

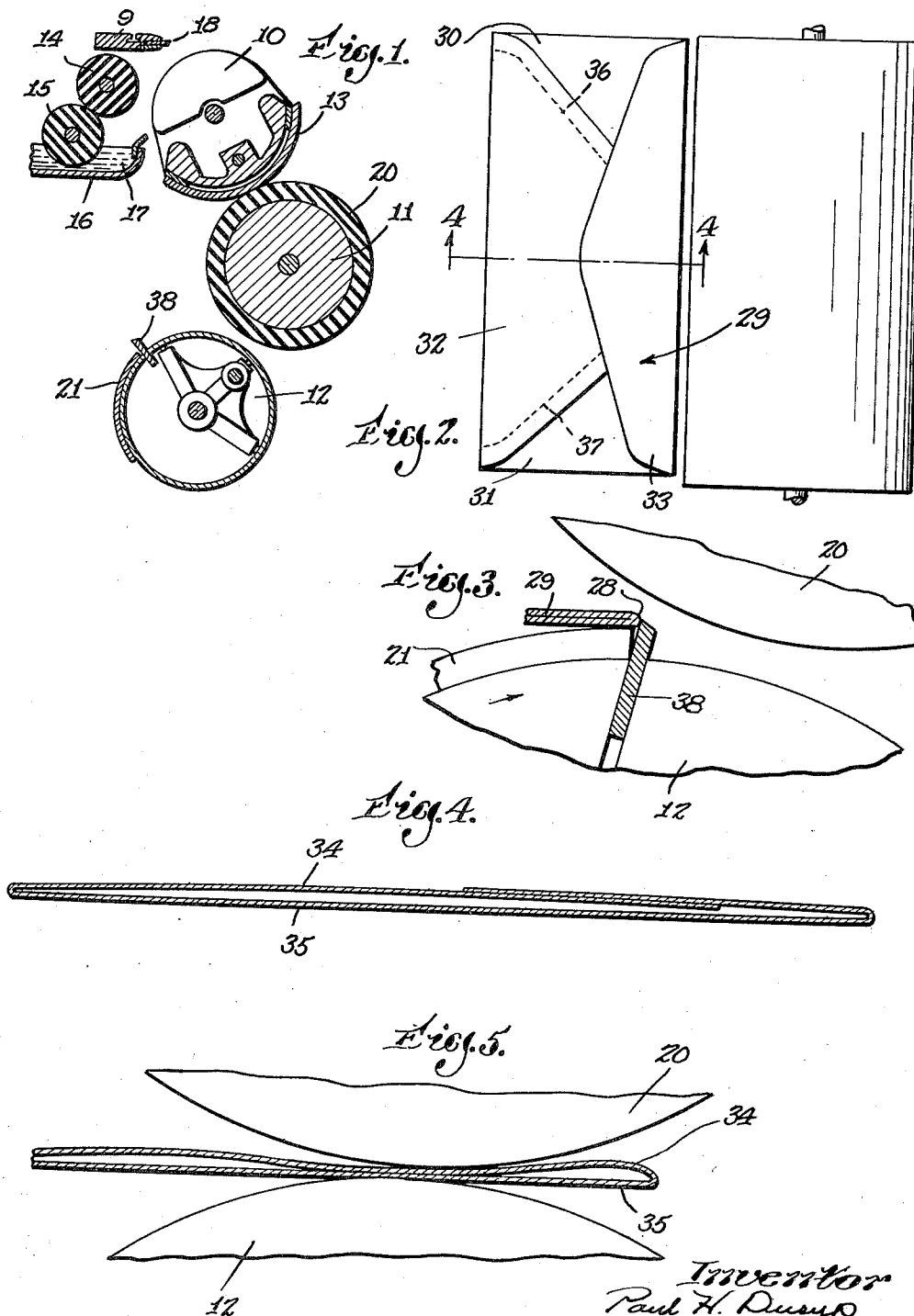
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METHOD OF PRINTING ENVELOPES

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METHOD OF PRINTING ENVELOPES

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This invention relates to methods of printing envelopes, and other multiple sheet subject matter, and to a method of printing such subject matter from edge to edge.

5 In printing envelopes and similar subject matter it has been found desirable to apply printed subject matter entirely over the back side of the envelope or sheet thereby covering it from edge to edge. It is also required that such an operation be carried out at relatively high speeds, as
10 for example 5,000 or more envelopes per hour, in order for the cost of the printing operations not to be prohibitive. At such printing speeds, difficulty is experienced in holding an envelope or other
15 similar sheet in a registered position with the printing members. Difficulty is also experienced in removing the envelope or similar sheet of material from the printing roll after printing occurs, on account of the ink tending to stick the
20 subject matter to the printing member. Both of these difficulties are due to the fact that it is not possible to apply conventional gripping mechanism against the surface of the envelope since all of the rear face is required to be covered by
25 the printing ink.

It is the chief object of this invention to provide a method of printing envelopes or similar sheets from edge to edge, with a view to effecting suitable registration and to obtaining adequate separation of the envelope from the printing members at high speeds.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing and the novel features will be particularly pointed out in the appended claims.

In the drawing:

Figure 1 is a diagrammatic view illustrating printing means employed in carrying out our improved method.

40 Fig. 2 is a plan view illustrating a method of positioning and advancing an envelope to printing members.

Fig. 3 is a detail view illustrating a step of registering an envelope between printing members.

45 Fig. 4 is a cross section taken on the line 4—4 of Fig. 2.

Fig. 5 is a fragmentary view in end elevation of printing members illustrating separation of an envelope from the rolls.

50 Our invention comprises an improved method of printing envelopes at high speed and in the absence of gripper mechanism. This application is a continuation in part of our co-pending application, Ser. No. 251,192, filed January 16, 1939.

Referring in detail to the drawing, one example of printing means suitable for carrying out our method has been illustrated in Fig. 1, in which 10 indicates a printing roll, 11 refers to a transfer roll and 12 denotes an impression roll. Roll 10 5 is provided with a printing plate 13 of some suitable type as a gravure or intaglio type, and the roll is adapted to rotate in a clockwise manner as viewed in Fig. 1. This roll picks up ink from a distributing roll 14 deposited thereon by an ink 10 roll 15 in association with an ink trough containing an ink 17. 18 denotes a doctor blade received in bar 19 for removing excess ink from the printing plate 13 during rotation thereof. According to the usual manner of offset printing, 15 the ink is pulled from the recessed portions of the plate 13 by the resilient blanket 20 of roll 11. The latter roll rotates in conjunction with roll 12 and applies ink to the subject matter to be printed supported on impression plate 21 of roll 20 12. If desired, other types of printing presses may be resorted to in carrying out our improved method.

In employing the above described apparatus we make use of certain mechanical features of an envelope. Envelopes are usually of a rectangular or square shape, and present a front face and a rear face. The rear face comprises an arrangement of overlapping flaps secured by adhesive. As an example of one flap arrangement we have illustrated in Fig. 2 an envelope 29 which has folded end flaps 30 and 31. Glued to the end flaps is a bottom flap 32 and loosely overlying the end flaps and the bottom flap is a top flap 33.

It will be observed that edges 28 of the envelope 29 are formed from folding the flaps over on the front face. These edges are of a somewhat rounded character which are never completely covered by printing ink when passed between the printing rolls. The reason for this is that the pressure of the rolls is not great enough to result in the edges 28 becoming pressed into a sharply formed line. However, when viewed the envelope appears to be completely covered from edge to edge and those portions of the rounded 45 edges not covered with ink are not observed.

We make use of this condition, in printing an envelope from edge to edge, to secure registration with the elimination of smurring or undesirable picking up of ink by register mechanism.

55 In printing from edge to edge, a difficult type of registration is required to be carried out. The usual registration consists in providing subject matter in a squarely presented position and insuring that printing occurs at the same point for 55

each impression. Registration for printing from edge to edge consists in positioning the subject matter not only in a squarely presented position but also in a position such that the edge of the printing plate carrying the printing ink will coincide with an edge of the subject matter. To effect this, some type of guide must be employed and it is customary to employ a guide which is depressed at the nip of the rolls but which provides a surface for receiving an edge of the subject matter up until the point of nip has been reached. When an edge of the ink image is in a position to roll into contact with an edge of the subject matter, it has heretofore been considered practically impossible to prevent ink being picked up by the edge of the depressible guide member against which the edge of the subject matter rests.

Since, by the folding referred to, there is a very small part of an envelope edge which will not receive ink in any event, we allow the edge to be received against a depressible guide 38 which has been slightly spaced away from the pressure plate 21 of roll 12 as may be more clearly seen in Fig. 4. As a result a substantial "bleeding-off" operation is effected. By "bleeding-off" is meant that the subject matter is printed from edge to edge. No smurring of ink occurs due to the slight spacing described and a high speed, practical, and continuous "bleeding-off" is made possible.

It will be observed, as seen in Fig. 5, that an envelope presents two layers of paper 34 and 35, of which only the top layer receives ink when the envelope is printed. It will also be observed that there is a space between the two layers which is constantly maintained, thereby developing a springiness or a tendency of the two layers to remain apart even after being pinched together. The reason for this springiness is readily apparent since folded over parts which make up the back of the envelope tend to open up and occur in a slightly arched state, as illustrated in Fig. 5, while the front of the envelope tends to remain in substantially flat state. It has been found that this envelope construction, which is common to a majority of envelopes, develops a resistance which may be used to advantage in opposing and minimizing sticking of the envelope to the printing member. This results in making possible a higher speed operation than would be possible with a single ply sheet.

The tendency of the two plies of paper to spring apart tends to result in there occurring a distortion of the top ply 34 by the printing member after passing the nip of the printing member with the pressure plate member as has been illustrated in Fig. 6. The bottom ply 35 of the envelope tends to pass along in a straight line as has been illustrated and thereby may tend to pull the top ply away from the printing member.

In addition, the mechanical construction of the envelope is such that it may be more effectively utilized by specific positioning to further assist in separating the envelope from the printing member after printing has occurred. It is pointed out that an envelope may be advanced to the printing members with either the bottom flap 32, end flaps 30 or 31, or top flap 33 in a forward position. Varying amounts of stiffness will be presented by advancing the top flap of the envelope to the rolls first. The reason for this is that the two edges 36 and 37 of the bottom flap 32 are secured by gum or other adhesive which tends to increase stiffness in the envelope. In

addition, the edges converge toward the top flap 33. Therefore positioning of the envelope with the gummed edges 36 and 37 in this converged position with respect to a printing roll results in the envelope offering greatest initial resistance to bending and having the strongest tendency to maintain itself in a flat state, and break away from the inky printing surface.

There are further advantages in presenting the top flap of an envelope in a forward position. This location insures the top flap 33 being completely flattened down when printing occurs, eliminates danger of an unprinted margin developing around the edge of the flap. Also, in this position the printing ink is rolled against those edges where the bottom flap 32 laps over the end flaps 30 and 31. This results in the ink film tending to effect a sealing action along these edges and also tending to prevent accidental loosening of the edges which may occur when the envelope is exposed to dampness or other unfavorable conditions.

It will be observed that by our method of printing an envelope, it is possible to carry out "bleeding-off" operation at high rates of speed. In practice, applicants have succeeded in printing as many as 10,000 envelopes per hour by employing the steps above outlined. It will be noted that the elimination of difficulties arising from ink smurring heretofore encountered have been overcome, a fine character of printing is available, and a sufficiently high-speed operation is possible to effect material savings in the cost of printing envelopes.

While we have thus described a preferred embodiment of our invention, it will be noted that the invention may be employed in other forms without departing from the spirit thereof.

We claim:

1. In a printing process, the steps which comprise advancing subject matter comprising a plurality of sheets joined together along an edge thereof to printing means, transferring an image from said printing means to one of said sheets, distorting said printed sheet in a direction toward the printing surface by adherence of said sheet to said surface, and separating said sheet from said surface by a pull exerted along said connected edge from another constituent sheet of said subject matter.

2. The process of printing a multiple layer sheet having folded edges which comprises advancing the sheet to printing members, printing thereon and then effecting separation of the multiple sheet from the printing member by the pull exerted from the folded edges of the multiple sheet.

3. In a printing process, the steps which comprise advancing resilient multi-ply subject matter to a curved printing surface, transferring an image from said printing surface to one ply of said subject matter, resisting the tendency of said printed ply to adhere to said printing surface, and separating said subject matter from said surface, by the inherent resiliency of said subject matter.

4. In a printing process, the steps which comprise advancing resilient multi-ply subject matter to a curved printing surface, constituent plies of said subject matter being connected at edges thereof but inherently spaced apart intermediate said connected edges, transferring an image from said printing surface to one ply of said subject matter, resisting the tendency of said printed ply to adhere to said printing surface and sep-

arating said subject matter from said surface, by the inherent resiliency of said subject matter, the resiliency of the unprinted ply exerting on the printed ply, through an attached edge thereof, a pull to assist in separating said ply from the printing surface.

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That improvement in methods of printing a sheet of subject matter between a printing roll and a pressure roll which consists in registering a front edge of said sheet against a depressible guide in one of the rolls, engaging said front edge flatly against the roll while the guide is being depressed, and then passing the sheet between the rolls independently of any holding means on the printing couple.

6. That improvement in methods of printing envelopes between a printing roll carrying a printing image and a pressure roll having a pressure plate thereon, which consists in registering a forward edge of an envelope against a depressible guide in a slightly overhanging position with relation to the edge of the said pressure plate, then engaging said forward edge of the envelope at the nip of the printing image on the printing roll with the forward edge of the pressure plate, and then applying a printing image to the envelope.

7. That improvement in methods of printing which consists in advancing subject matter toward rolls and against a depressible guide in one

of said rolls, holding the forward edge of the subject matter flatly against the depressible guide roll and then engaging said front edge of the subject matter with the front edge of a printing image on one of the rolls at the point of nip thereof with the other of the said rolls.

8. That improvement in methods of printing a sheet of subject matter between a printing roll having a printing image on a pressure roll which consists in registering the said sheet against a moving guide in the pressure roll and then engaging the front edge of said sheet with the front edge of a printing image on a printing roll at the point of nip thereof with the pressure roll, and then printing the said sheet from edge to edge independently of any holding means on the printing couple.

9. That improvement in methods of printing a sheet between a printing roll carrying a printing image and a pressure roll having a pressure plate thereon which consists in registering the front edge of the sheet against a depressible guide located adjacent the said pressure plate, then engaging the said front edge of the sheet at the nip of the front edge of the printing image on the printing roll with the forward edge of the pressure plate and then applying a printing image to the sheet.

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