Feb. 12, 1952 J. A. E. BURLS 2,585,433

BOOKBINDING MACHINERY

Filed April 28, 1948 3 Sheets-Sheet 1

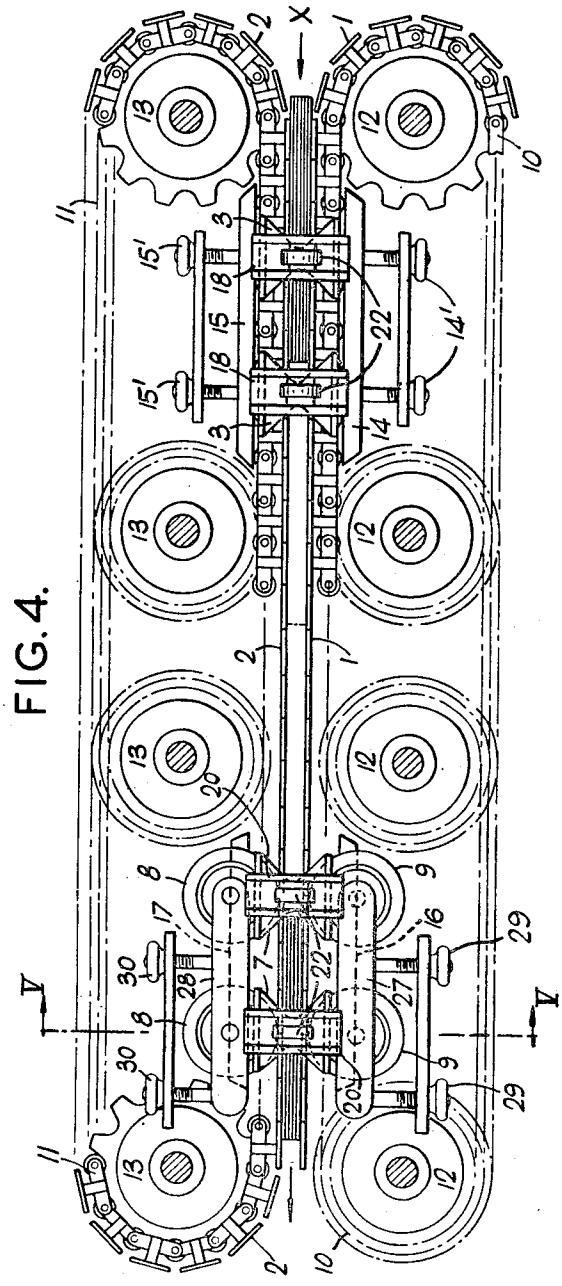


FIG. 4.

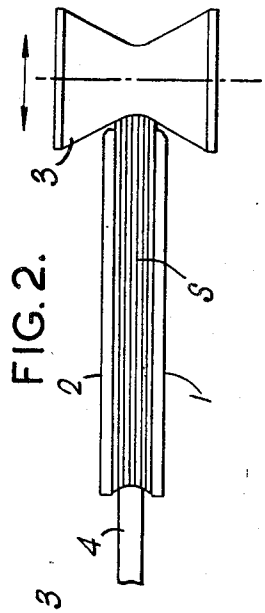


FIG. 2.

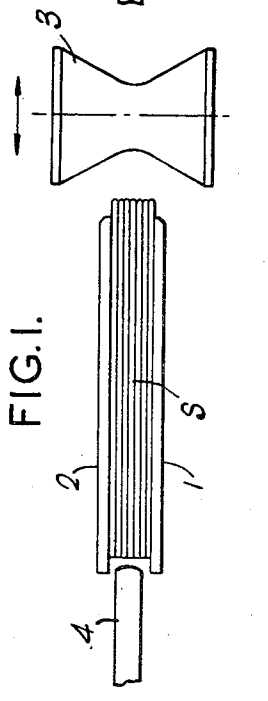


FIG. 1.

INVENTOR

John A. E. Burls

BY Albert J. Horton

ATTORNEY

Feb. 12, 1952 J. A. E. BURLS 2,585,433

BOOKBINDING MACHINERY

Filed April 28, 1948 3 Sheets-Sheet 2

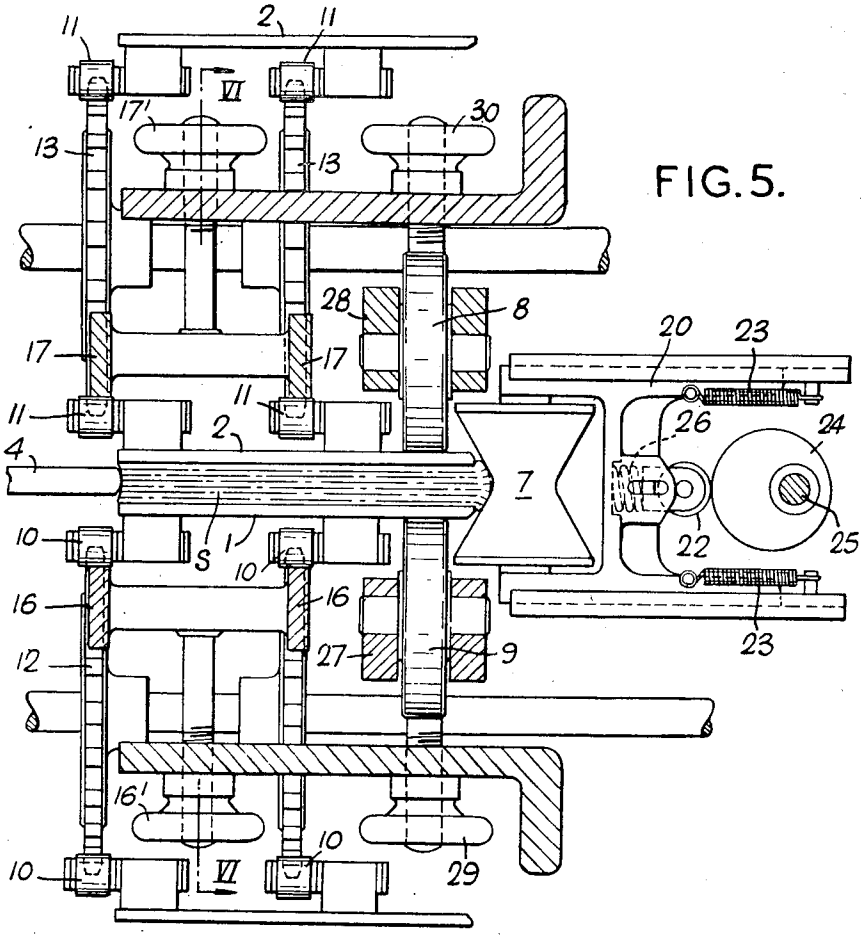
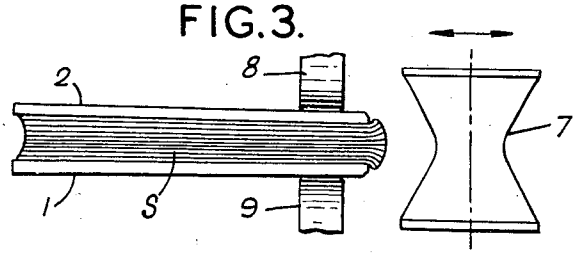


FIG. 5.

FIG. 3.



INVENTOR

John A. E. Burls

BY Albert G. Norton

ATTORNEY.

Feb. 12, 1952 J. A. E. BURLS 2,585,433

BOOKBINDING MACHINERY

Filed April 28, 1948 3 Sheets-Sheet 3

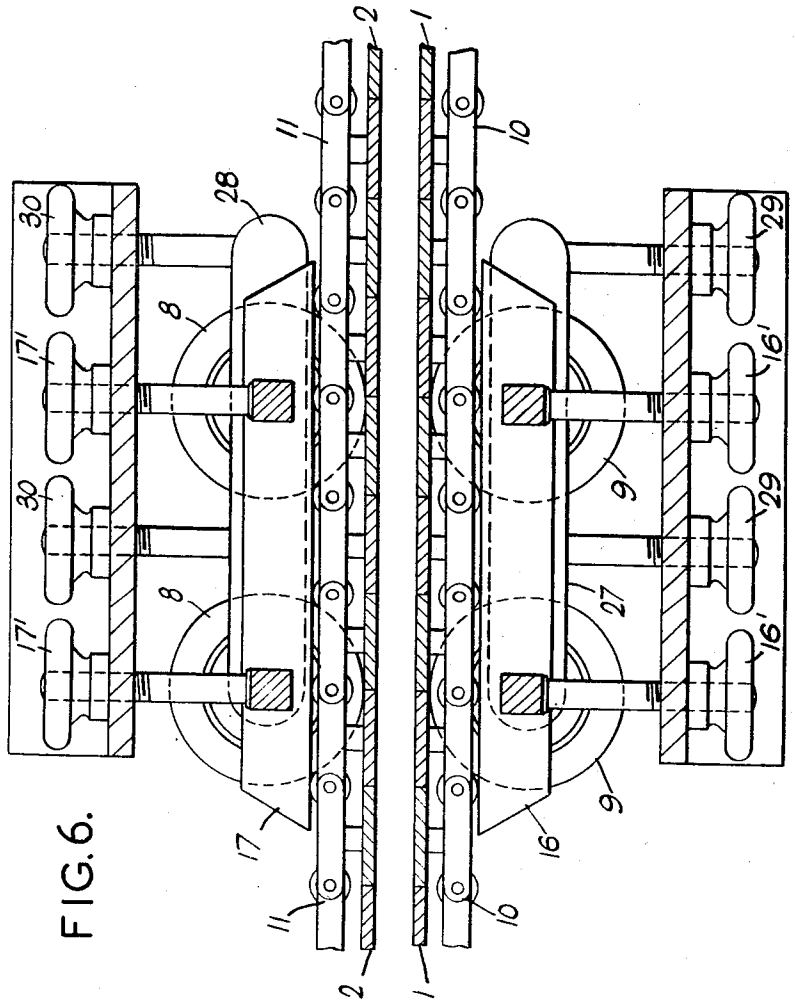


FIG. 6.

INVENTOR
John A. E. Burls
BY Albert J. Horton
ATTORNEY

Patented Feb. 12, 1952

2,585,433

UNITED STATES PATENT OFFICE

2,585,433

BOOKBINDING MACHINERY

John Albert Edward Burls, Kenton, England, assignor to R. Hoe & Co. Inc., New York, N. Y., a corporation of New York

Application April 28, 1948, Serial No. 23,785
In Great Britain April 30, 1947

3 Claims. (Cl. 11—5)

1

This invention relates to improvements in bookbinding machinery and is more especially concerned with mechanism to perform what is known as the "rounding" and "backing" operation; the rounding operation imparts the familiar convex finish to the spine of the book (with the corresponding concave finish to the opening edge) while the backing operation results in the bending-over of the rear or spine edges of the signatures or sheets forming the front and rear parts of the filling formed by them so that the natural "hinge" line of the book is brought forward from the edges of those signatures or sheets.

The main object of this invention is to provide a mechanism which will enable such a rounding and backing operation to be effected at relatively high speed.

According to the present invention a mechanism for rounding and backing collated signatures comprises a rounding component having an operating face shaped to correspond to the shape of the rounding, a backing component having an operating face shaped to turn over or back the signatures, means to impart a vibratory or tamping movement to the components and means to grip the signatures firstly with a relatively light pressure while the rounding component is operating and then with increased pressure while the backing component is operating; the light pressure exerted while the rounding component is in operation enables the signatures to be moved on one another under control so that they can take up the requisite relative position to conform at their spinal and opening edges to the desired curvature; the heavy pressure is such as to clamp the signatures against relative movement over one another to enable the backing component effectively to turn over their spinal edges.

One set of gripper pads could be employed, the pads moving past pressure control means which regulates the pressure so as first to be light for the rounding operation and then heavier for the backing operation.

Both the spine and the opening edges of the signatures can be subjected to the action of a rounding component for which purpose two shaped components would be provided to operate respectively on those edges.

Although the signatures could be brought to rest to be operated on in sequence by the rounding and backing components, it would generally be preferred to move the signatures continuously past the components so that they are progressively operated on, the action proceeding progressively in the direction of the length of the edges.

2

Such a continuously operating mechanism is illustrated in the accompanying drawings in which Figures 1–3 are diagrammatic views showing collated signatures in various stages of the rounding and backing operation; Figures 4–6 are views of a machine incorporating the invention, Figure 4 being a side elevation, Figure 5 a section on the line V—V Figure 4, and Figure 6 a local longitudinal sectional elevation on the line VI—VI Figure 5.

Referring firstly to Figures 1–3, the collated signatures to be handled are denoted by the reference S. These signatures are, for the rounding operation assembled as shown in Figure 1 and are clamped between pressure plates 1, 2 which exert a relatively light pressure such as to enable the signatures S to slide over one another; the signatures while so clamped are subjected to the action of a free-running shaping roll 3 which is vibrated and is applied to the spine of the signatures. The shape of this roll is such as to cause the spine to take the required concave form as is shown in Figure 2.

The opening edge of the signatures can be subjected to the action of a counterpart component which would be vibrated but in general it would be sufficient to present to that edge a shaping bar 4.

The collated signatures having thus been rounded are then subjected to a backing operation, and for this purpose the signatures are clamped with a greater pressure between pressure plates which may be the same plates 1, 2 or further plates. The pressure with which the signatures are clamped is such as to hold the signatures S against relative movement and while so clamped the spine is subjected to the action of a vibrated backing component which may be a free-running shaping roll 7.

To provide the desired increased pressure adjacent the spine of the signatures the pressure plates 1, 2 can be engaged by supplementary pressure rollers 8, 9. The action of the backing roll 7 is to turn over the spinal edges of the signatures as is shown in Figure 3, this being the operation known as the backing operation.

Reference will now be made to Figures 4–6. In these figures the parts corresponding to those in Figures 1–3 are given corresponding references. The pressure plates 1, 2 are constituted by slats which are carried respectively by pairs of endless roller chains 10, 11 passing respectively over sprocket wheels 12, 13 and arranged one over the other so that the chains have adjacent parallel

runs. These slats 1, 2 are so disposed and arranged that in these adjacent parallel runs of the chains, the slats on the two chains provide, as is seen in Figure 4, continuous and continuously moving surfaces. These two surfaces are opposed to one another, and into the space between the surfaces the collated signatures are fed in the direction indicated by the arrow X in Figure 4, the spine of the collated signatures lying parallel with the direction of movement of the chains.

The slats are arranged to grip the collated signatures over the whole of their page area, the slats extending up close to the spines of the sections to afford an adequate support especially during the backing operation.

The rollers of the chains 10, 11 in their parallel runs engage two sets of opposed pressure bars. One set comprises the two bars 14 (Figure 4) and the two bars 15 and the other set is comprised of the two bars 16 (Figure 5), and the two bars 17. The separation of these bars 14, 15 and 16, 17 is adjustable by providing the various sets of bars with adjusting hand wheels indicated by the reference number of the appertaining bar with the index 1.

The bars 14 and 15 are adjusted so that as the chains pass them their slats 1, 2 are caused to hold the signatures between them with the relatively light pressure for the rounding operation.

To one side of the bars 14, 15 are disposed two rounding components which are constituted by free-running shaping rolls 3 carried by slides 18 which are caused to reciprocate in guides to impart the desired vibration or tamping movement to the rolls 3.

The bars 16 and 17 are adjusted so that as the chains pass them, the slats 1, 2 are caused to exert the increased pressure on the signatures which is necessary for the backing operation. Associated with these bars is a pair of backing components which are constituted by free-running shaping rolls 7 which, like the rolls 3 are carried by slides 20.

The arrangement for vibrating the slides 18 and 20 is similar and is shown most clearly in Figure 5 as applied to the slides 20. The slides are provided with follower rollers 22 which are drawn by springs 23 against an eccentric 24 on a constantly rotating shaft 25 so that as the eccentric rotates the slides are vibrated. Preferably a spring 26 is interposed effectively between each roller 22 and its associated slide 18 or 20.

The supplementary pressure components 8, 9 are disposed to co-operate with the slats as they pass between the pressure bars 17, and these components are in the form of rollers which are carried by frames 27, 28 capable of being adjusted respectively by hand wheels 29, 30. These rollers exert their supplementary pressure on the slats at their ends adjacent the spines of the collated signatures so as to impart increased local pressure at the parts of the slats about which the signatures are to be backed or bent over.

A hopper can be located at each end of the chain run. One constitutes a feed hopper from which the collated signatures are taken one at a time under the control of an electrically operated feed mechanism, guide rollers being employed to guide or to advance the products from the hopper to the nip of the slats on the chains. The other hopper constitutes a delivery hopper to which the treated products pass and in which they are piled on a delivery board, the finished products being if desired conveyed from the delivery end

of the conveyors to the hopper by an endless flexible band.

It will be clear that this invention provides a method and an apparatus which enables the rounding and backing operations easily to be effected, the continuous operation of the machine illustrated in Figures 4–6 enabling the operation to be effected at high speed suitable for modern book-production methods.

What I claim is:

1. To round and back collated signatures, apparatus comprising upper and lower continuously driven endless chain conveyors having parallel operating runs, and including slats so formed as to provide opposed sensibly continuous horizontal surfaces to receive a succession of collated signatures between them, first and second sets of pressure bars disposed to engage rollers carried by the conveyor chains as they move continuously, to press the slats of one conveyor toward the slats of the other conveyor, pressure rollers disposed adjacent the second set of pressure bars to inrrease the pressure between the slats of the conveyors in the region adjacent the spines of the collated signatures held between the slats, free-running shaping rolls disposed respectively in the regions of the first and second sets of pressure bars to engage the spines of collated signatures as they are conveyed past the said sets, and means to impart a continuous vibratory action to the shaping rolls.

2. In a machine for performing rounding and backing operations on batches of collated signatures for the binding of books, an endless conveyor having cooperating upper and lower conveyor members each comprising a pair of roller carrying chains supported on suitably driven sprockets and having slats secured to the chains to form substantially continuous flat surfaces suited to engage collated signatures fed in succession between the slats of the upper and lower conveyor members, pressure bars positioned beside the path of each chain to engage the rollers on the chains and adjustable to exert a desired pressure of the slats on the signatures as they pass the pressure bars, free-running shaping rolls carried on reciprocable supports and positioned to engage the spines of successive batches of collated signatures while they are carried past the pressure bars and the pressure rollers by the slats, and resiliently acting means to reciprocate the supports and thereby cause the shaping rolls to tamp the spines of the signatures into a predetermined form.

3. In a machine for performing rounding and backing operations on batches of collated signatures for the binding of books, an endless conveyor having cooperating upper and lower conveyor members each comprising a pair of roller carrying chains supported on suitably driven sprockets and having slats secured to the chains to form substantially continuous flat surfaces suited to engage collated signatures fed in succession between the slats of the upper and lower conveyor members, first and second pressure bars positioned beside the path of each chain to engage the rollers on the chains and adjustable to exert a desired pressure of the slats on the signatures as they pass the pressure bars, pressure rollers adjacent the second pressure bars positioned to engage the slats and adjustable to exert a desired additional pressure of the slats on the signatures, first free-running shaping rolls carried on a reciprocable support and positioned to engage the spines of successive batches of collated signatures while they are carried past the first

pressure bars, to round the spine of the signatures, second free-running shaping rolls carried on a reciprocable support and positioned to engage the spines of the said batches while they are carried past the second pressure bars and the pressure rollers, to back the signatures, and means for reciprocating the first and second reciprocable supports, each comprising an eccentric continuously driven about a fixed axis, resilient means biasing the support toward the said axis, and a follower roller resiliently mounted on the support and engaging the eccentric.

JOHN ALBERT EDWARD BURLS.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
24,425	Coffin	June 14, 1859
1,097,012	Eldredge	May 19, 1914
1,802,355	Schramm	Apr. 28, 1931
2,010,810	Bredenberg	Aug. 13, 1935