Jan. 6, 1953 J. R. LAUFFER 2,624,576

FEED MECHANISM FOR FLEXIBLE SHEETS SUCH AS ENVELOPES

Filed Feb. 9, 1949 3 Sheets-Sheet 1

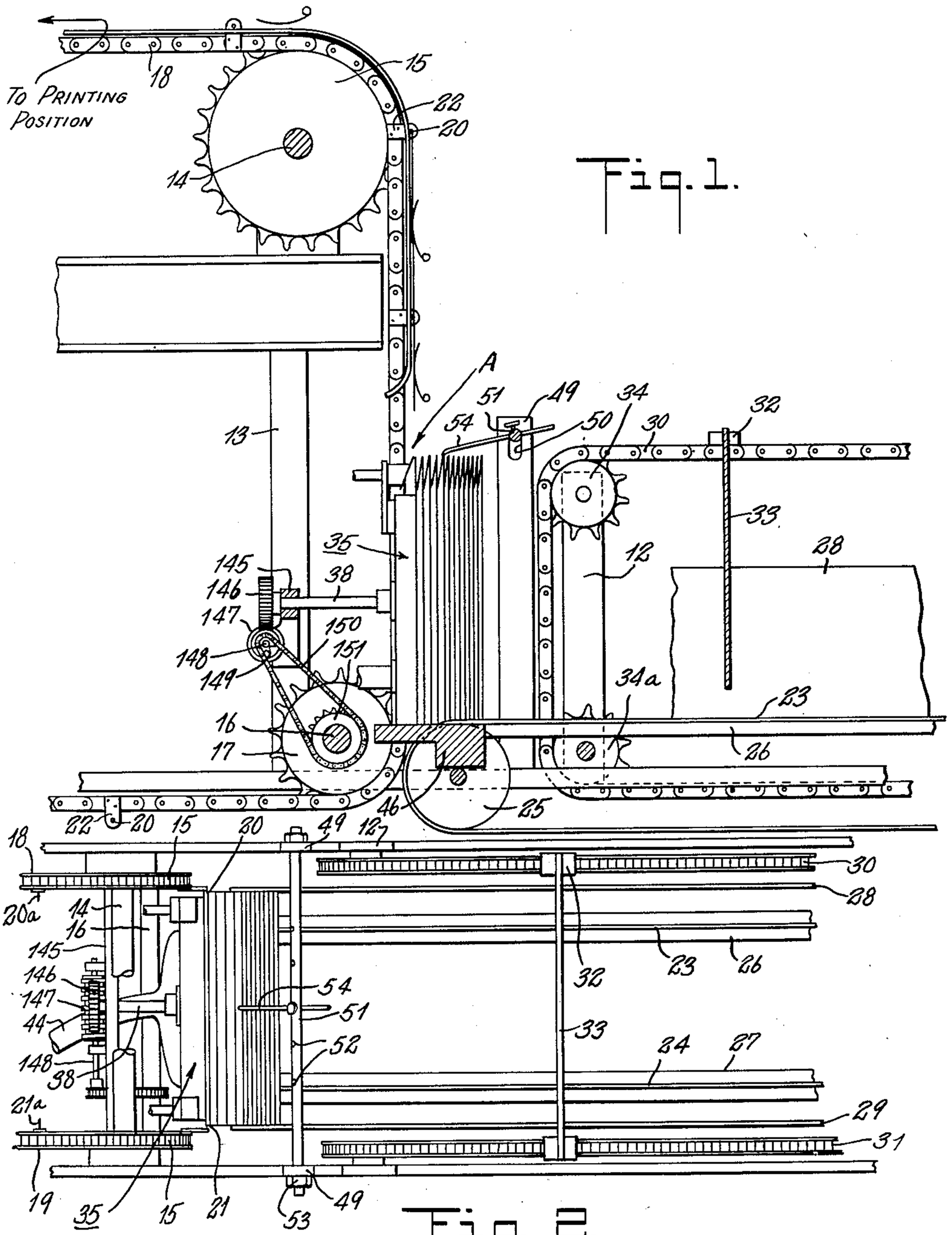

Fig. 1.

Fig. 2.

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Filed Feb. 9, 1949 3 Sheets-Sheet 2

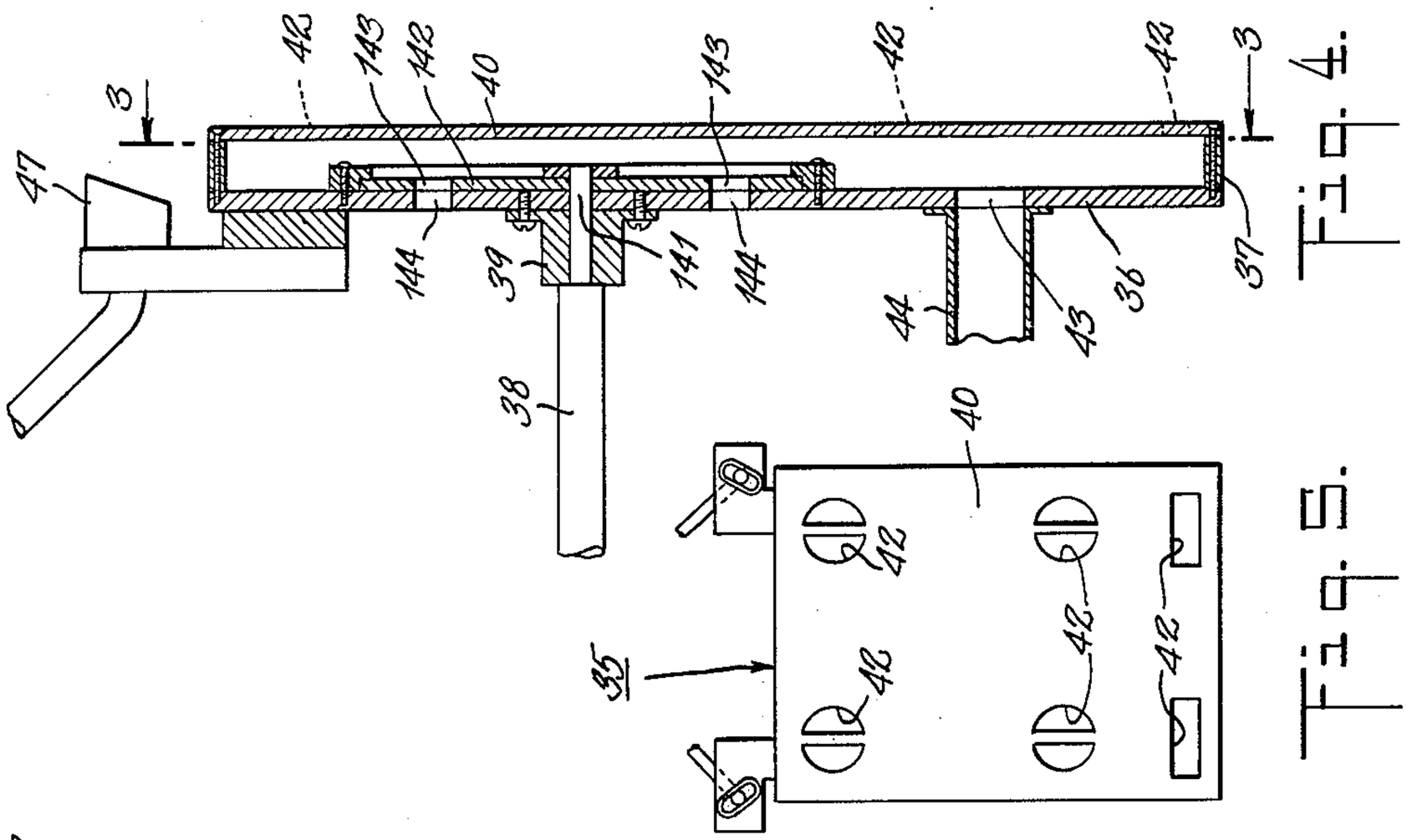

Fig. 4.

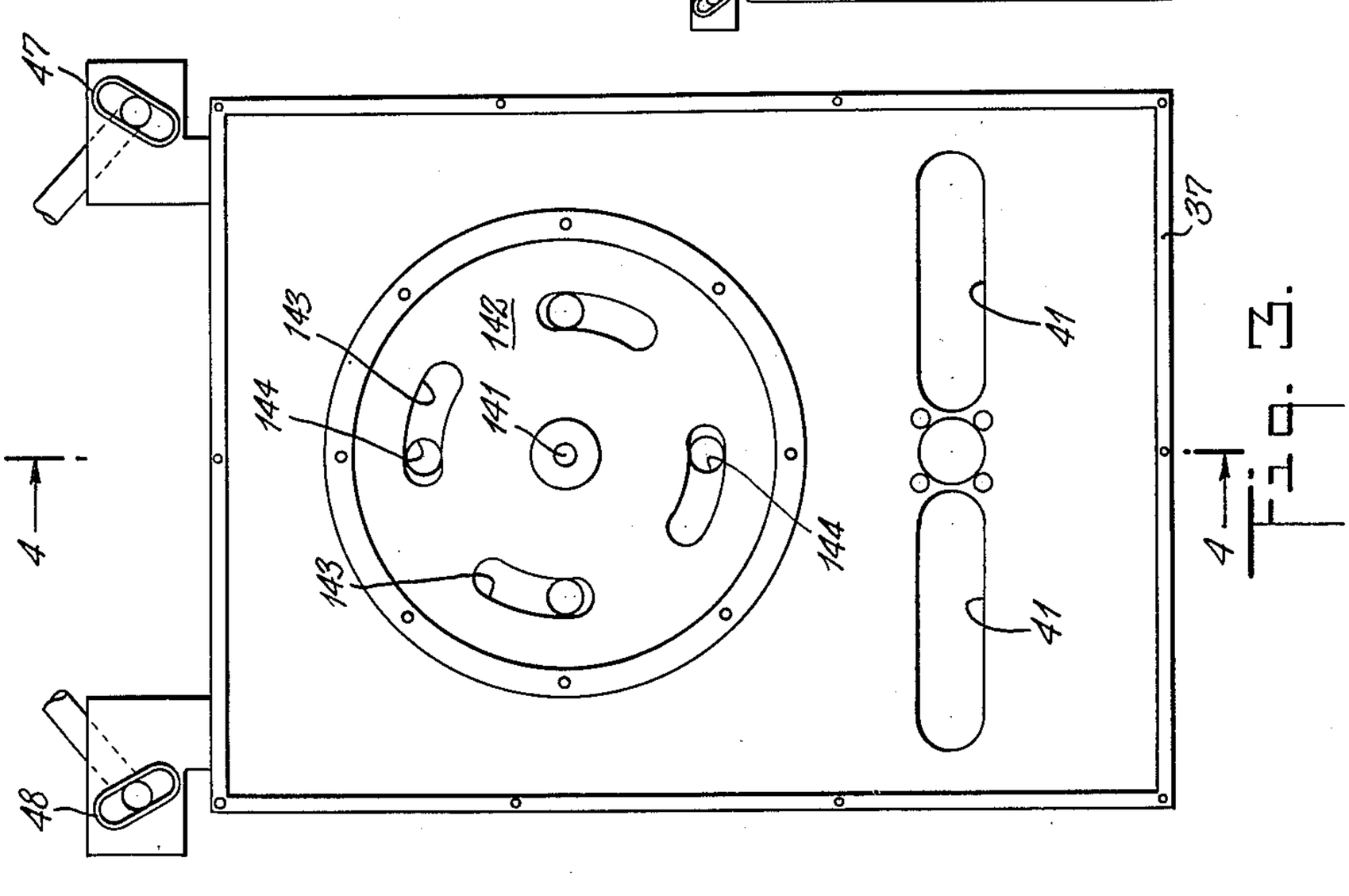

Fig. 5.

Fig. 7.

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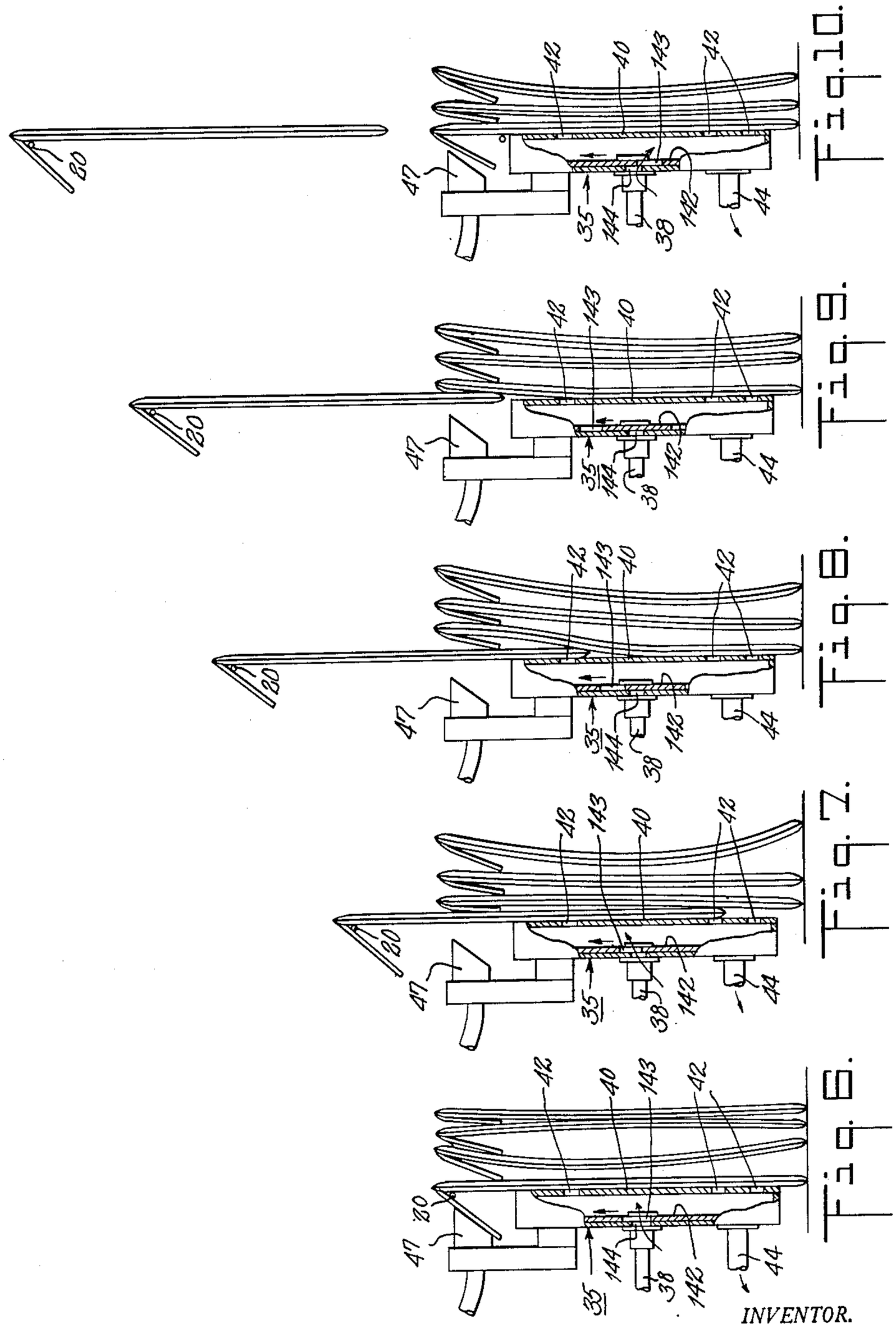

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UNITED STATES PATENT OFFICE

2,624,576

FEED MECHANISM FOR FLEXIBLE SHEETS SUCH AS ENVELOPES

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Application February 9, 1949, Serial No. 75,338

15 Claims. (Cl. 271—12)

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This invention relates to a mechanism for feeding separate sheets of flexible material such as envelopes. In the embodiment here described for purposes of illustration, there is disclosed a mechanism for feeding envelopes in succession from a stack thereof to a printing position. Most envelopes, and particularly those of crisp paper such as bond, are likely to be somewhat warped and a stack of such envelopes, moving along a conveyor, except when tightly compressed together exhibit noticeable irregularities of spacing. When compared in the hand, certain envelopes seem to be almost flat; others show deformations ranging from barely perceptible to very noticeable deviations from complete flatness. These deformations are due to the crispness of the paper, the effects of folding, local shrinkage when the paste dries, humidity and static. The extent of deformation varies with different kinds of paper, bond paper being an extreme example, but is present in almost all envelopes.

The printing of impressions on envelopes has heretofore been done through the use of reciprocating feeder devices or presses whose maximum speed is approximately 10,000 impressions per hour. This speed limitation is imposed by the nature of the reciprocating mechanism itself, which cannot be operated at materially higher speeds to produce satisfactory work. While rotary presses can operate on continuous webs of paper at very much higher speeds (up to 100,000 impressions per hour), the difficulties inherent in feeding separated sheets, especially folded and pasted sheets such as envelopes, at these speeds have, so far as I am aware, prevented commercial use of rotary presses for printing on separated sheets or on envelopes.

In my prior application Ser. No. 768,744, filed August 15, 1947, now Pat. No. 2,554,577 granted May 29, 1951, I have shown and described a rotary printing press for separated sheets such as envelopes, in which the envelopes are engaged under opposite ends of their flaps by a pair of projecting lugs carried on two geared-together carrier chains moving in parallel paths, the envelopes being thereby successively extracted one by one from the leading end of a moving feed stack to and through a rotary press and thence to a delivery table. This feeding mechanism is herein sometimes called the "onward feeder." The present invention was conceived primarily as an improvement in the feeding mechanism of the press shown in said prior application, but in a more general sense is believed to be useful in

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connection with the feeding of any kind of previously-separated flexible sheets, whether or not envelopes, where it is desired to transfer such sheets one at a time from the leading end of a moving stack thereof towards a point where some further operation, including but not limited to printing, is to be performed upon them. Consequently, while the prior application is referred to as disclosing a printing press and carrier chains with which the present invention is susceptible of being used, it is expressly pointed out that the present invention is not limited to use solely in that connection.

One object of the present invention is to provide a stationary shaping plate located at or adjacent the translation point—where the sheets are to be withdrawn one by one from a moving stack—which in cooperation with suction acting through openings in the plate holds the leading sheet of the stack in an exactly predetermined position for the length of time necessary to enable the onward feeder to gain control of the particular sheet so held.

Another object is to provide a suction-aided shaping plate which will compel the leading sheet of the stack to assume momentarily a predetermined shape which will permit it to be taken hold of by any gripping or engaging elements of the onward feeder.

Another object is to provide positively-actuated means synchronized with the onward feeder to regulate and control the suction so that the maximum effect thereof will be utilized in drawing the leading sheet of the stack into contact with, and compelling it to conform to the shape of, the shaping plate, and so that the suction effect will then be diminished while the onward feeder is withdrawing the leading sheet from its position in contact with the shaping plate.

In this specification I show and describe one form of mechanism according to my invention for handling relatively large envelopes. Since the printing mechanism and other mechanisms for handling and delivering the envelopes after printing form no part of the present invention, I do not describe them but merely indicate their general location by legend on the drawings.

Referring to the drawings which are annexed to and form part of this specification—

Fig. 1 is a vertical section in a longitudinal plane through the delivery portions of the mechanism.

Fig. 2 is a top plan view, with some parts cut away, of the mechanism shown in Fig. 1.

Fig. 3 is a front elevation of the shaping mem-

ber, with its cover plate removed, substantially in the plane 3—3 of Fig. 4.

Fig. 4 is a vertical section through the shaping member, with its cover plate in place, substantially in the plane 4—4 of Fig. 3.

Fig. 5 is a front elevation on a reduced scale of the shaping member, with its cover plate in place, from the same point of view as Fig. 3.

Figs. 6 to 10 inclusive are partial vertical cross-sectional views at the translation point, somewhat diagrammatic in character, illustrating successive stages of the envelope action at that point, with the warp of the envelopes shown in exaggerated form for purposes of illustration—

Fig. 6 shows the leading envelope sucked against and conforming in shape to the flat face of the shaping member, with its flap drawn against the flap sucker, at the moment the flap has been engaged by the lugs 20 of the onward feeder—the bleed valve being fully open;

Fig. 7 shows the leading envelope partially lifted from the stack by upward movement of the lugs, and the lower end of the second envelope beginning to be sucked toward the lowest openings of the shaping member—the bleed valve is closing;

Fig. 8 shows the leading envelope lifted almost clear of the shaping member, and the second envelope being sucked into position against the shaping member by both of the lower openings—the bleed valve is now fully closed;

Fig. 9 shows the first envelope lifted fully clear of the shaping member and the second envelope almost completely drawn against the shaping member—the bleed valve is still fully closed; and

Fig. 10 shows the body of the second envelope fully drawn against the shaping member—the bleed valve is now beginning to open.

Referring to Figs. 1 and 2, a bed plate or frame 11, serving as the support for the mechanism hereafter to be described, is itself supported on suitable legs (not shown) so as to be maintained at a convenient working height above the floor. Vertical supports 12 and 13, some of which are shown and others not shown in the drawing, journal and support the axles on which the various wheels and pinions hereinafter mentioned are rotatably mounted. These vertical supports are mounted upon bed plate 11 or secured in fixed relation thereto.

Secured upon shaft 14 are sprocket wheels 15, 15. Secured upon shaft 16 are sprocket wheels 17. Chains 18, 19 pass over sprocket wheels 15, 15 and 17, and also over other sprocket wheels (not shown) at least one of the sprocket wheels in the path of each chain being powered by connection with a suitable motor. The two chains 18 and 19 are arranged to run in parallel paths a predetermined distance apart. The shafting and other connections are such that the chains run at the same speed and are maintained in fixed relation to each other as respects forward movement. Thus a given link of one chain is always opposite a given link of the other, at all stages of rotation. At fixed distances apart, along each chain, there are provided lugs 20, 21 projecting laterally of the chain, each mounted upon a suitable bracket 22 secured to one link of the chain. Each lug is directed toward a corresponding lug on the opposite chain, the two lugs thus paired pointing towards each other and being maintained in alinement during their entire traverse. (See, for example, lugs 20*a* and 21*a* in Fig. 2.)

The two chains, moving in unison and in parallel paths, thus form with their paired lugs a carrier for envelopes, designed to transport the latter one at a time from the "translation point," hereinafter described, to a printing position, whose location is indicated generally by a legend on Fig. 1, and thereafter to a delivery position beyond the printing position. In so doing, an opposed pair of lugs engages an envelope under the opposite ends of the flap thereof, and thus advances the envelope to and through a rotary printing mechanism, comprising printing and impression rollers. The type cylinder and impression cylinder are located between the chains, and may imprint on any desired portion of the envelope without interference from the chains and lugs. What has thus far been described is shown in more detail in my prior application Serial No. 768,744, filed August 15, 1947, and reference thereto is made for a more complete understanding of the structure involved. The present invention is not concerned with the nature of the printing or other operations performed upon the envelopes after they have come under control of the chains 18, 19, and accordingly the further traverse of those chains and operations associated therewith are not described herein.

If desired, the sprocket wheels serving one chain may be slidably mounted on their supporting shafts, whereby that chain may be moved toward or away from the other chain, thus adapting the machine to be manually adjusted for printing envelopes of different widths.

At one portion of their path of travel the chains 18, 19 move, in the form of mechanism here described, in a substantially vertical plane as shown in Fig. 1. At this portion of their travel the lugs 20, 21 move upwardly, and during this upward movement they are arranged and adapted to engage under the opposite ends of the opened flap of an envelope held for this purpose in a vertical plane by the mechanism hereinafter described. The position occupied by the envelope which is ready to be grasped by lugs 20, 21 is herein termed the "translation point" and is generally indicated by the reference character A on Fig. 1.

The feed of envelopes to the translation point A may if desired be in the form of a compact stack moving in a horizontal feed magazine at a suitable speed or speeds under control of powered mechanism tending to advance the stack toward the translation point, described as follows:

The horizontal feed magazine may contain powered feeding mechanisms such as the wires 23, 24 mounted over sheaves 25 and driven by a suitable source of power not shown. Wires 23 and 24, in their upper horizontal traverse, are arranged to lie upon support plates 26, 27 fixedly supported with respect to bed plate 11. Similarly supported are side plates 28 and 29 serving to guide the lateral margins of the stack of envelopes supported on wires 23, 24.

If desired, one wire and its supporting sheave and plate, and the corresponding side plate, may be slidably mounted on their respective supporting shafts and mounts, whereby they may be moved toward or away from the other wire and plates, thereby permitting the width of the horizontal and plates, thereby permitting the width of the horizontal feed magazine to be manually adjusted for handling envelopes of different widths.

In slotted supports 49, 49 resting on or in fixed relation to bed plate 11 is mounted a cross-rod 51 having a series of perforations 52 therein.

Rod 51 passes through slots 50 in the supports and may be adjusted for angular and vertical position by suitable nuts or thumbscrews 53. In a selected perforation of rod 51, and held there by a thumbscrew, is placed a hold-back finger 54 having a curved and pointed end adapted to rest against the top of the moving stack of envelopes. The position of the pointed end may be adjusted and fixed by means of the nuts and thumbscrews mentioned. By suitably adjusting the pressure of the pointed end of finger 54 on the top of the moving stack of envelopes, this finger will as pressure builds up behind from the forward movement of the stack permit envelopes to escape towards the translation point at a regular rate of speed. In ordinary operation this adjustment is so made that the envelopes in the stack between the pointed end of finger 54 and the translation point A (to the left of the finger as seen in Fig. 1) are under substantially less pressure, and are looser, than the envelopes in the stack approaching the finger (to the right of the finger as seen in Fig. 1).

For optional use when feeding very tall envelopes, where the stack in the horizontal feed magazine has a tendency to fall forward or backward, I provide auxiliary chains 30, 31 which, at intervals, carry blocks 32 suitably slotted. Into the slots of blocks 32 there may be manually inserted a guide plate 33, adapted to be manually removed as the block reaches the forward end of its upper line of travel. Chains 31 engage with and are rotated by sprocket wheels 34, 34*a* and other sprocket wheels not shown, which are suitably powered so that, if the plate 33 is in use, it will advance at substantially the same speed as that at which the stack of envelopes is being advanced by wires 23, 24 and will support the upper ends of the envelopes.

At the translation point, and generally at right angles to and across the path of travel of the stack feeder, and in or immediately adjacent the path of travel of the onward feeder, there is positioned a shaping member or suction box designated generally by the reference character 35, and shown in more detail in Figs. 3 to 5 inclusive.

The shaping member comprises a plate, preferably of polished steel or other suitable metal, having a shape such that, when the leading envelope is firmly pressed against this plate, said envelope will conform to a predetermined shape when it is at the translation point. In the form of machine here described, it is desired that the leading envelope shall be flat while at this point. Accordingly, the plate is flat, and is designed to make contact with so much of the surface of the leading envelope presented thereto as is necessary to make said envelope, at the moment it is to be lifted by the onward feeder, conform substantially to the requirements of flatness which will assure its accurate positioning so that each of a pair of lugs 20, 21 of the chain will accurately come into register with the ends of the flap and will engage and lift the envelope thereby.

In the form of shaping member illustrated in Figs. 3, 4 and 5, the shaping member is box-like in structure, having an interior chamber. This box-like structure is formed as follows. Secured to base 36 are continuous wall members 37 and a cover plate 40. Secured to the base 36 is a journal bearing 39 supporting a rotatable shaft 38 whose reduced end 141 extends into the chamber within the shaping member. Secured to reduced end 141 is a valve disc 142 having four slots 143 therein arranged symmetrically about the shaft, and preferably arc-shaped and equidistant from the center of the shaft. A series of four round vents 144 in base 36 are arranged symmetrically about the center of the shaft with their centers equidistant therefrom and arranged to register with the slots 143. The arrangement is such that, as valve disc 142 revolves with shaft 38, the four vents 144 are simultaneously opened and then closed by movement across them of the slots 143 and intervening lands. Thus, disc 142 serves as a valve for controlling the bleed of air from atmosphere to the interior of shaping member or suction box 35, such air being allowed to bleed and then being prevented from bleeding, in alternation, as disc 142 revolves.

An opening or slot 43, preferably though not necessarily formed of a series of openings 41, 41 communicates with tube 44 through which suction is drawn by a suitable fan not shown. Suitable mounting means are provided whereby shaping member 35 may be secured on base plate 46 in proper position.

Shaft 38 is journalled in cross bar 145 and upon this shaft is secured a gear 146 engaging with worm 147 fixed on shaft 148 which is journalled in supports mounted on cross bar 145. Fixed on shaft 148 is a sprocket 149 over which passes a chain 150 that also passes over sprocket 151 secured on shaft 16. The arrangement is such that rotation of shaft 16, in response to movement of the carrier chains 18, 19, causes valve disc 142 within shaping member 35 to rotate at a speed which is proportional to and in step and synchronism with the movement of the chains.

Cover plate 40 on the shaping member 35 is provided with suitably placed openings 42.

The number, arrangement and location of these openings in plate 40 is a matter of choice, depending on the character of the sheets (or envelopes) to be handled. I have in the drawing shown an arrangement comprising two openings near the bottom of the envelope, two more about a third the way up from the bottom of the envelope, and two near the upper corners, which has been succesifully used in handling tall end-opening manilla envelopes. More openings may be used if desired. The use of one or more openings near the bottom, and one or more near the upper corners, of the envelope has the special advantages that suction from the lower openings will be operative to draw the lower edge of a following envelope towards the plate while a preceding envelope is being raised but is still in contact with the upper openings. The shaping plate 40 is of such a size as to engage the back of an envelope, beneath the flap, leaving the flap free. This permits the flap to ride clear over the top of the shaping member. Plate 40 therefore engages only the body portion of the envelope which is beneath the flap.

Above each end of the shaping member there is mounted a flap sucker 47, 48, each comprising a flared-end tube suitably connected to a source of suction, the mouth of the tube being set at an angle to the face of the shaping plate 40 as shown.

As presently advised the invention is believed to comprehend the use of a shaping plate, whether planiform as is best adapted for handling envelopes to be engaged by lugs under their flaps, or curved as may be suited to other types of flexible sheets which are to be engaged by gripping mechanisms other than lugs, where suction operating through or adjacent the shaping

surface is employed to cause the leading envelope or sheet to conform to a predetermined shape during the moment it is to be extracted from the stack.

The operation of the above-described apparatus is as follows:

A stack of envelopes resting on wires 23, 24 (and, if desired, also guided and advanced by moving guide plate 33) is moved flap-sides leading toward translation point A by means of the power applied to drive wires 23 and 24. Hold-back finger 54 releases envelopes successively into a zone in front of the translation point where the envelopes are more loosely arranged in the stack. As the leading envelope approaches translation point A, it comes under the influence of atmospheric air rushing into openings 42 in the face of plate 40 of shaping member 35, and is thereby caused to be flattened against the flat face of plate 40. This operation does not catch the flap of the leading envelope against plate 40 but allows the flap to extend beyond and above the surface of shaping member 35. The flap suckers 47, 48 open the flap and hold it in extended position while the envelope is held against plate 40. The leading envelope, which may if left to itself be considerably warped or misshapen, is thus compelled to assume a flat position, with its flap outwardly extended, at the moment when the opposite ends of its flap are to be engaged by the lugs 20, 21 of the onward delivery mechanism.

The timing of valve disc 142 in relation to the arrival and departure of envelopes at the translation point is so arranged (through the chain 150 and worm 147, Figs. 1 and 2) that the bleed vents 144 are closed during the time the leading envelope in the stack is to be drawn toward the surface of the shaping plate in a direction normal to that surface, and are open during the time that an envelope in contact with said surface is to be moved away in a direction parallel thereto. Consequently, the suction operates with maximum force to move an envelope towards the plate (to the left as seen in Fig. 1 and Figs. 6 to 10), and is reduced to a minimum, by reason of the bleed, when the chain and lugs are moving this envelope from in contact with the plate (upwardly as seen in Fig. 1 and Figs. 6 to 10). By this arrangement the suction applied through openings 42 fluctuates in a regular and cyclic manner between maximum and minimum in timed relation to the approach and departure of successive envelopes at the translation point.

This operation is illustrated in Figs. 6 to 10, inclusive.

In Fig. 6, which shows lugs 20 in engagement with the flap of the leading envelope and about to move this envelope upwardly, the bleed vent 144 is open because slot 143 of valve 142 is in registry therewith. At this stage, because atmospheric air is bleeding into the interior of shaping member or suction box 35, the suction effect through openings 42 is at a minimum.

In Fig. 7, the leading envelope has been raised to some extent and bleed vent 144 is beginning to close.

In Fig. 8, the bleed vent has entirely closed and the second envelope is being drawn against plate 40 by the full force of the suction which is now exerting itself unmitigated by bleed. While the bleed valve may be thus closed before the first envelope has fully cleared the upper openings 42, in order to allow vacuum to build up rapidly in the interior of shaping member 35 and thus

hasten the movement of the second envelope, this will not interfere with the further movement of the first envelope when it has reached the point shown.

In Fig. 9 the bleed hole is still closed, and the second envelope is being drawn firmly against plate 42 by the full force of the suction.

In Fig. 10, the bleed hole has begun to be opened by arrival of the leading edge of a succeeding slot 143 opposite hole 144. Consequently the vacuum in the interior of the member 35 is beginning to be diminished by inrush of atmospheric air, and the force tending to press the second envelope against the plate 40 is beginning to diminish. At this stage flap sucker 47 is drawing the flap of the second envelope to full open position where it will be in readiness to be engaged by the next pair of lugs 20, 21.

The result is that positively-actuated means are provided, synchronized with the movement of the lugs of the onward feeder, to assure that the suction is at maximum value when an envelope is being drawn towards the plate in a direction normal to its surface, and at minimum value when an envelope is lifted away from the plate in a direction parallel to its surface.

While I have herein shown and described, with certain alternates and modifications, the best form of apparatus known to me whereby the advantages of the invention may be realized, I do not intend that the invention shall be limited to the particular form in which the invention is illustrated, but that it shall be taken as embracing all forms and subcombinations thereof comprehended within the following claims.

I claim as my invention:

1. In a machine for feeding flexible sheets, the combination of a stack feeder, an onward feeder for advancing one by one sheets taken from the stack, the paths of travel of said feeders intersecting at substantially right angles, a plate positioned immediately adjacent the path of travel of the onward feeder and across the path of travel of the stack feeder, suction openings located in the plate surface to draw the leading sheet in the stack toward the plate and to conform said sheet to a predetermined shape at the moment it is to be engaged by the onward feeder, vents open to atmosphere in communication with said suction openings, and a bleed valve alternately opening and closing said vents, said valve being driven in synchronism with the onward feeder and arranged to open said vents and thus to reduce said suction when said sheet is to be engaged by the onward feeder.

2. In a machine for feeding flexible sheets, the combination of a stationary shaping plate, power-driven feeding mechanism for continuously advancing a stack of said sheets with their faces juxtaposed in such manner that the leading sheet approaches said plate from a direction generally normal to the surface thereof, a suction opening in said plate adapted to draw the leading sheet into engagement with the plate and thus cause it to conform in shape to the shape of the plate, power-driven feeding mechanism adapted to remove successive leading sheets one by one from a position of engagement with the surface of the shaping plate in a direction generally parallel to said surface, and a bleed valve driven in synchronism with the last-named feeding mechanism and adapted to open and thus to reduce said suction when a sheet is to be removed from engagement with said plate.

3. In a machine for feeding envelopes, the

combination of a horizontal envelope stack feeder, an envelope feeder for extracting envelopes vertically from the stack one at a time by engagement with their flaps, a vertical plate positioned across the path of travel of the stack feeder and substantially in the plane in which envelopes are to be extracted therefrom, suction openings adjacent the plate surface adapted to draw the body of the leading envelope toward the plate and thereby conform it to a predetermined shape with its flap clear of the surface of the plate, and a bleed valve driven in synchronism with said second-mentioned feeder and arranged to open and thus reduce the suction when an envelope is to be extracted from the stack.

4. In a machine for feeding envelopes, the combination of a horizontal envelope stack feeder, an envelope feeder for extracting envelopes vertically from the stack one at a time by engagement with their flaps, a vertical plate positioned across the path of travel of the stack feeder and substantially in the plane in which envelopes are to be extracted therefrom, suction openings adjacent the plate surface adapted to draw the body of the leading envelope toward the plate and thereby conform it to a predetermined shape with its flap clear of the surface of the plate, a flap sucker adjacent said plate surface adapted to open the flap of an envelope held against the plate, and a bleed valve driven in synchronism with said second-mentioned feeder and arranged to open and thus reduce the suction when an envelope is to be extracted from the stack.

5. In a machine for feeding flexible sheets, the combination of means for causing a stack of said sheets to be delivered so that a portion of the surface of the leading sheet is presented against the surface of a shaping plate, at least one suction opening adjacent the plate surface adapted to be covered by the leading sheet when the latter comes to rest against the plate, a passageway communicating with said opening for sucking air through said opening to draw said sheet toward the plate, bleed vent open to atmosphere communicating with said passageway, and a power-operated valve arranged alternately to open and close said bleed vent from said passageway to the atmosphere thereby alternately decreasing and increasing the suction effect through said opening.

6. In a machine for feeding flexible sheets, the combination of power-driven feeding mechanism for continuously advancing a stack of said sheets with their faces juxtaposed and delivering the leading sheet against the surface of a shaping plate, a suction opening adjacent the plate surface adapted to be covered by the leading sheet when the latter comes to rest against the plate, a passageway communicating with said opening for sucking air through said opening to draw said sheet toward the plate, a bleed vent open to atmosphere communicating with said passageway, and a power-operated valve arranged alternately to open and close said bleed vent from said passageway to the atmosphere thereby alternately decreasing and increasing the suction effect through said opening.

7. In a machine for feeding flexible sheets, the combination of a stationary shaping plate, means for causing a stack of said sheets to be moved toward the surface of said plate in such manner that the leading sheet approaches said plate from a direction generally normal to the surface thereof, an opening in said plate adapted to be covered by the leading sheet when said sheet comes in contact with the plate, a passageway communicating with said opening for sucking air through the opening, power-driven feeding mechanism adapted to move successive leading sheets one by one from in contact with the surface of the shaping plate in a direction generally parallel to said surface, and a bleed valve driven in synchronism with the last-named feeding mechanism and adapted to open and thus to reduce said suction when a sheet is to be removed from engagement with said plate.

8. In a machine for feeding envelopes, the combination of means for causing a stack of said envelopes to be delivered so that a portion of one lateral surface of the leading envelope is presented against a shaping plate, at least one suction opening adjacent the plate surface adapted to be covered by the envelope when the latter comes in contact with the plate, a passageway communicating with said opening for sucking air through the opening and thus drawing the envelope towards the plate, power-driven feed mechanism adapted to engage under the opposite ends of the flap of the leading envelope while it is in contact with the plate and to move said envelope away from the plate in a direction generally parallel to the surface thereof, and a bleed valve driven in synchronism with said last-named feed mechanism arranged to open and thus reduce the suction when an envelope is to be moved away from the plate.

9. In a machine for feeding envelopes, the combination of means for causing a stack of said envelopes to be delivered so that a portion of the flap side of the leading envelope is presented against a shaping plate with the flap free of the plate, at least one suction opening adjacent the plate surface adapted to be covered by the envelope when the latter comes to rest against the plate, a passageway communicating with said opening for sucking air through the opening and thus drawing the envelope towards the plate, and a power-operated valve arranged alternately to open and close a bleed vent from said passageway to the atmosphere thereby alternately decreasing and increasing the suction effect through said opening.

10. In a machine for feeding envelopes, the combination of means for causing a stack of said envelopes to be delivered so that a portion of the flap side of the leading envelope is presented against a shaping plate with the flap free of the plate, at least one suction opening adjacent the plate surface adapted to be covered by the envelope when the latter comes in contact with the plate, a passageway communicating with said opening for sucking air through the opening and thus drawing the envelope towards the plate, power-driven feed mechanism adapted to engage under the opposite ends of the flap of the leading envelope while it is in contact with the plate and to move said envelope away from the plate in a direction generally parallel to the surface thereof, and a bleed valve driven in synchronism with said last-named feed mechanism arranged to open and thus reduce the suction when an envelope is to be moved away from the plate .

11. In a machine for feeding envelopes, the combination of means for causing a stack of said envelopes to be delivered so that a portion of the flap side of the leading envelope is presented against a shaping plate with the flap free of the plate, at least one suction opening

substantially in the plane of the plate adapted to be covered by the envelope when the latter comes in contact with the plate, a passageway communicating with said opening for sucking air through the opening and thus drawing the envelope towards the plate, power-driven feed mechanism adapted to engage under the opposite ends of the flap of the leading envelope while it is in contact with the plate and to move said envelope away from the plate in a direction generally parallel to the surface thereof, suction means to raise the flap of the leading envelope into elevated position while the envelope is in contact with the plate, and a bleed valve driven in synchronism with said feed mechanism and arranged to open and thus to reduce said suction when the flap has been raised.

12. In a machine for feeding envelopes to a printer, the combination of a stationary shaping plate, power-driven feeding mechanism for continuously advancing a stack of envelopes flap-sides leading towards the surface of said plate so that the leading envelope approaches said plate from a direction generally normal to said surface, said plate being so shaped that the flap of the leading envelope remains free of the plate when the body of the envelope comes in contact with the plate, a plurality of suction openings in the plate adapted to draw the body of the envelope toward the plate and to conform it in shape to the shape of the plate, power-driven feeding mechanism engaging under opposite ends of the flap of the thus-conformed leading envelope to withdraw it from a position in contact with the plate and to advance it towards printing position, suction means to raise the flap of said envelope into elevated position while the envelope is in contact with the plate, and a bleed valve driven in synchronism with said feed mechanism and arranged to open and thus to reduce said suction when the flap has been raised.

13. In an envelope handling machine, a suction box for momentarily holding an envelope in a predetermined position in which it may be engaged by an onward feeder, said box having a vent open to atmosphere, and a powered valve for alternately opening and closing said vent to

atmosphere and driven by the feeder to open the vent for bleeding air to the suction box when the envelope is to be engaged by the feeder to reduce suction on the envelope at that time.

14. In an envelope handling machine, a power-driven feeder adapted to extract envelopes one by one from a moving stack thereof, a suction box positioned across the path of travel of envelopes in the stack and arranged to draw envelopes one at a time from the stack and to hold them in position to be engaged by the feeder, said box having a vent open to atmosphere, and a powered valve for alternately opening and closing said vent to atmosphere and driven in synchronism with the feeder to open the vent for bleeding air to the suction box when an envelope held by the box is to be extracted by the feeder to reduce suction on the envelope at that time.

15. In an envelope handling machine, a power-driven feeder adapted to extract envelopes one by one from a moving stack thereof, a suction box positioned across the path of travel of envelopes in the stack and arranged to draw envelopes one at a time from the stack and to hold them in position to be engaged by the feeder, said box having a vent open to atmosphere, and a powered bleed valve for the box for alternately opening and closing said vent to atmosphere and driven in synchronism with the feeder and adapted to close the vent when an envelope is to be drawn towards the box to apply full suction to the envelope at that time and to open the vent when an envelope is to be extracted by the feeder to then reduce suction on the envelope.

JACOB R. LAUFFER.

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Number	Name	Date
Re. 20,862	Harrold	Sept. 20, 1938
769,927	Zeh	Sept. 13, 1904
955,112	Abrams	Apr. 12, 1910
1,724,199	Hoag	Aug. 13, 1929
2,449,690	Chapman	Sept. 21, 1948