Dec. 15, 1959 H. BIEL 2,917,307

AUTOMATIC PAPER WORKING MACHINE

Filed May 6, 1955 2 Sheets-Sheet 1

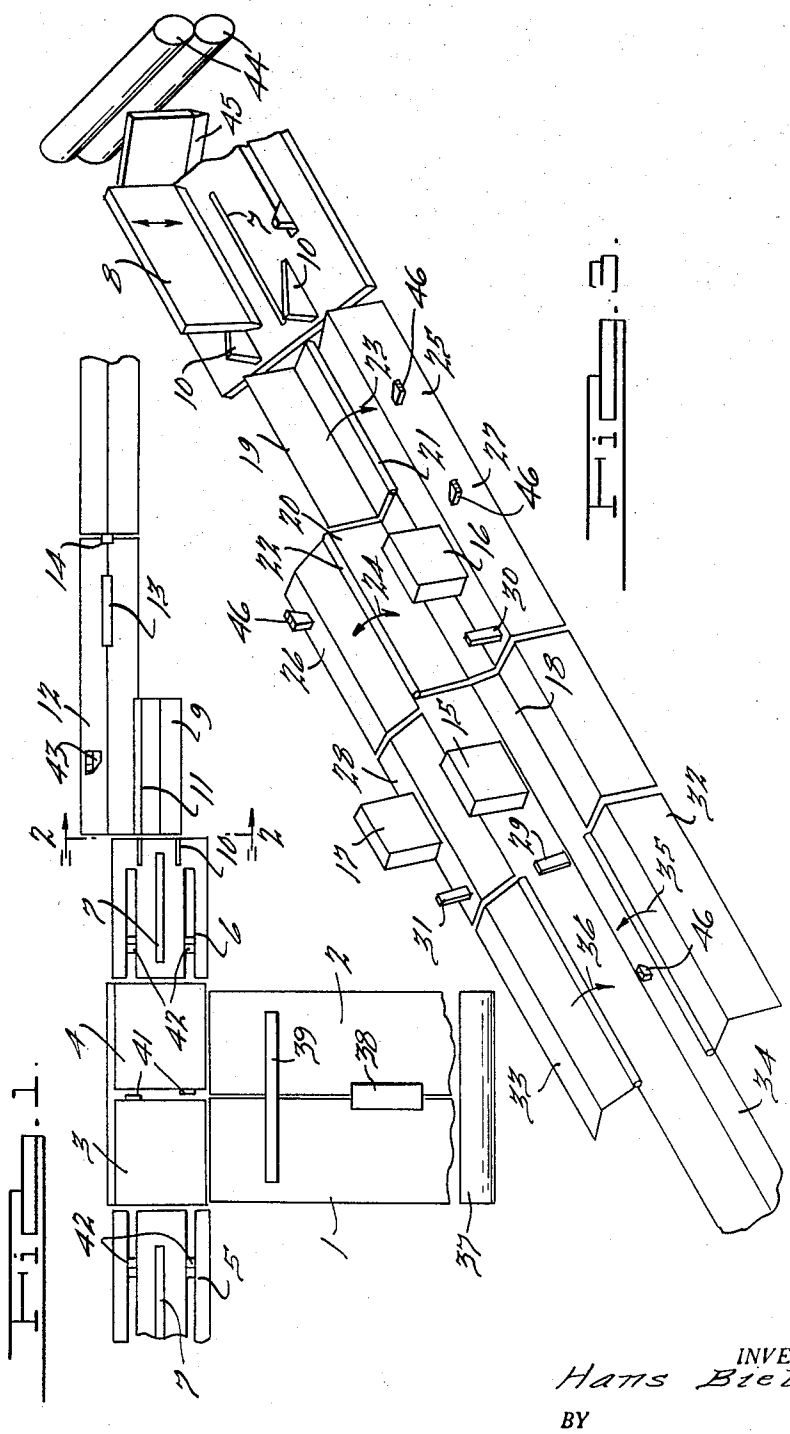


Fig. 1.

Fig. 2.

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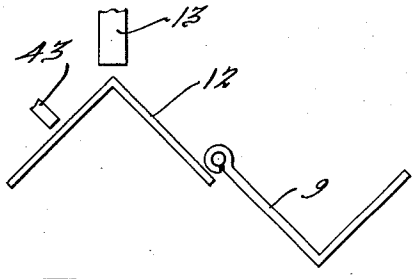


Fig. 2.

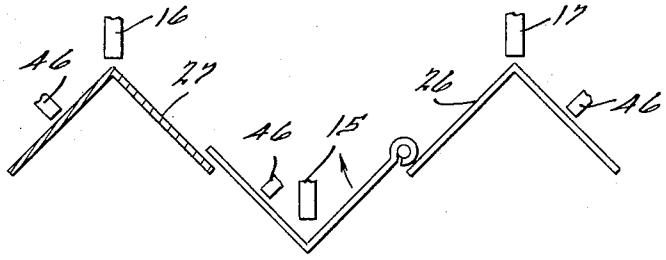


Fig. 4.

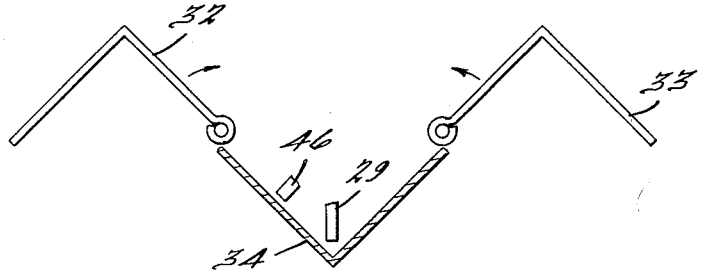


Fig. 5.

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2,917,307

AUTOMATIC PAPER WORKING MACHINE

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5 Claims. (Cl. 270—37)

This invention relates to automatic paper working machines and, more particularly, to an improved automatic paper working machine for making school exercise books and the like.

In automatic paper working machines equipped with printing, stitching, and folding devices for the manufacture of school exercise books and the like, the operating speed of the entire machine is determined by the operating speed of the stitching device. If a thread stitching device is provided, which operates relatively slowly, the dependence of operating speed of the entire unit on the operating speed of the stitching device becomes particularly manifest, while with the use of wire stitching or sewing devices, which operate at a relatively faster rate, a better operating speed is generally obtained.

An object of the invention is to overcome disadvantages in prior automatic paper working machines of the indicated character and to provide an improved automatic paper working machine incorporating improved means for increasing the efficiency and the production capacity thereof.

Another object of the invention is to provide an improved paper working machine incorporating improved paper distribution means.

Another object of the invention is to provide an improved automatic paper working machine that is economical to manufacture and assemble, durable, and reliable in operation.

In accordance with the present invention, a better utilization of the capacity of the printing or ruling device is obtained by the fact that for a single printing or ruling device several stitching devices are provided to which, subject to the higher running speed of the paper through the printing or ruling device, the ruled sheets or piles of sheets may be distributed.

The above as well as other objects and advantages of the present invention will become apparent from the following description, the appended claims and the accompanying drawing wherein:

Figure 1 is a partially schematic fragmentary top plan view of one embodiment of the invention;

Figure 2 is a cross-sectional view in elevation taken along the line 2—2 of Figure 1 and showing the disposition of the carriage with respect to the saddle;

Figure 3 is a partially schematic fragmentary perspective view of another embodiment of the invention;

Figure 4 is a cross-sectional view in elevation taken along the line 4—4 of Figure 3 and showing the disposition of the parts adjacent one of the stitching stations; and

Figure 5 is a cross-sectional view taken along the line 5—5 of Figure 3 and showing the parts adjacent the joint transport groove.

Referring to the drawing, in the embodiment of the invention illustrated in Figs. 1 and 2, the printing or ruling device is dimensioned for a paper web which is a multiple of the width of sheet. In the printing or ruling

section, or after it, a cutting device is provided by which the paper web is cut into several individual webs conforming to the width of sheet, and the various sheets or sheet piles obtained from the several individual webs are subsequently worked in separate stitching, folding and, if so required, cutting devices.

In the embodiment shown in Figs. 1 and 2, a paper web is shown having twice the width of the sheets. The paper web running in the printing or ruling device 37 may either be cut within the printing or ruling device or after the latter by a cutter 38 into two webs 1 and 2 each having the width of a sheet. The sheets cut by a cutter 39 from the two webs 1 and 2 are piled, with a lateral distance therebetween, at two depositing stations 3 and 4 that are arranged side by side, a cover sheet being deposited on each of the depositing stations 3 and 4 before the sheets are placed thereon, by any suitable or conventional means (not shown), after which the sheets and cover are trimmed in a transverse direction. After the number of sheets required to form a book have been piled up, the sheet piles are conveyed by advancing means 41 from the depositing station 3 to the left, and from station 4 to the right, as viewed in Fig. 1, towards folding stations 5 and 6, respectively. The folding stations may (as also in the embodiment of Fig. 3) provide a stamping groove 7 working in conjunction with a stamping die 8 that may be vertically moved into its stamping position. The stamping die 8 presses the sheets into the stamping groove 7 thus producing in the sheet pile the crease required for the folding operation. At the same time, the stamping die 8 keeps the sheet pile in an opened condition for the subsequent stitching operation. After the folding stations 5 and 6, there is an upwardly open carriage 9 to accommodate the folded pile. To insure unimpeded entry of the sheet pile into carriage 9, blocks 10 are provided on a plate at either side of groove 7, by which means the lateral portions of the sheet pile are held upright while being conveyed by advancing means 42 to carriage 9. In this embodiment, the carriage 9 is designed as a reverser that may be swung round edge 11 and by which the folded piles are deposited on a saddle 12 which forms, in its extension, the saddle of a customary stitching machine, such as a thread stitching machine, in the stitching head of which has been indicated schematically in the form of a rectangle 13. At the stitching head, the sheet pile is brought into register in a longitudinal direction prior to being stitched by advancing means 43 and an automatically engaged and disengaged stop 14. After the stitching operation, stop 14 rises and thus releases the stitched pile for further conveyance.

It will be understood that this embodiment of the invention may be modified so that the reverser 9 feeds a cover and a succession of several sheet piles to one and the same stitching saddle, if thicker exercise books are to be made, which plurality of sheet piles are then jointly advanced as one bundle to the stitching device concerned.

In the embodiment of the invention illustrated in Figs. 3 to 5, two or more stitching devices working in parallel are provided after a single folding station, and the stitching devices may be fed simultaneously or alternatively. This embodiment of the invention admits of the possibility of providing several kinds of stitching devices, e.g. wire stitching, thread stitching or sewing devices, thus offering a wider range of variation. After the folding station, a transport groove is preferably arranged in which the sheet piles are advanced directly to a wire stitching device, while immediately before the latter device a reversing mechanism is provided through which the sheet piles may be deposited on the stitching

saddle of a laterally arranged thread stitching machine. The reversing mechanism admits of the use of customary thread stitching machines having a stitching saddle. A similar, or an additional, second reversing mechanism may be incorporated to work on a thread stitching device mounted on the other side. In this case, the first sheet pile may, for instance, be advanced along the transport groove to the wire stitching device while the following pile is deposited on the stitching saddle of one thread stitching device and the third pile is deposited on the stitching saddle of the other thread stitching device. After having been separately stitched, the stitched piles may be deposited with the aid of reversing mechanisms working in an opposite sense onto a joint transport groove which is preferably arranged in the extension of the groove that passes along the wire stitching device.

In the embodiment shown in Figs. 3 to 5, a folding station with a stamping groove 7 and a stamping die 8 is followed by three stitching machines whose schematically indicated stitching heads are marked 15, 16 and 17. As in Figs. 1 and 2, the folding station is preceded by a printing or ruling device 44 and a cutter 45 and is followed by an upwardly open conveyor groove leading to a groove 18 located within the range of the stitching apparatus 15 of a wire stitching device.

The groove section arranged before the wire stitching device is composed of two successively arranged reversing carriages 19 and 20 which may be swung around shafts 21 and 22 separately in opposite directions (arrows 23 and 24) to deposit the piled up folded sheets on the saddle pieces 25 and 26 which are arranged on either side of the groove leading to the stitching device 15. Thence the sheet piles are conveyed by advancing means 46 into the stitching saddles 27 and 28 of a conventional thread stitching machine of which the stitching heads 16 and 17 form a part. At the end of each stitching device, stops 29, 30 and 31, respectively, which are capable of being engaged and disengaged, are provided at which the folded pile that has entered the range of action of the stitching device is brought into register in a longitudinal direction prior to being stitched. The stitching saddle 27, and 28, respectively, of each thread stitching device is followed by a saddle member 32, 33, designed like a reverser by which the pile stitched by the respective stitching device may be deposited into a central upwardly open groove 34 (arrows 35 and 36). Groove 34 is located in the extension of groove 18 that passes through the range of the wire stitching device. Device 15 may be of the type which applies wire staples so that their backs are on the inside of the folded book with the closed ends on the outside, a strip of paper or cloth later being applied to the back of the book.

The embodiment of the invention illustrated in Figs. 3 to 5 offers several variations. For instance, all three stitching devices could be employed in such a manner that one sheet pile is advanced up to the stitching device 15, the second pile is deposited by the reverser 19 onto saddle 25 on which it is advanced to the stitching device 16, while the third pile is deposited by reverser 20 onto saddle 26 to be conveyed to the stitching saddle 28 of of the thread stitching device 17. The first pile continues to advance, after the stitching operation, through device 15 in groove 34, while the piles stitched on devices 16 and 17 are conveyed to the reversers 32 and 33 which will deposit them successively in groove 34 on which all three piles are advanced further in a successive order. Instead of three stitching devices, only two could be employed, for example, the two thread stitching devices 16 and 17 if only thread stitching is desired. In addition, mixed stitching could be obtained when using only one of the two thread stitching devices 16 or 17 together with the wire stitching device 15. In view of the fact that the wire stitching device works faster than the thread stitching device, it may prove suitable to feed to the wire stitching device for each pass two successively arranged piles, thus obtaining twice as many wire stitched piles. Naturally, the wire stitching device could also be employed alone.

It will also be understood that the embodiment illustrated in Figs. 3 to 5 may be combined also with multiweb work as shown in Figs. 1 and 2.

While preferred embodiments of the invention have been shown and described, it will be understood that various changes and modifications may be made without departing from the spirit of the invention.

What is claimed is:

1. In a paper working machine for making school exercise books and the like, a single printing device for printing a single web of paper, means for cutting said web into sheets and forming sheet piles, a plurality of stitching devices, each of said devices comprising a stitching saddle and a stitching head adjacent said saddle, said stitching saddles being in parallel relation, means for forming a downwardly directed crease in each pile while maintaining the pile in opened condition, first and second reversing carriages each comprising an elongated V-shaped member mounted for pivotal movement on a horizontal axis along one edge thereof, each of said carriages being adjacent a corresponding stitching saddle and being movable between a first position adapted to receive a folded but open pile and a second position inverting such pile so as to rest on its adjacent saddle, means for feeding some of said piles to said first carriage, and means for feeding others of said piles to said second carriage.

2. In a paper working machine for making school exercise books of a predetermined height, a single printing device for printing a single web of paper having a width approximately twice said predetermined height, means for cutting said web longitudinally so as to form two halves each having a width equal to said predetermined height, means for cutting said web halves transversely to form sheets, means for forming sheet piles at first and second depositing stations adjacent each other, means for advancing sheet piles from said adjacent stations in a laterally outward direction away from each other, first and second folding stations outwardly adjacent said first and second depositing stations, means at each of said folding stations for forming a downwardly directed crease in each pile while maintaining said pile in open condition, first and second stitching stations outwardly adjacent said first and second folding stations, each of said stitching stations comprising a stitching saddle and a stitching head, and first and second reversing carriages, said carriages being aligned with said depositing stations and folding stations and being movable between a first position adapted to receive said folded but open piles and a second position inverting said piles onto their corresponding stitching saddles.

3. In a paper working machine for producing school exercise books having a predetermined width, a single printing device for printing a web having twice said predetermined width, means for cutting said web transversely into sheets and forming sheet piles, a folding station adapted to receive said sheet piles, said folding station including means for forming a longitudinal downwardly directed central crease in each sheet pile while maintaining the pile in open condition, a first reversing carriage aligned with said folding station, said carriage comprising an elongated V-shaped member having a horizontal pivot along one edge, a first stitching saddle parallel with and adjacent the pivoted side of said first reversing carriage, said carriage being movable between a first position adapted to receive sheet piles from said folding station and a second position inverting said piles onto said first saddle, a second reversing carriage aligned with said first carriage and pivoted along the edge opposite the pivoted edge of said first carriage, and a sec-

ond stitching saddle parallel to and adjacent the pivoted edge of said second reversing carriage.

4. In a paper working machine for making school exercise books and the like, a single printing device for printing a single web of paper, means for cutting said web into sheets and forming sheet piles, a plurality of stitching devices, each of said devices comprising a stitching saddle and a stitching head adjacent said saddle, means for forming a downwardly directed crease in each pile while maintaining the pile in opened condition, first and second reversing carriages each comprising an elongated V-shaped member mounted for pivotal movement on a horizontal axis along one edge thereof, each of said carriages being adjacent a corresponding stitching saddle and being movable between a first position adapted to receive a folded but open pile and a second position inverting such pile so as to rest on its adjacent saddle, means for feeding some of said piles to said first carriage, and means for feeding others of said piles to said second carriage.

5. In a paper working machine for making school exercise books and the like, a single printing device for printing a single web of paper, means for cutting said web into sheets and forming sheet piles, a plurality of

stitching devices, each of said devices comprising a stitching saddle and a stitching head adjacent said saddle, said stitching saddles being in parallel relation, means for forming a downwardly directed crease in each pile while maintaining the pile in opened condition, first and second reversing carriages each comprising an elongated V-shaped member mounted for rotational movement about a horizontal axis, each of said carriages being adjacent a corresponding stitching saddle and being movable between a first position adapted to receive a folded but open pile and a second position inverting such pile so as to rest on its adjacent saddle, means for feeding some of said piles to said first carriage, and means for feeding others of said piles to said second carriage.

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