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METHOD AND APPARATUS FOR THE PRODUCTION OF
ENVELOPES WITH GUMMED CLOSING FLAPS

2,944,470

Filed May 6, 1958

4 Sheets-Sheet 1

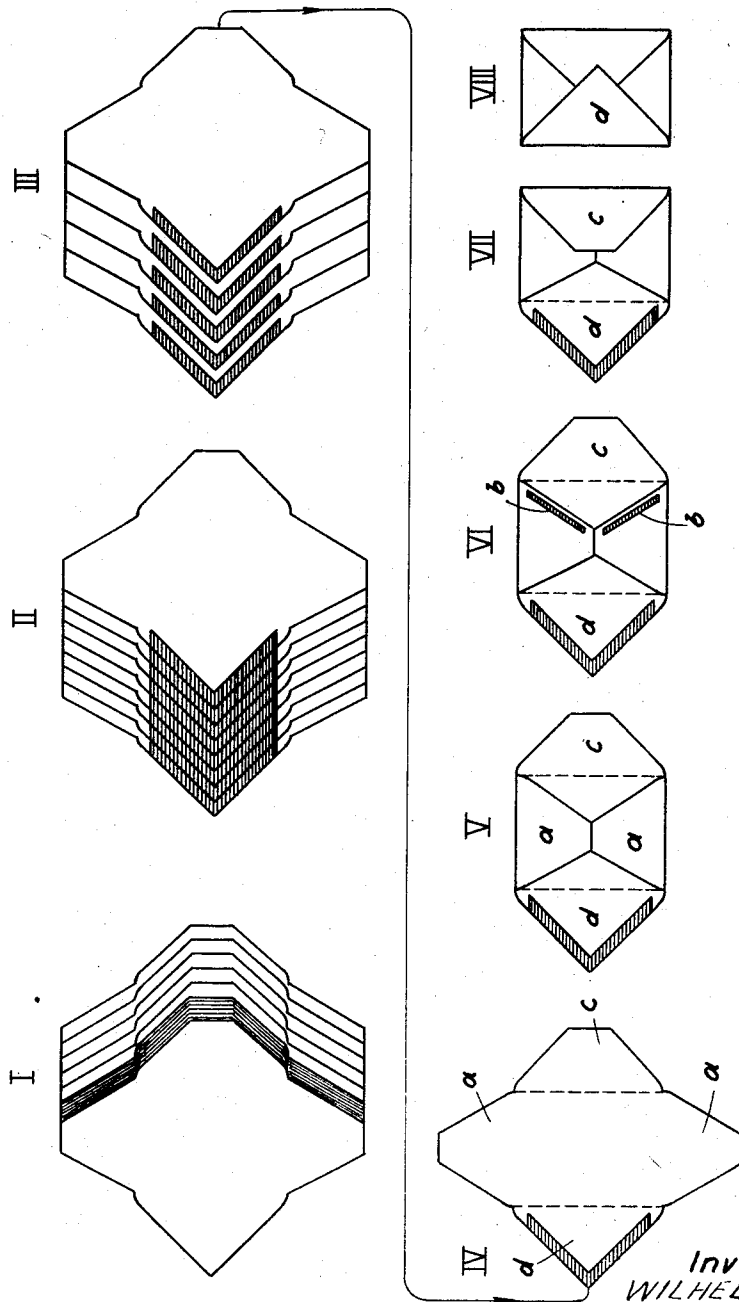


Fig. 1

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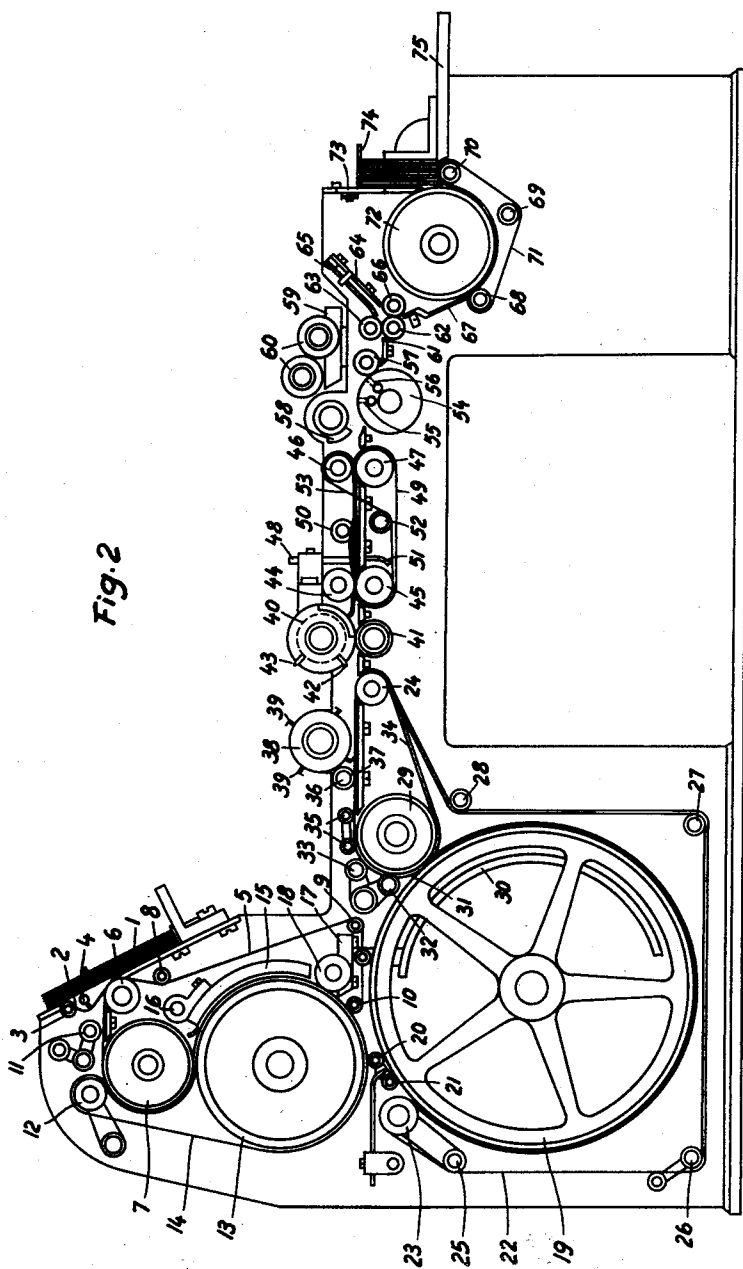
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Fig. 3

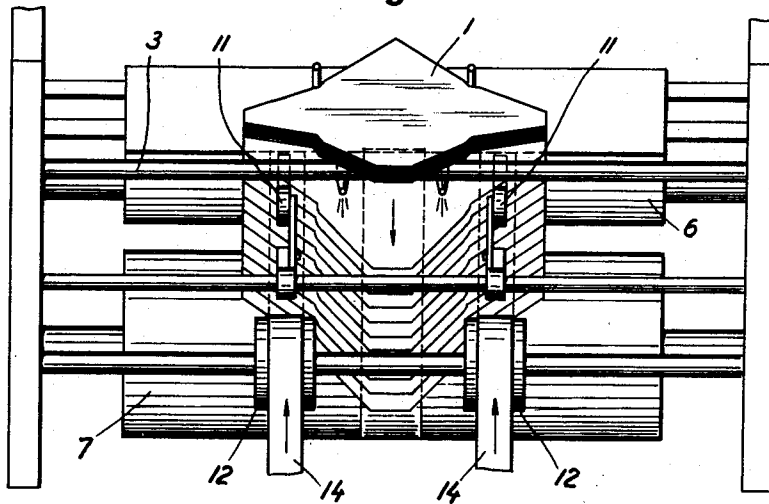
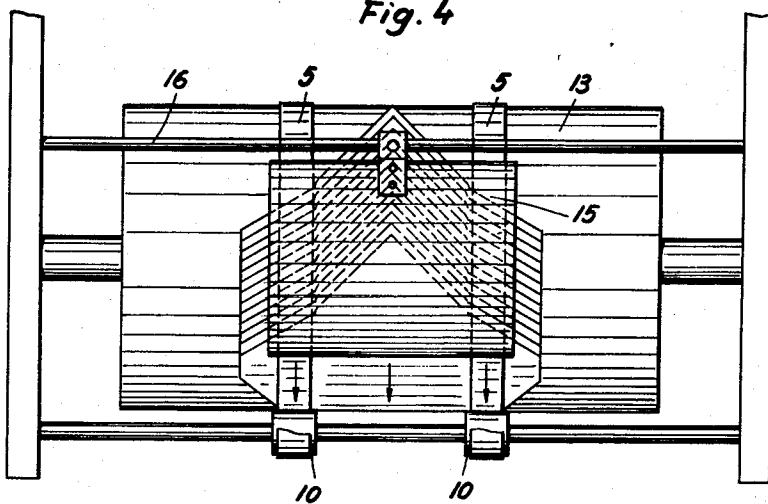


Fig. 4



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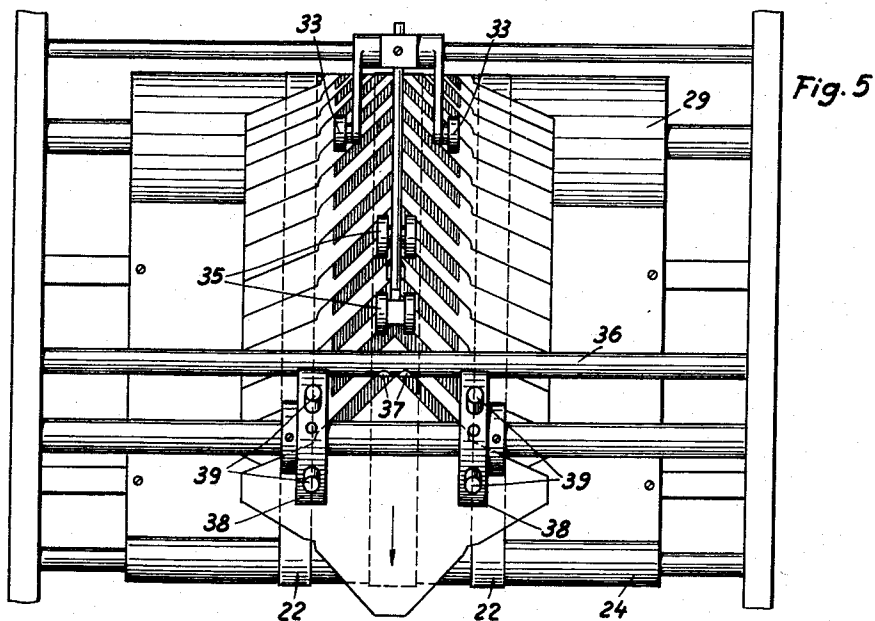


Fig. 5

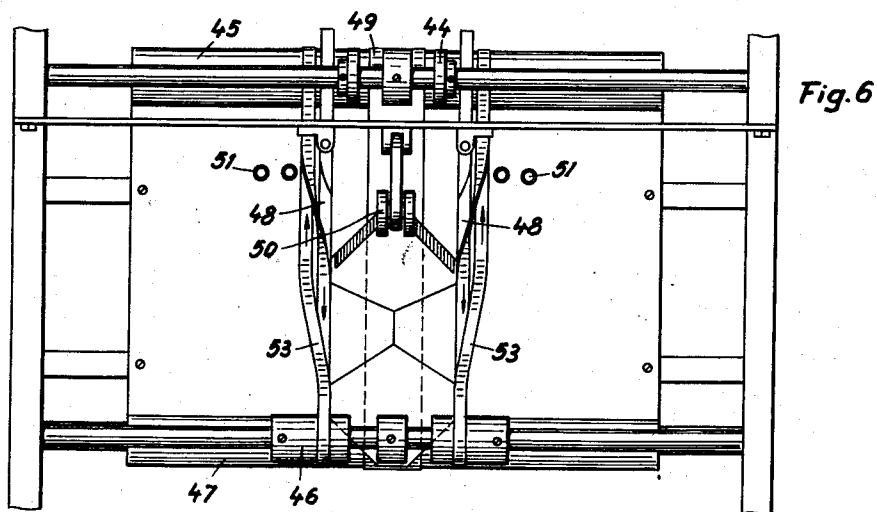


Fig. 6

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METHOD AND APPARATUS FOR THE PRODUCTION OF ENVELOPES WITH GUMMED CLOSING FLAPS

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2 Claims. (Cl. 93—62)

For producing letter envelopes with gummed closing flaps a method is known according to which the blanks taken from a pile of sheets are heated over a heating drum on the side remote from the gummed side with the object of heating the edges of the closing flaps to be gummed. In this method in which the stacked blanks are conducted over the heating drum, the heat must always penetrate through the whole pile of paper so as to heat the freely projecting edges of the flaps. As a result it may happen, especially in the case of thick paper, that the sheets located nearest the heating element become scorched, whereas the uppermost flaps are not sufficiently heated to dry the gum which is subsequently applied.

The object of the invention is to devise a method of producing envelopes wherein the above-mentioned objections are overcome and important advantages both from a technical as well as from an economical point of view are attained.

The method according to the invention is characterized in that the blanks taken from a pile of sheets or a roll of paper and cut to shape and size are assembled in a continuous paper web with the edges of the closing flaps staggered one below the other and one behind the other, and the exposed surfaces of the flaps to be gummed are smoothed, hardened and heated by an ironing process, the gum is then applied on the smoothed heated flap surfaces and dried, whereupon the foremost and uppermost of the blanks forming the layer of gummed blanks is straightened up, thereby widening the spacing of the staggering, is withdrawn from the layer of blanks and then finally folded and stuck down.

The method according to the invention possesses the advantage that preferably only the surfaces of the closing flaps to be gummed are heated and at the same time the surface of the paper to be gummed is smoothed and hardened. The gum subsequently applied cannot therefore penetrate the paper and hardens directly on the heated surface. The drying process is thereby considerably accelerated. Moreover the quantity of gum to be applied can be far less.

The invention also relates to a machine or an apparatus for carrying out this new method and comprises a device for receiving the pile composed of blanks cut to shape and size, a device for removing the blanks from the pile, a conveying device for transporting the blanks, a device for individually separating the blanks and a device for folding and sticking the envelopes.

The machine is characterized in that it comprises means for pulling the blanks from the pile in staggered formation, means for smoothing and hardening as well as heating the surfaces of the closing flaps to be gummed, means for straightening up the blanks in the position necessary for folding and sticking, and means for folding and sticking the side and bottom flaps.

Other features of the invention will be hereinafter disclosed in the following description of a form of construction of the invention illustrated by way of example in the accompanying drawings, in which

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Fig. 1 is a diagram illustrating the different stages of the method according to the invention;

Fig. 2 is a longitudinal section of a machine for carrying out this method;

Fig. 3 shows in plan view a device for withdrawing the blanks in staggered formation from a pile of blanks cut to shape and size;

Fig. 4 is a plan view of a device for smoothing out, hardening and heating the surfaces of the closing flaps to be gummed;

Fig. 5 shows a device for straightening up the blanks in top plan view, and

Fig. 6 is a top plan view of a device for folding over the side and bottom flaps.

According to the method illustrated by way of example in Fig. 1, in stage I the blanks are withdrawn from the pile of blanks according to the gummed width of the edges of the closing flaps and are brought by a conveyor track into the position necessary for applying the gum. After the surfaces of the closing flaps which are to be gummed have been smoothed and heated, the application of the gum on these heated surfaces of the closing flaps is carried out in stage II. In stage III the applied gum dries and the staggering is widened slightly, whereupon the blank which is actually foremost and uppermost is quickly straightened up and withdrawn from the layer of blanks and is then in stage IV. In the subsequent stages V to VII of the method, the side flaps *a* are folded over, the gum *b* is applied for subsequently sticking the bottom flap *c*, the bottom flap *c* is folded over and the closing flap closed.

As can be seen from Fig. 2, the lowermost blank of the pile 1 is gripped by the suction holes 2 in the suction shaft 3 at the point of the bottom flap and bent away from the pile. As soon as the bent portion of the blank comes within the range of the compressed air nozzles 4 it is forced by the compressed air passing out of the nozzles on to a belt 5 which is driven by the cylinders 6, 7 and guided over the rollers 8, 9 and 10. When the blank arrives on the belt 5 with its bottom flap in advance, the rollers 11 move towards the pile of blanks 1 and pull the blank forward a distance corresponding to the width of that portion of the closing flap to be gummed. While the blank is being carried along, the rollers 11 return into their initial position, the next following blank being withdrawn from the pile 1 (Fig. 3) by the suction shaft 3 and fed to the rollers 11 now again moving towards the pile 1.

The layer of blanks staggered by the belt 5 and the rollers 11 is then guided under the conveyor belt 14 driven by the drum 13 and passes over this drum 13 between the pairs of belts 5 and 14. The free edges of the closing flaps are smoothed out, hardened and heated by means of the ironing plate 15 (Fig. 4) movably mounted on the shaft 16. Thereupon the gum is applied on the smoothed and heated surfaces of the closing flaps by means of the cylinder 18 mounted in the gum bath 17. The layer of staggered and gummed blanks passing out from between the pairs of conveyor belts 5, 14 is taken over by the disc wheels 19 and the rollers 20. The supplementary rollers 21 assist the layer in running in under the belts 22. The speed of the disc wheels 19 and of the conveyor belts 22 is somewhat higher than that of the conveyor belts 5, 14, so that the staggering spacing is slightly increased and the edges of the closing flaps do not stick together. The conveyor belts 22 are driven by the cylinders 23 and 24 and guided by the rollers 25, 26, 27 and 28. The heated edges of the closing flaps are cooled and the gum dried completely on the path to the cylinder 29 by means of cold air, fed through the passage 30. The gummed layer of blanks is led off from the disc wheels 19 by guides 31 and, while still remaining tem-

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porarily on the belts 22, is taken over by the rollers 32, 33 and passed on to the conveyor belt 34 running at a higher speed and the counter rollers 35. These rollers 35 are adjustable in such a manner that they can grip the foremost and uppermost blank when it is released by the rollers 33. The conveyor belt 34 is driven at such a speed that although the blanks still remain staggered, the spacing of their staggering is considerably increased. From this layer of staggered blanks the foremost blank is picked up by its flap trailing behind with the aid of the suction shaft 36 provided with suction aperture 37 and is lifted off the layer of blanks. Fingers 39 (Fig. 5) are provided on rollers 38 and grip the blank at its rear fold corner incisions and carry it to the withdrawing cylinders 40, 41, at the same time dressing or straightening it up, whereupon these cylinders promptly withdraw it completely from the layer of blanks. The upper withdrawing cylinder 40 is equipped with blades 42, 43 adjustable in relation to each other and has in its peripheral surface an aperture which allows the free entrance of the advance bottom flap. As the blank passes between the rollers 40, 41 it is creased by means of the creasing blades 42, 43 to facilitate the subsequent folding over of the bottom and closing flaps. In passing from the cylinders 44, 45 to the cylinders 46, 47 the blank comes under the folding blades 48 (Fig. 6) which are adjustable in such a manner that the distance between their outer edges corresponds to the crease lines for the side flaps. The travel to the cylinders 46, 47 is assisted by the conveyor belt 49 with the counter rollers 50. With the aid of compressed air nozzles 51 the two side flaps located outside the crease lines are raised, then folded over between the cylinders 44, 46 by belts 53 circulating in the form of a loop over the cylinders 45, 46 and 52 and finally pressed down in passing between the cylinders 46, 47. The loop shape of the endless circulating belts 53 is produced by the fact that the contact side is reversed in the upper strand like a Möbius belt. The envelope blank continues to travel towards the conveyor and folding cylinder 54 and is gripped by the suction apertures 55 directly behind the crease line for the bottom flap. At the same time the point of the bottom flap pointing ahead is raised by compressed air passing out of the aperture 56 and is guided over the creasing shaft 57. Gum is previously applied to the front edges of the side flaps by the gumming device 58 which receives gum from the cylinders 60 mounted in the gum bath 59. The envelope running out from between the cylinders 54, 57 passes over a guide plate 61 between the cylinders 62, 63 and is conducted thereby into the folding pocket 64. Adjustable abutments 65 are arranged in the folding pocket 64 and determine the height of the fold, and in the course of the further transport of the envelope between the cylinders 62, 63 the closing flap is folded over between the cylinders 62, 66, the direction of travel of the envelope being thereby reversed. The finished folded envelope running out from between the cylinders 62, 66 is then guided by the curved plate 67 between the conveyor belts running over the cylinders 68, 69 and 70 and the disc 72, from which it is conveyed by the plate 73 against the adjustable stops 74 and stood on the delivery table 75.

I claim:

1. Machine for producing gummed envelopes comprising, in combination, means for withdrawing blanks

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individually and successively from a source of supply and forming a continuous web of blanks arranged in staggered formation having the edges of the closing flaps to be gummed exposed, means for smoothing, hardening and heating said exposed edges, means for applying gum to said heated edges, means for cooling said gummed edges, means for straightening up and advancing the foremost and uppermost blank of the web, means for removing the advanced blanks successively from the web, means for folding over the side flaps of the blank, means for applying gum for sticking the side flaps and the bottom flap of each blank, means for folding over the bottom flap, means for folding over the closing flap and means for collecting the finished folded envelopes, and a transporting system interconnecting said aforementioned means, said means for smoothing, hardening and heating said exposed edges including a flat ironing device arranged in the path of said web adapted to engage the surfaces of the said exposed edges to be gummed, subsequent to said means for withdrawing said blanks, and preceding said means for applying gum, said straightening up and removing means further comprising a rotary suction shaft for raising up the foremost blank of the gummed web and a rotary cam shaft cooperating with said suction shaft for straightening and discharging the raised blank from the web.

2. Machine for producing gummed envelopes comprising, in combination, means for withdrawing blanks individually and successively from a source of supply and forming a continuous web of blanks arranged in staggered formation having the edges of the closing flaps to be gummed exposed, means for smoothing, hardening and heating said exposed edges, means for applying gum to said heated edges, means for cooling said gummed edges, means for straightening up and advancing the foremost and uppermost blank of the web, means for removing the advanced blanks successively from the web, means for folding over the side flaps of the blank, means for applying gum for sticking the side flaps and the bottom flap of each blank, means for folding over the bottom flap, means for folding over the closing flap and means for collecting the finished folded envelopes, and a transporting system interconnecting said aforementioned means, said means for smoothing, hardening and heating said exposed edges including a flat ironing device arranged in the path of said web adapted to engage the surfaces of the said exposed edges to be gummed, subsequent to said means for withdrawing said blanks, and preceding said means for applying gum, said side flap folding means further comprising belt loops for folding over the side flaps of the envelopes and air nozzles coordinated to these loops for lifting the two side flaps outside the folding lines.

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