May 22, 1945. E. G. RICE 2,376,724

METHOD OF CUTTING OPENINGS THROUGH A PILE OF SHEETS

Filed Oct. 20, 1943

Fig.1.

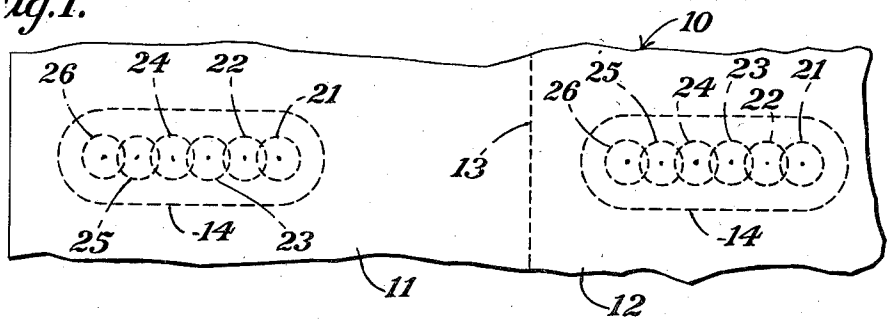


Fig.2

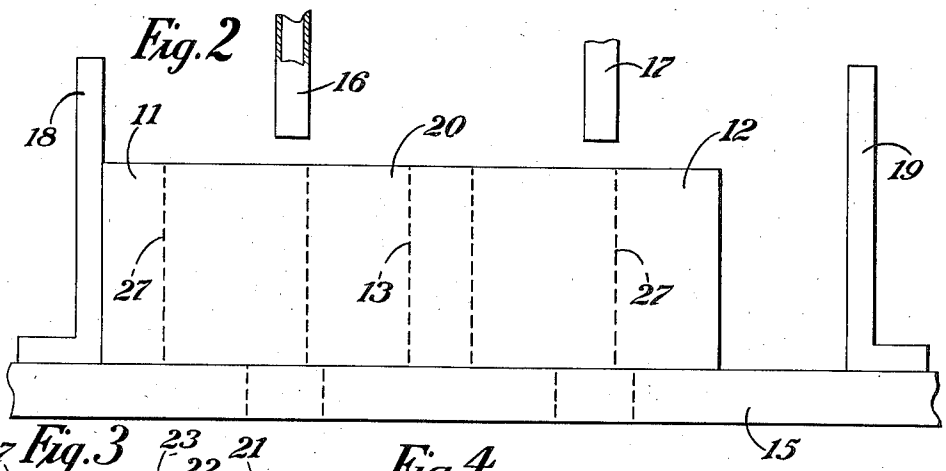


Fig.3

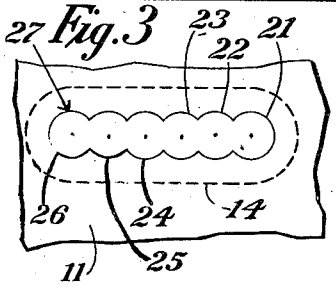


Fig.4

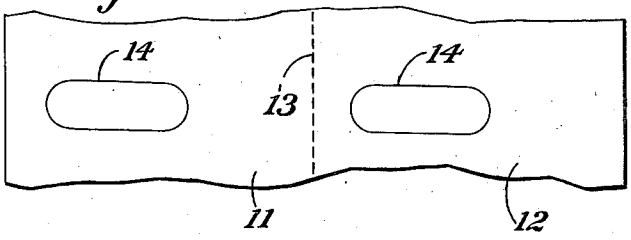
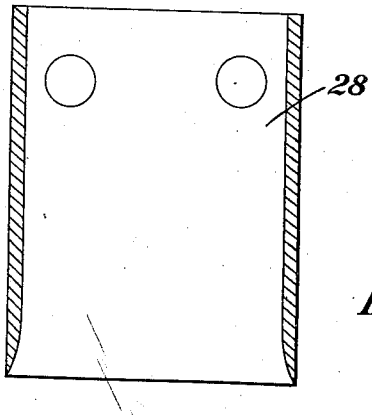


Fig.5



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METHOD OF CUTTING OPENINGS THROUGH A PILE OF SHEETS

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Application October 20, 1943, Serial No. 507,040

8 Claims. (Cl. 164—18)

This invention relates to the cutting of window openings in envelope blanks, and it has for its object the provision of a new and improved method by the use of which the speed of cutting may be very greatly increased. In the production of window openings in envelope blanks by the methods which have been employed for many years by the use of a die forced through a pile of blanks, the operation has been slow and expensive. Under the best of conditions, it has been impossible to die-cut on a commercial basis more than from 25 to 50 or 60 sheets at a time of such weight and thickness as would normally be used for making an envelope. When this is compared with the capacity of the blank forming die which very often can be used to advantage for cutting 500 sheets at a time, it is seen that the window cutting operation has been comparatively tedious and difficult.

My improved method involves the introduction of a preliminary step in the formation of window openings whereby a cutting die is enabled to cut cleanly and easily through from 300 to 600 sheets at a single operation, in marked contrast with the results attained by the former methods. This preliminary step employed by me for increasing the operating capacity of the cutting die, comprises an initial perforation or mutilation of a portion of the paper within the limits of the window opening, involving preferably the removal of a portion of the paper so as to make the necessary preparation for the collapse inwardly of the cut-out portions of the sheets as the cutting die progresses through the pile of sheets. I have found in practice that when a small amount of the paper has been removed by a preliminary step, the cutting die very easily passes through a thick pile of the sheets with a clean sharp cut, and that when the cutting die and the paper have been separated by vertical movement of one or both of them the cut-out pieces ordinarily clear themselves readily from the die by the force of gravity.

The preliminary step of mutilating or cutting out a portion of the paper from within the limits of the window opening is preferably carried out by means of a paper drill which is passed through the pile of sheets at a plurality of points in alignment across the opening. The points of drilling are preferably selected so as to insure that the drill openings shall overlap, whereby an elongated opening is provided inside of the outline of the window opening and preferably extending substantially from end to end of the window opening, such preliminary opening being of such width as to afford ample space into which the later cut paper can collapse inwardly at the die-cutting operation. I have found in practice that a series of overlapped aligned drill openings can be cut in a pile of sheets of paper in a few seconds time in preparation for the subsequent die-cutting operation. In any case where a plurality of envelope blanks are formed in multiple in alignment with each other, a plurality of drills may be employed in the required spaced relationship to each other with one drill operating on one blank portion while at the same time the other drill operates on the other blank portion.

It is another object of my invention to improve in sundry details the method of cutting openings through a pile of sheets. The preferred means by which such improved method may be carried out is illustrated in the accompanying drawing, in which

Fig. 1 is a face view of a portion of a multiple unit envelope blank, showing in dotted lines the positions of the window openings to be cut therein by means of a die, together with the preliminary openings to be cut therein by means of paper drils.

Fig. 2 is a front elevational view on a reduced scale showing a drill press equipped for providing the preliminary openings through a pile of multiple unit envelope blanks or the sheets from which such blanks are to be made.

Fig. 3 is a face view of one end portion of the blank of Fig. 1 after the formation of the preliminary opening therethrough.

Fig. 4 is a face view on a reduced scale corresponding to that of Fig. 2 but showing a portion of a multiple unit envelope blank with the window openings formed complete therein; and

Fig. 5 is a central sectional view on an enlarged scale through a window cutting die suitable for forming the window openings through a thick pile of sheets after the formation of the preliminary openings through the sheets.

Referring now to the several figures of the drawing, in which corresponding parts are indicated by the same reference characters, 10 indicates a multiple unit envelope blank arranged for the production of two envelopes at a time in accordance with the teachings of my patent application Serial No. 506,364, filed October 15, 1943. The portion of the blank as shown in Fig. 1 comprises parts of the front panels 11 and 12 of two envelopes separated by a line of division at 13, each of said front panels being designed to have a window opening 14 cut therein, as shown in Fig. 4 and as indicated by dotted lines in Fig.

1, such window openings being arranged in alignment with each other in the two panels.

As shown in Fig. 2, 15 indicates the bed plate of a drill press of any approved type, having two paper drills 16 and 17 rotatably mounted in position above the bed. As is usual in machines of this type, the bed and the drills are mounted so as to be movable vertically with respect to each other under the control of the operator for effecting the desired contact of the drills with the pile of paper, and means is provided for driving the drills at high speed. Inasmuch as the drill press forms no part of my invention, it is believed to be unnecessary to show the control and operating means therefor, since such parts may be of any desired type.

The bed 15 is provided with guides 18 and 19 in adjustable positions thereon adapted to receive a pile of multiple unit envelope blanks 20 in contact with one of the guides so as to be shiftable by a series of step by step movements toward the other guide. The paper drills 16 and 17 are spaced with respect to each other so as to overlie corresponding portions of the panels 11 and 12 of the blanks 20. In operation, with the parts in the poistions as shown in Fig. 2, the drill press is operated for drilling openings at 21 at the extreme right in Figs. 1 and 3; the pile of blanks is then shifted step by step toward the right, being drilled in successive positions in turn at 22, 23, 24, 25 and 26, so as to provide a continuous opening 27 spaced inwardly at all points from the outline of the proposed window 14. A pile comprising 500 sheets of fairly heavy envelope paper can be drilled readily at a single operation, and the complete drilling operation at the several points can be performed easily within a comparatively short time.

After the provision of an opening through the pile of blanks of reduced size as compared with the size of the proposed window opening, an ordinary window cutting die 28 can be very easily forced through the pile so as to enlarge the opening to the desired size. This is doubtless due to the fact that the paper making up the cut-out portion is enabled to collapse inwardly into the preliminary opening. However that may be, I have found in practice that the window cutting die is able very readily to cut cleanly as many as 500 blanks at a single operation, cutting straight and true through the entire pile. When the drill and the pile of blanks have been separated by suitable vertical movement of the appropriate parts, the cut-out portions of the paper can be quickly and easily cleared from the drills and from the blanks preparatory for the succeeding drilling operation.

By my improved method, I am able to produce window openings in envelope blanks many times more easily and quickly than could be done by the methods heretofore in use. I am accordingly able to produce the completed envelopes much more expeditiously and at a lower cost than has been possible prior to my invention.

While I prefer to employ the methods and means as above described for the production of the window openings in envelope blanks, my invention is not necessarily to be limited thereto except so far as the claims may be so limited, it being understood that changes might well be made in the procedure or in the means by which the method is carried out without departing from the spirit of the invention.

I claim:

1. The method of cutting openings through a pile of sheets, comprising the formation of preliminary openings cut along lines spaced inwardly from the intended outlines of the completed openings, and the step thereafter of enlarging the openings to the intended size by cutting loose all remaining sheet material within the outlines and collapsing such material inwardly by the use of a hollow cutting die.

2. The method of cutting window openings in a pile of envelope blanks, comprising the preliminary step of removing a comparatively small amount of the material of the blanks cut along a line spaced inwardly from the intended outline of the window, and the step thereafter of enlarging the openings to the intended window size by the removal of additional material of the blanks about the preliminary openings.

3. The method of cutting elongated window openings in a pile of envelope blanks, comprising the preliminary step of removing a comparatively small amount of the material of each blank so as to form an elongated preliminary opening through the blank extending continuous from end to end of the opening, and the step thereafter of enlarging the openings in the blanks to the intended window size by the removal of additional material of the blanks about the preliminary openings.

4. The method of cutting openings through a pile of sheets, comprising the formation of preliminary openings of a reduced size through the sheets by a drilling operation, and then enlarging such openings by the removal of additional sheet material about the preliminary openings.

5. The method of cutting openings through a pile of sheets, comprising the preliminary step of removing a comparatively small amount of the sheet material by a drilling operation, and the step thereafter of enlarging the openings to the intended size by a die-cutting operation serving to remove additional sheet material about the preliminary openings.

6. The method of cutting openings through a pile of sheets, comprising the formation of preliminary openings of a reduced size through the sheets, and then enlarging such openings by die-cutting additional material from the sheets about the preliminary openings.

7. The method of cutting window openings through a pile of envelope blanks, comprising the formation of preliminary openings of a reduced size through the blanks by a drilling operation so as to remove a comparatively small amount of the material of the blanks, and then enlarging such openings by die-cutting additional material from the blanks about the preliminary openings.

8. The method of cutting window openings through a pile of multiple unit envelope blanks, comprising the formation of preliminary openings of a reduced size through the blanks at corresponding points in the several units by a single operation serving to remove a comparatively small amount of the material of the blanks, and then enlarging such openings by the removal of additional material of the blanks about the preliminary openings.

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