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PAPER FOLDING MACHINERY

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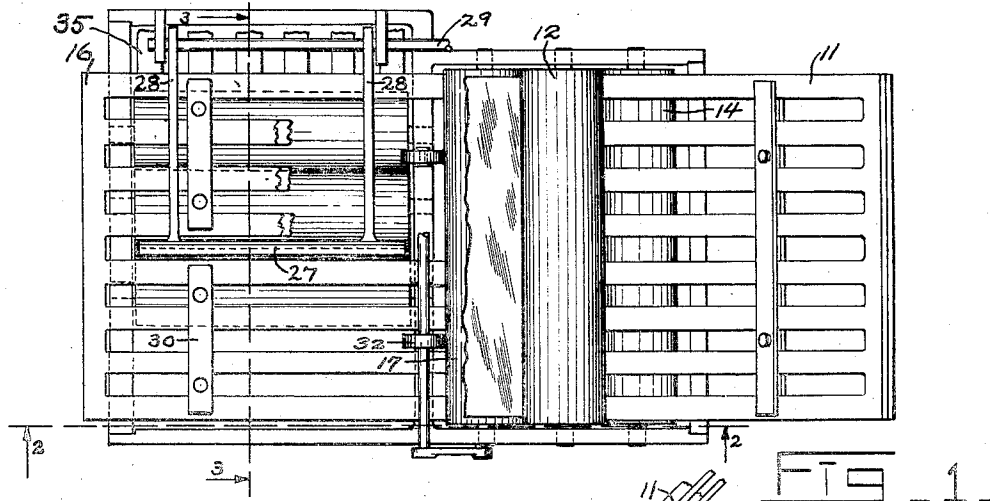


FIG. 1

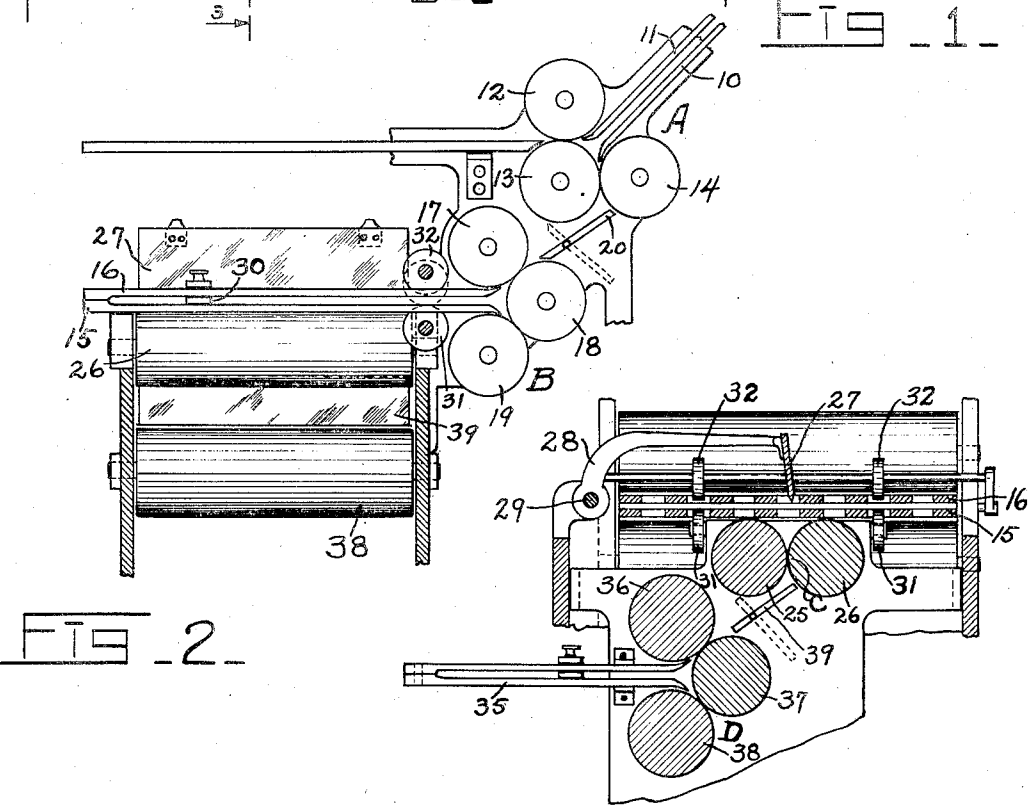


FIG. 2

FIG. 3

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PAPER-FOLDING MACHINERY.

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This invention relates to paper folding machines of the kind which includes one or more folding mechanisms of the loop type. The principal object of the invention is to provide a folding machine in which the looper or grid of one or more of the loop mechanisms may be used to perform its normal function of looping the sheet, or used as part of a knife folding mechanism. Other objects and advantages will later appear.

In the accompanying drawing,

Fig. 1 is a plan view of a machine embodying my improvements;

Fig. 2 is a side elevational view with the near frame removed; in other words, a view on line 2—2 of Fig. 1, and

Fig. 3 is an end view on line 3—3 of Fig. 1, but with the right hand portions of Figs. 1 and 2 omitted. This and the other figures of the drawing are rather diagrammatic in character, gears, belts and other operating connections well known and in common use in this art being omitted.

It being understood that the machine has the necessary frame structure, only part of which is shown in the drawing, I shall not refer thereto, but merely describe the parts directly concerned with my invention. Briefly, my machine consists of a plurality of folder mechanisms, such as A, B, C and D, all of which but C are, in the present case, of the well known loop type, C being of the equally well known knife type. These folder mechanisms are so arranged that papers can be given a single fold in A, or two parallel folds in A and B, C and D then remaining unused. Or they may be folded in A and then passed to the knife mechanism C, where they are folded at a right angle to the fold received in A. From C they may be dropped to a packer, not shown, or directed to mechanism D and given a fold parallel to fold C.

Folder mechanism A comprises the usual looper or grid, consisting of slightly spaced plates or grids 10 and 11, feed rolls 12 and 13, and folding rolls 13 and 14. Folder mechanism B comprises slightly spaced plates or grids 15 and 16, feed rolls 17 and 18, and folding rolls 18 and 19. Following the custom in the art the plates or grids 10 and 11 will be referred to collectively as a "grid"; also the grids 15 and 16. Pivotaly mounted between folders A and B is a guide or deflector 20, adapted to occupy either of

two positions. In one of these positions, as in Fig. 2, this deflector directs papers emerging from folder A to the bite of the feed rolls 17 and 18 of folder B. When in its other position, indicated with dotted lines, this deflector will direct the papers to a stacker or other receptacle, not shown. Means, not shown, is provided for maintaining the deflector in one or the other of these positions.

Mounted below the grid 15, in suitable bearings not shown, are the folding rolls 25 and 26, forming part of the knife mechanism C, the axes of these rolls being at right angles to the axes of the rolls of the folders A and B. These rolls are preferably placed close to the under side of the grid 15. The knife 27 of this folder is above the grid 16, and carried by arms 28 mounted on a rock shaft 29. The knife is adapted to pass between the bars of the grids 15 and 16 to tuck papers lying between the grids into the bite of the rolls 25 and 26. In fact, this is an ordinary knife folder, except that the grid of folder B is used for supporting the papers to be folded by this knife folder C, in lieu of the tape conveyer or table generally used. The grid is provided with an adjustable stop device 30, and folder B or folder C will function according to the position of this stop with reference to the size of the sheets entering the grid. If the stop is set in a position such that the leading edge of the sheet reaches the stop while the sheet is still in the bite of rolls 17—18 the sheet will loop and be folded by rolls 18 and 19 in the usual way of a loop folder. But if the sheet leaves the bite of the rolls 17—18 before its leading edge encounters the stop, the sheet will continue its movement into the grid until it is arrested by the stop, and it will be tucked between rolls 25 and 26 the next time the knife descends. Inasmuch as the sheet will leave the bite of rolls 17—18 before it reaches a position to be folded with the knife, auxiliary feed rolls 31—32 are provided to carry the sheet to the stop 30. It is not to be understood, however, that other means may not be used for this purpose and for preventing rebound of the sheet. Mechanism for such purposes and for constantly rotating one or both of the rolls 31—32 being common in this art, it is not necessary to illustrate or describe it here. Nor is it necessary to illustrate or describe

mechanisms for rotating the various rolls and operating the knife, all of this being well known in the art.

Below the knife folder C is the folder D, comprising the grid 35, feed rolls 36 and 37, and the folding rolls 37 and 38. A deflector 39 is arranged to direct papers to folder D as they emerge from folder C, as is shown in Fig. 3, or to direct them to a packer or other receptacle, not shown, when the deflector occupies the position indicated by dotted lines in Fig. 3. Suitable mechanism, not shown, is provided for holding the deflector in one or the other of its positions. Utilization of the grid or folder B as a table for the knife folder C simplifies the structure and renders it more compact. Furthermore, it does away with tapes ordinarily used to carry and position the sheet for the knife C. All that is necessary to put the folder C into action is to set the stop 30 in the proper position and start the mechanism for operating the knife and the rollers 31 and 32. I believe I am the first to utilize the grid of a loop folder as an element in a knife folder and I wish to claim that broadly. While I have shown and described but one embodiment of my invention, it is to be understood that it is susceptible of various embodiments within the scope of the appended claims.

I claim—

1. In a paper-folding machine, a loop folder comprising feed rolls and a grid, a knife folder comprising folding rolls and a knife, said latter rolls being situated on one side of said grid and the knife on the other side, the knife being adapted to pass through an aperture in the grid to tuck sheets between the folding rolls, said grid serving as a table for said sheets.

2. In a paper-folding machine, a loop folder comprising feed rolls and a grid, a knife folder comprising folding rolls and a

knife, said latter rolls being below and the knife above the grid, the grid having an aperture through which the knife passes to tuck sheets reposing in the grid into the bite of the folding rolls, a stop whereby to arrest sheets at the proper place in the grid to enable the knife to tuck them between the folding rolls, and means for moving the sheets to said stop.

3. In apparatus for folding paper, a loop folder comprising a grid, a knife folder comprising folding rolls and a knife, and means whereby said grid serves the double purpose of a looper for said loop folder and a support for sheets to be folded by the knife folder.

4. In apparatus for folding paper, a loop folder comprising a grid, a knife folder comprising folding rolls and a knife, means whereby said grid serves the double purpose of a looper for said loop folder and a support for sheets to be folded by the knife folder, and an adjustable stop to arrest sheets at predetermined points in said grid, the position of said stop determining whether said loop folder or knife folder shall fold the sheets.

5. In a paper folding machine, a loop folder comprising feed rolls and a grid, a knife folder comprising folding rolls and a knife, the axes of said knife folder rolls being at an angle to the axes of the loop folder rolls, and means for positioning sheets in the grid to be folded by the knife and folding rolls.

6. The combination in a paper folding machine, of a loop folder, folding rolls and the knife of a knife folder, and means for selectively using the grid of the loop folder normally, to loop the sheets, or as a support for the sheets to be folded by the knife and folding rolls.

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