Oct. 27, 1964 R. F. CORDEY 3,153,964

PRODUCTION OF MAGAZINES, PAMPHLETS AND THE LIKE

Filed May 26, 1960 4 Sheets-Sheet 1

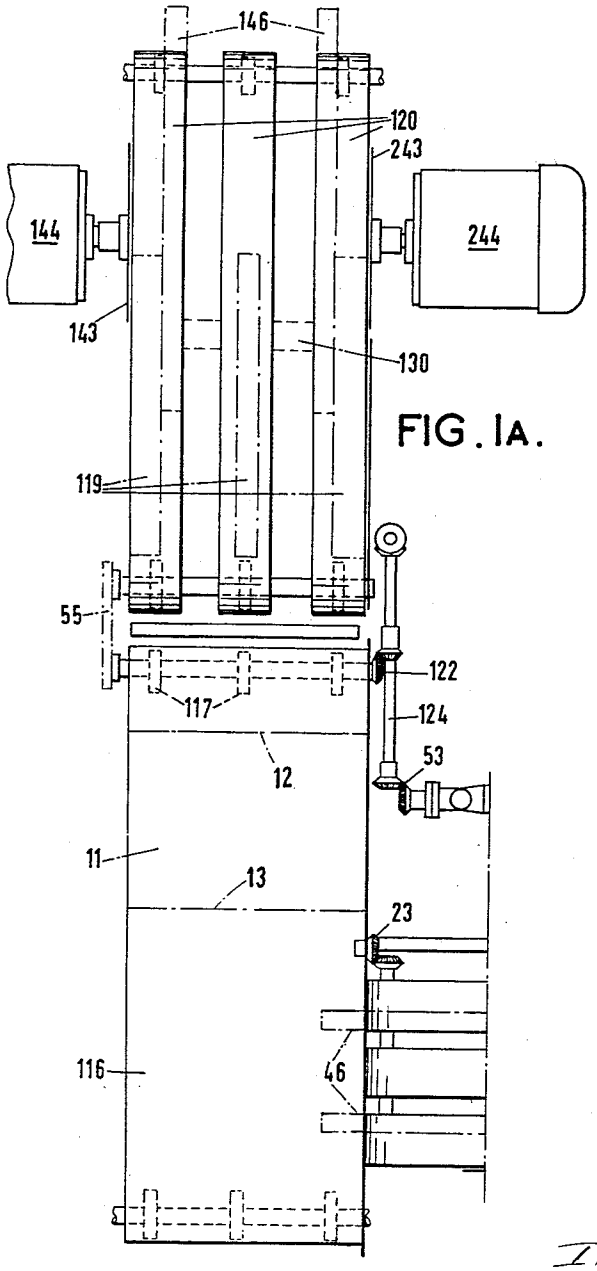


FIG. 1A.

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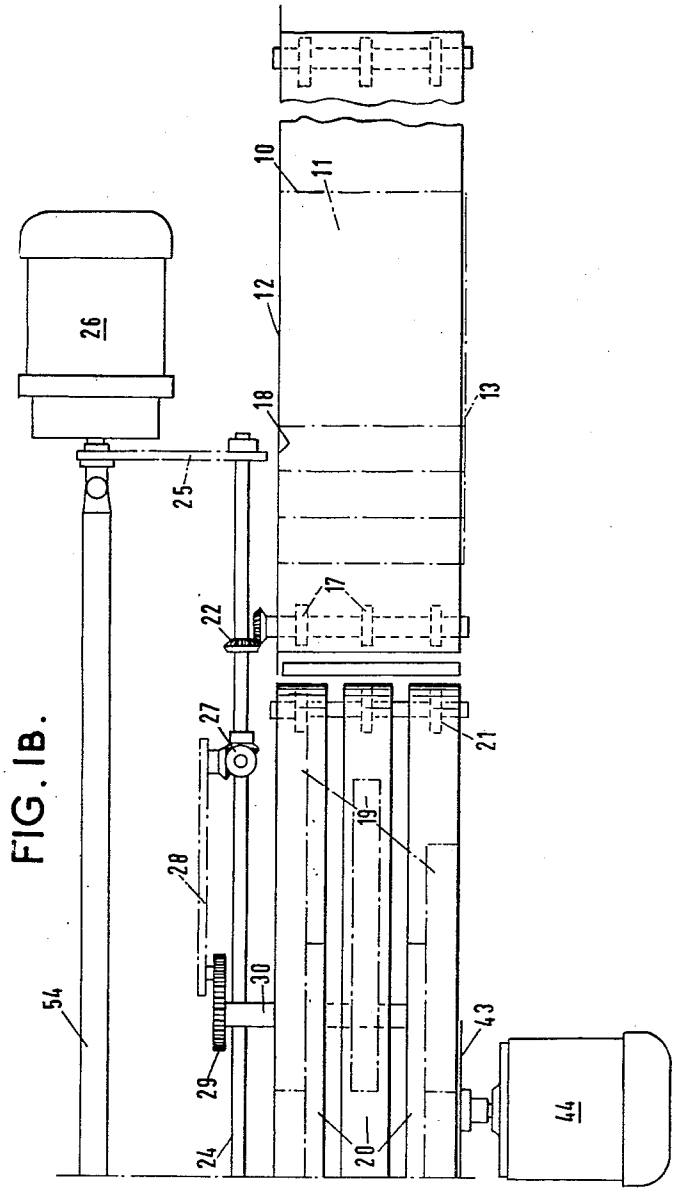


FIG. IB.

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PRODUCTION OF MAGAZINES, PAMPHLETS AND THE LIKE

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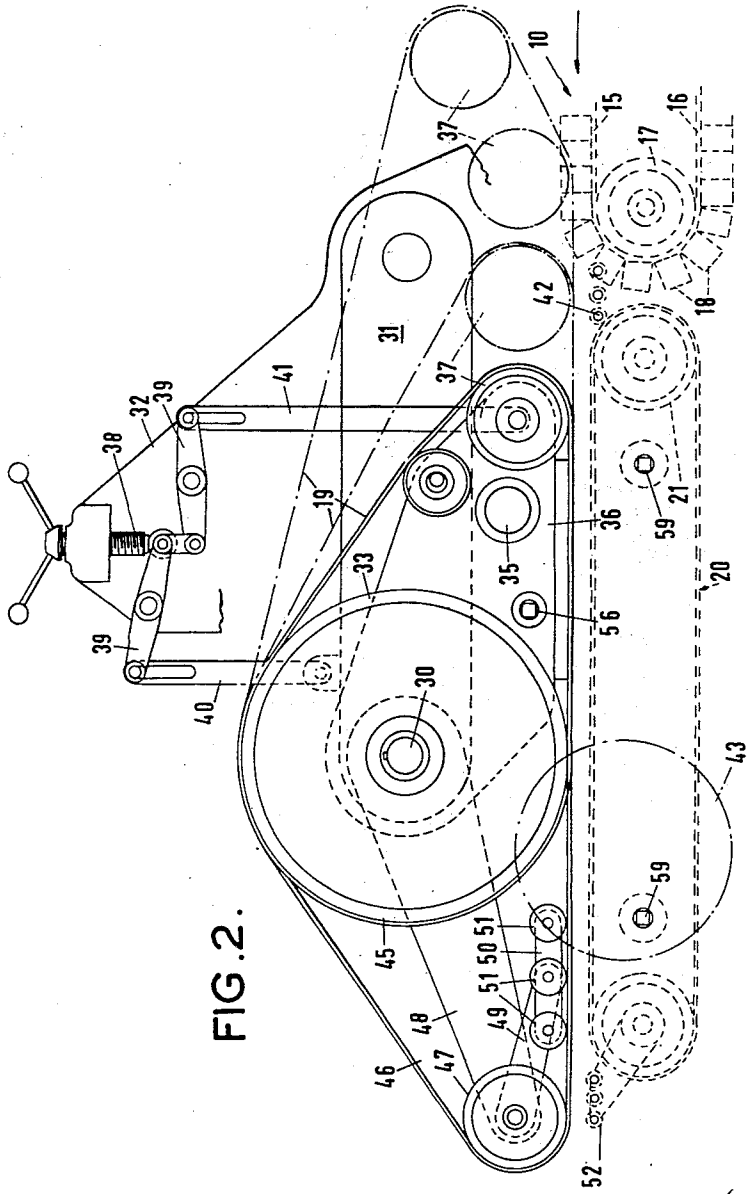


FIG. 2.

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Oct. 27, 1964 R. F. CORDEY 3,153,964

PRODUCTION OF MAGAZINES, PAMPHLETS AND THE LIKE

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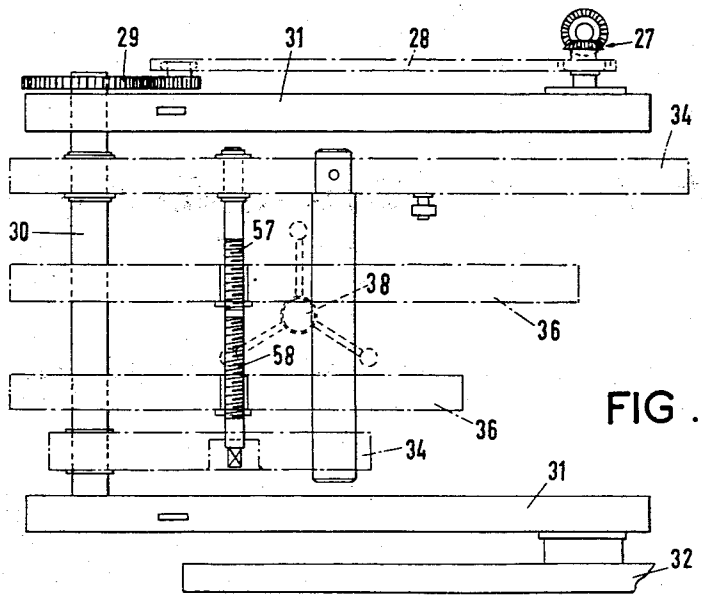


FIG .3.

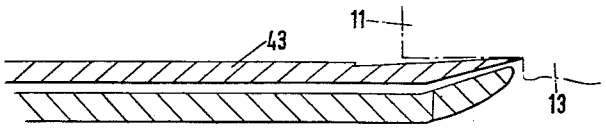


FIG.4.

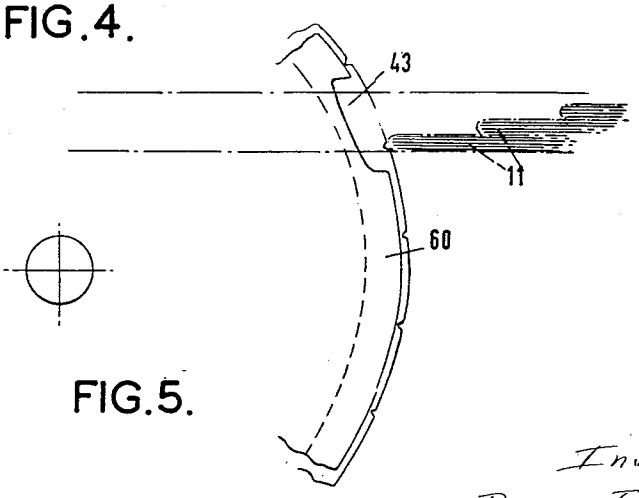


FIG.5.

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3,153,964

PRODUCTION OF MAGAZINES, PAMPHLETS AND THE LIKE

Roger Frederick Cordey, Bexley, England, assignor to Sun Printers Limited, Watford, England, a British company

Filed May 26, 1960, Ser. No. 31,912
3 Claims. (Cl. 83—407)

This invention is concerned with the production of magazines, pamphlets and the like (hereinafter described for convenience as "books") of the kind comprising a printed and folded sheet or sheets whose component pairs of leaves are secured together by wire-stitching at their central fold-lines.

In the quantity production of such books, it is usual for a stream of them to be delivered from the printing machine with their stitched folds (or back edges) foremost, and only requiring trimming at the head, tail and fore-edge of each.

Hithereto, it has been the practice for the books to be collected in stacks of suitable thickness and trimmed collectively under a guillotine, but this a relatively slow method and one which cannot complete with the output of a modern printing machine unless a number of guillotines and a correspondingly large labour force is employed.

The object of the present invention is to provide improved apparatus whereby a stream of books may be trimmed continuously with speed and accuracy.

According to this invention the improved trimming apparatus comprises an endless conveyor upon which the books are deposited in echelon and uniformly by the printing machine, travelling means whereby the echeloned stream is progressively gripped, in such manner as to expel air from between the leaves of the books, after mechanical alignment of their corresponding edges in a direction lengthwise of the conveyor, a cutter or cutters for continuously trimming the aligned and/or opposite edges of the books acted upon by said gripping means, a second conveyor disposed at right angles to, but below, the first conveyor and running at such speed that the books are deposited thereon with the same degree of mutual overlap as before the trimming operation, further travelling means for progressively gripping the diverted stream of books after mechanical alignment of their uncut edges in a direction lengthwise of the second conveyor, and a further cutter or cutters for continuously trimming the newly-aligned and/or opposite edges of the books whilst gripped as aforesaid.

The gripping means in each case may comprise an endless band or bands opposed to, and running at the same linear speed as, the associated conveyor, the books supported upon the latter being engaged by the adjacent run of the (or each) gripping band whose spacing from said conveyor is adjustable to suit the thickness of such books and the extent to which they overlap one another. Any or each of the successive trimming operations may exert an upward pressure against the book or books momentarily engaged thereby.

The apparatus may also include a counter mechanism designed automatically to displace one of the issuing stream of trimmed books after a predetermined number of the latter have passed a scanning point and thereby to facilitate collection of the books into standardized bundles for packaging.

In the accompanying drawings:

FIGS. 1A and 1B are schematic plan views of complementary parts of one example of the improved trimming apparatus the break being indicated by chain lines,

FIG. 2 is a schematic side elevation, to an enlarged scale, of one of the top-pressure devices indicated in FIGS. 1A and 1B,

FIG. 3 is a schematic plan view corresponding to FIG. 2, and

FIGS. 4 and 5 are fragmentary plan and side views respectively of one of the rotary knives.

In the example illustrated of a continuous trimming apparatus according to the present invention, the input conveyor **10** is arranged somewhat below the delivery conveyor (not shown) of the printing machine and driven at such a speed that each book deposited thereon will be more or less overlapped by the one following.

The input conveyor **10** thus carries forward a stream of books **11** lying in echelon, their degree of mutual overlap being adjustable by varying the linear speed of such conveyor relatively to that of the printing machine conveyor.

It is a matter of convenience whether the books **11** reach the conveyor **10** with their stitched folds (or back edges) **12** disposed longitudinally or transversely of the latter, but in the example under consideration the former arrangement is adopted, the books being delivered from the printing machine with their back edges **12** leading and the upper run of the conveyor **10** travelling at right angles to the stream of books **11**.

To obviate risk of the latter being marked thereby the conveyor surface comprises a band of juxtaposed stainless-steel slats **15** mounted transversely of a series of endless chains **16** running over sprockets **17**, the ends of such slats remote from the printing machine conveyor being upturned as at **18**.

For ease of illustration the upper run of the conveyor **10** is shown travelling in a horizontal plane, but in fact such conveyor circulates in a plane canted at (say) 17½ degrees to the vertical, the upturned portions **18** of the slats **15** being at their lower ends and thus forming a continuous stop for the arriving books **11** so that the latter travel forward with their back edges **12** in alignment.

The newly-folded and stitched sheets constituting the books **11** will, of course, have their constituent leaves in somewhat divergent relation at this stage, and before the first trimming operation, it is desirable to express the air from between such leaves.

This is conveniently effected by means of three endless top-pressure slat-bands **19** respectively co-operating with three relatively narrow slat-band conveyors **20** which run side-by-side with their upper runs in the same laterally-canted planes as the corresponding run of the input conveyor **10** and travelling at the same speed. The bands **19** are likewise circulated at the same linear speed as the three-part conveyor **20**, but in the opposite sense.

The multiple sprocket **17** at one end of the conveyor **10**, and the mutually-coaxial sprockets **21** at one end of the three-part conveyor **20**, are driven through bevel gears **22**, **23** from a side shaft **24** which is itself chain-driven at **25** from a motor **26**.

Further bevel gears **27**, a chain-drive **28**, and spur gearing **29** connect this shaft **24** to an elevated cross-shaft **30** carried by radius arms **31** from the sides of a bridge-structure **32** spanning the three-part conveyor **20**.

This shaft **30** carries the driving sprockets **33** for the top-pressure bands **19** and also has pivoted thereon two carrier plates **34** rigidly connected by a cross-bar **35** which co-operates with the sprocket shaft **30** to support two intermediate laterally-slidable carriers **36**. Each of these latter, and one of the main carriers **34**, serves to maintain a pair of idle sprockets **37** in alignment with the adjacent driving sprocket **33**.

Mounted centrally of the crown of the bridge-structure **32** is a vertical adjusting screw **38** connected to the adjacent arms of two rocking levers **39** pivoted upon the same structure and having their other arms respec-

tively linked at **40**, **41** to the radius arms **31** and the swinging assembly represented by the carriers **34**, **36**.

By operation of the screw **38** the top-pressure bands **19** can be collectively raised and lowered whilst their lower runs maintain parallel relation with the associated parts of the conveyor **20**.

The idle sprockets **37** are so arranged that the lower runs of the three bands **19** are of graduated lengths, the longest of such bands being that which co-operates with the low side of the three-part conveyor **20**, so that, when the echeloned books **11** pass on to the latter over a series of small idle rollers **42**, the bands **19** act thereon in succession so as progressively to express the air from between the constituent leaves of such books in a direction towards their fore-edges **13**.

Whenever the leading edge of a book **11** reaches a position directly below the sprocket shaft **30**, by which time it can be considered squeezed free of all trapped air, the fore-edge **13** of such book commences to be sheared off, at a predetermined distance from its back edge **12**, by means of a rotary knife **43** driven by a separate motor **44**.

United to each of the outer sprockets **33** is a pulley **45** connected by an endless belt **46** to an idle pulley **47** on an arm **48** mounted to swing about the axis of the shaft **30** at the side of the latter remote from the slat-bands **19**. Pivoted concentrically with each idle pulley **47** is a shorter arm **49** carrying a bogie **50** with three rollers **51** which serve to load the lower run of the adjacent belt **46**.

The two belts **46** operate to position each successive book **11** during the trimming of its fore-edge **13** and finally ensure its movement beyond the three-part conveyor **20** on to a series of idle rollers **52** from which the books fall one at a time on to a transversely arranged slat-band conveyor running at a higher speed and forming the input means of a second system substantially corresponding to that just described.

The second input conveyor **116** is laterally canted in the same way as the previous conveyor system its lower edge, with upturned slat ends corresponding to the ends **18**, being disposed beneath the rollers **52** aforesaid.

One multiple sprocket **117** of the conveyor **116** is bevel-geared at **122** from a side shaft **124** which in turn is driven through bevel gearing **53** and a cardan shaft **54** from the motor **26**.

A three-part conveyor **120** forming a continuation of the input conveyor **116** is driven from the latter by means of a chain **55** and three top-pressure bands **119** co-operating therewith are driven from the side shaft **124**.

The conveyor **116** is so directed that the partly-trimmed books still overlapping to the same extent as before, pass therefrom on to the conveyor **120** and beneath the bands **119** with their back edges **12** leading, their heads (or tails) having previously been mutually aligned by gravitational engagement with the upturned edge of the conveyor **116**.

The bands **119**, whose lower runs in this case are of equal length, serve to express, at their fore-edges **13** of successive books **11**, any air which has found its way between the leaves thereof since the first trimming operation, the books, whilst still engaged by the loaded belts **146** driven from the mainshaft **130** of the top-pressure assembly, having their heads and tails trimmed simultaneously by two rotary knives **143**, **243** which have their own driving motors **144**, **244** and which are canted in the same manner as the conveyors **116**, **120** and the bands **119**.

The vertical spacing of the top-pressure bands **119** above the three-part conveyor **120** is adjustable by means similar to those associated with the first set of bands **19**, the adjustment in each case being made to suit the thickness of the individual books **11** and their degree of mutual overlap.

Similarly one or other of the knives **143**, **243** is axially adjustable to suit the height of page required in the finished books whose echeloned arrangement means that each of the several knives is acting for most, if not all, of the time upon two or more superimposed books and can thus cut at a faster rate than would be feasible if the books were advanced edge-to-edge.

Since the three-part conveyors **20**, **120** are required to support the books **11** as close as possible to the knives acting thereon, each of such conveyors, together with the top-pressure means **19**, **46** (or **119**, **146**) acting thereon is necessarily adjustable for width.

A convenient device for effecting such adjustment in the case of the top-pressure means **19**, **46** comprises a lead-screw **56**, rotatably captive in the carrier **34** for the longest band **19** which extends parallel to the shaft **30** and has two threaded sections **57**, **58** respectively engaging tapped holes in the two slidable carriers **36**.

The thread **58** engaging the shorter of these carriers has a pitch twice as that of the section **57** so that on rotation of the screw **56** by a key applied to its free end, the shortest band **19** (carrying with it one of the belts **46**) is moved twice as far as the third band, which thus remains at all times midway between the other two.

A similar lead-screw, indicated at **59**, is provided for adjusting each set of sprockets **21** carrying the three-part conveyor **20** and as previously mentioned similar provision made for width adjustment of the bands **119** and conveyor **120**.

The rotary knives **43**, **143**, **243** are hollow-ground and each is bevelled at 12½ degrees, on the side remote from the books, to co-operate with a suitably-recessed shroud (indicated at **60**) in providing an annular jet through which air and water mist is blown under pressure for the purpose of keeping the blade edge cool whilst the cuttings pass to a suction intake below.

If desired, a band knife circulated over a suitably canted set of pulleys and having its cutting edge bevelled and shrouded as aforesaid may be substituted for any or each of the three rotary knives.

I claim:

1. Apparatus for conveying and trimming a stream of magazines, pamphlets and the like received from a printing, folding or stapling machine, said apparatus comprising in combination: a trimming station having a single continuously rotating cutter for trimming the front edges of the magazines; a trimming station having two continuously rotating cutters for trimming the upper and lower edges of the magazines; a first continuously moving endless conveyor for receiving the magazines from a preceding machine and carrying them past one of said trimming stations; a second continuously moving endless conveyor disposed at right angles to, and in position to receive the magazines from, the first conveyor for carrying them past the other of said trimming stations, both of said conveyors being inclined laterally and provided with means for promoting and maintaining automatic alignment of the edges of the magazines in the longitudinal direction of each conveyor; and gripping means comprising a plurality of laterally spaced, vertically adjustable endless bands located upstream of each trimming station and moving at the same speed as, and in opposition to, the associated conveyor in pressure engagement with the magazines thereon to expel air from between the leaves of the magazines, the operative lengths of the bands in front of the station at which the front edges of the magazines are to be trimmed progressively decreasing towards that side of the conveyor on which said single cutter is situated.

2. Apparatus as defined in claim 1, wherein the two outermost bands of each gripping means are associated with endless belts located at each trimming station and adapted to maintain top pressure on the magazines throughout each trimming operation.

3. Apparatus for trimming a continuous stream of magazines, pamphlets and the like, comprising, in combination: a first conveyor upon which the magazines are received in overlapping relation from a preceding machine; a second conveyor disposed at right angles to, and in position to receive the magazines from said first conveyor, each of said conveyors being formed in two endless sections, the first of which is of constant width and comprises transversely disposed slats carried by endless chains which circulate in laterally canted parallel planes, and the second of which is adjustable in width to suit the width or height of page size to which the magazines are to be trimmed; continuous means, formed of one upturned end of each of the slats of said first endless sections for automatically aligning the edges of the magazines deposited on said sections; first endless belt means associated with the second section of each conveyor for progressively exerting pressure on the magazines to expel air from between their leaves; a trimming station associated with the second section of each conveyor for trimming three edges of the magazines, one trimming station having a single cutter for trimming the forward edges of the magazines and the other trimming station having a pair of cutters for trimming the upper and

lower edges of the magazines; means for driving said cutters independently of said conveyors; and second endless belt means associated with the second section of each conveyor for exerting top pressure on the magazines throughout each trimming operation.

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