adjustable with respect to each other in axial direction of said printing drum between an operative position in which said control cam means projects into said path, and an inoperative position in which said control cam means is spaced from said path so that during consecutive revolutions of said printing drum a fed printing element remains on said drum for repeated reproduction without another printing element being fed to the printing drum; a second magazine means for stacking a set of flat stackable imprint receiving elements having a separating layer and a projecting shoulder on one side of the protective layer; a second feeding means including a second reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat imprint receiving element and to feed the same to said printing drum; and linkage means connecting said first and second feeding means and said printing drum for operation in timed sequence.

6. A printing device as set forth in claim 5, wherein said holding element is adjustable in direction parallel with the axis of said printing drum to a plurality of positions so as to be in a position corresponding to the location of said opening in said flat printing element.

7. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; magazine means for stacking a set of flat elements having a separating layer and a projecting shoulder on one side of the separating layer; feeding means including a reciprocating feeding member, and resilient means urging said feeding member into a position adapted to engage said separating layer and the projecting shoulder of the outermost element for feeding the same to said printing drum and pressure roller; linkage means connecting said feeding means with said drum for operation in timed sequence and including control cam means for controlling said feeding means, means connecting said control cam means with said printing drum for rotation therewith along a circular path in a timed sequence and including means for holding said cam means in a plurality of positions angularly displaced with respect to said drum, actuating means arranged to project into said path so as to be engaged by said control cam means at a selected point of said path in relation to a selected position of said printing drum during the rotation thereof, and linkage elements connecting said actuating means with said feeding means so that said feeding means are operated when said printing drum is in said selected position, and so that the timed sequence between the operation of said drum and the operation of said feeding means can be selected by setting said control cam means to different angularly displaced positions.

8. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; magazine means for stacking a set of flat elements having a separating layer and a projecting edge on one side of the separating layer; feeding means including a reciprocating feeding member, and resilient means urging said feeding member into a position adapted to engage said separating layer and the projecting shoulder of the outermost element for feeding the same to said printing drum and pressure roller, said feeding member being in contact with the outermost element for engagement with said edge and for disengagement therefrom, respectively, said feeding member being movable transversely to said reciprocating movement so that at the beginning of its feeding stroke it is in a starting position of said transverse movement and moves to the end position of said transverse movement during the feeding stroke for engaging said edge, said feeding member returning to said starting position during the return stroke of said reciprocating movement, said feeding element having a hook-shaped tip having a first edge leading during the feeding stroke and adapted to engage said edge of the fed element, and having a second edge inclined to the direction of reciprocating movement

and to the direction of transverse movement and adapted to engage said edge of said element during the return stroke so that said feeding element is moved transversely to the said starting position during the return stroke of said reciprocating movement; and linkage means connecting said feeding means with said drum for operation in timed sequence.

9. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a separating layer and a projecting shoulder on one side of the separating layer; a first feeding means including a first reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the separating layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the feed printing element and for holding the same on said printing drum during rotation of the same, said engaging means including at least one hook-shaped holding element adapted to hold one of said flat printing elements on said printing drum by reaching from one side of said printing element through an opening thereof, said hook-shaped holding element being turnably mounted on said printing drum for movement between a holding position in which it is adapted to pass through the opening in the printing element for holding said flat printing element for movement with said printing drum, and a disengaged position in which it is swung towards the interior of said printing drum so as to release said printing element, and actuating means for actuating said hook-shaped holding element and being mounted on said printing drum for rotation therewith along a circular path, control cam means projecting into said path of said actuating means so as to be engaged by said actuating means at a selected point of said path in the relation to a selected position of said printing drum during the rotation of the same, and linkage elements connecting said actuating means with said holding element so that said holding element is operated when said printing drum is in said selected position.

10. A printing device comprising, in combination, a printing drum; a pressure roller cooperating with said printing drum along a printing line; a first magazine means for stacking a set of flat stackable printing elements having a separating layer and a projecting shoulder on one side of the separating layer; a first feeding means including a first reciprocable feeding member adapted to

engage the projecting shoulder of the outermost flat printing element and to feed the same to said printing drum with the separating layer of said outermost printing element separating said feeding member from the printing element adjacent to said outermost printing element; engaging means for engaging the feed printing element and for holding the same on said printing drum during rotation of the same, said engaging means including at least one hook-shaped holding element adapted to hold one of said flat printing elements on said printing drum by reaching from one side of said printing element through an opening thereof, said hook-shaped holding element being turnably mounted on said printing drum for movement between a holding position in which it is adapted to pass through the opening in the printing element for holding said flat printing element for movement with said printing drum, and a disengaged position in which it is swung towards the interior of said printing drum so as to release said printing element, and actuating means for actuating said hook-shaped holding element and being mounted on said printing drum for rotation therewith along a circular path, control cam means projecting into said path of said actuating means so as to be engaged by said actuating means at a selected point of said path in the relation to a selected position of said printing drum during the rotation of the same, and linkage elements connecting said actuating means with said holding element so that said holding element is operated when said printing drum is in said selected position; a second magazine means for stacking a set of flat stackable imprint receiving elements having a separating layer and a projecting shoulder on one side of the protective layer; a second feeding means including a second reciprocable feeding member adapted to engage the projecting shoulder of the outermost flat imprint receiving element and to feed the same to said printing drum; and linkage means connecting said feeding means and said printing drum for operation in timed sequence.

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