A. BREDENBERG.

BOOKBINDING MACHINE.

APPLICATION FILED SEPT. 4, 1915.

1,248,253.

Patented Nov. 27, 1917.

3 SHEETS—SHEET 1.

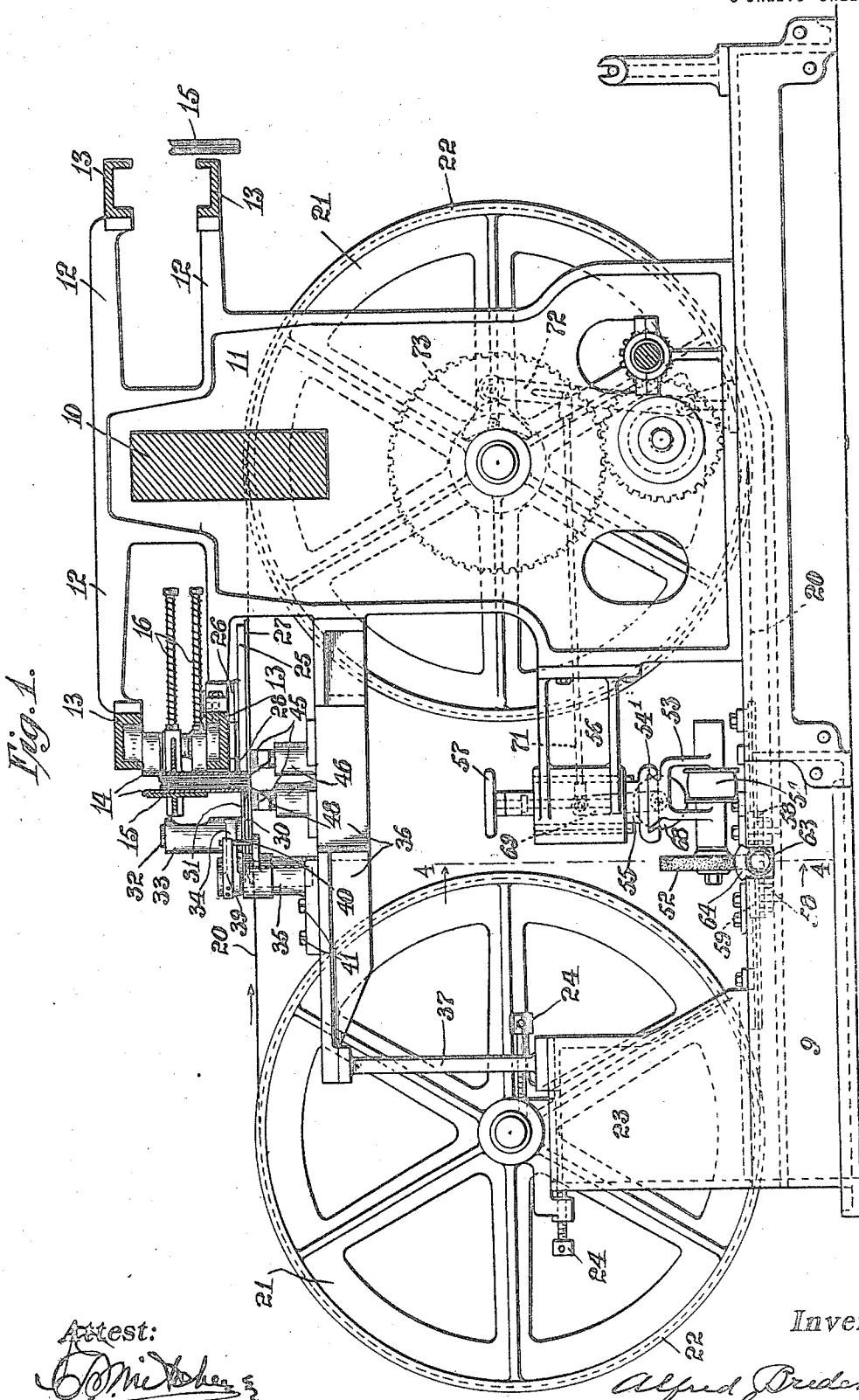


Fig. 1.

Attest:

P. Forke

Inventor:

Alfred Bredenberg

by J. Dolan, Atty

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3 SHEETS—SHEET 2.

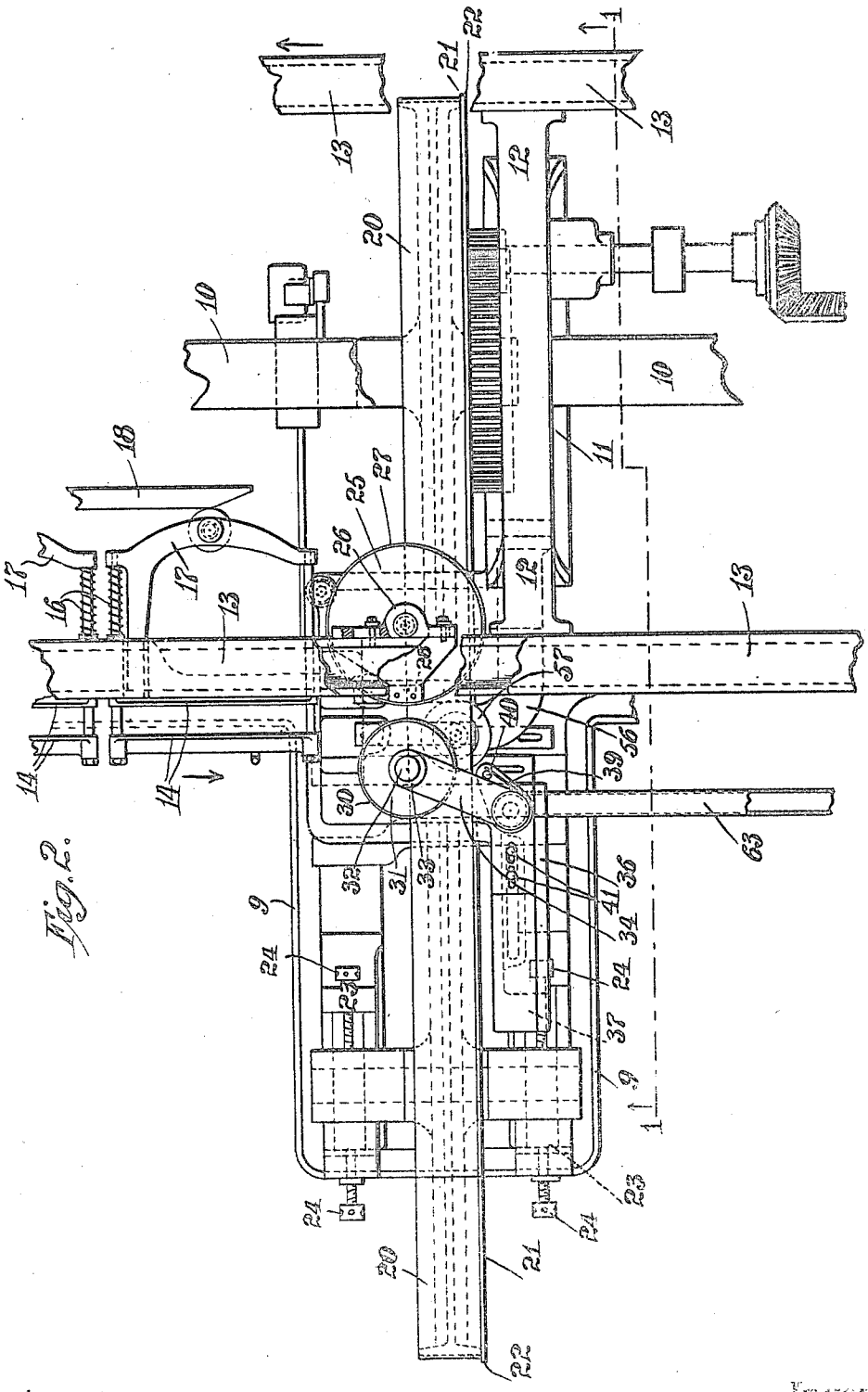


Fig. 2.

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3 SHEETS—SHEET 3.

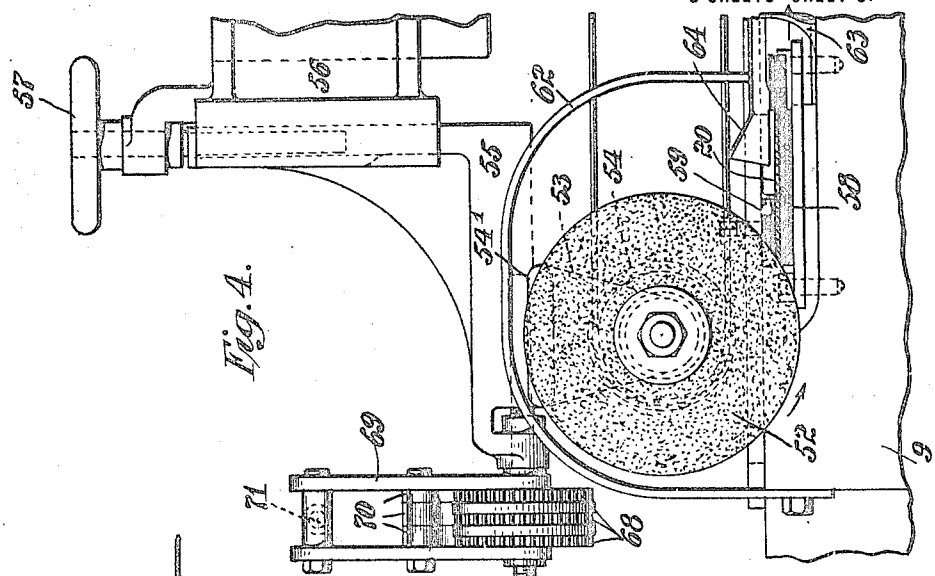


Fig. 4.

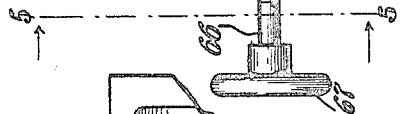


Fig. 5.

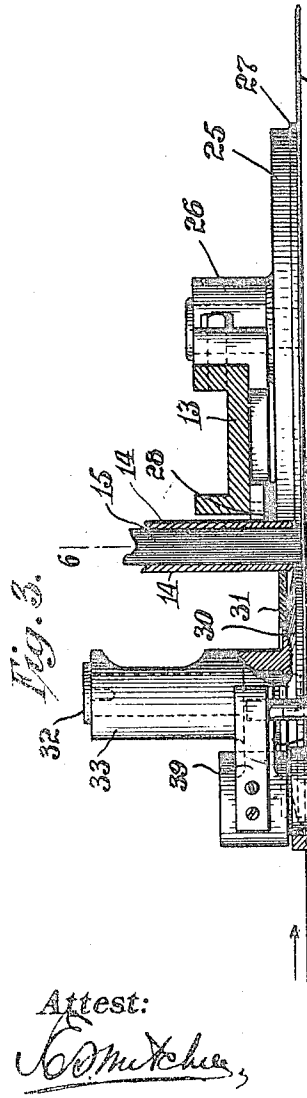


Fig. 3.

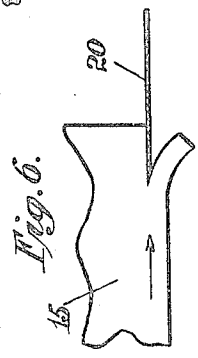


Fig. 6.

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F. Parker

Inventor:

Alfred Bredenberg

by

Wm. J. Dolan, Atty

UNITED STATES PATENT OFFICE.

ALFRED BREDENBERG, OF CHAMPLAIN, NEW YORK, ASSIGNOR OF ONE-HALF TO THE SHERIDAN IRON WORKS, A CORPORATION OF NEW YORK, AND ONE-HALF TO T. W. & C. B. SHERIDAN COMPANY, A CORPORATION OF NEW YORK.

BOOKBINDING-MACHINE.

1,248,253. Specification of Letters Patent. Patented Nov. 27, 1917.

Application filed September 4, 1915. Serial No. 48,959.

To all whom it may concern:

Be it known that I, ALFRED BREDENBERG, a citizen of the United States, residing at Champlain, in the county of Clinton and State of New York, have invented certain new and useful Improvements in Bookbinding-Machines, of which the following is a specification.

This invention relates to bookbinding machines, and more particularly to mechanism for trimming the back edge of the book, or rather, the signature-group, in the process of binding signatures into a book.

The invention is shown applied to that type of bookbinding machines wherein a succession of clamps are caused to travel around the machine so as to present the books or signature-groups held in the clamps successively to the various instruments or mechanism which perform the successive steps involved in book binding. Usually the first step is the even trimming of the back edges of the signatures so that the signature-group will be in proper condition for the succeeding operations which may, for example, comprise attachment of the signatures by adhesive or by metallic fastenings or otherwise, and the application by adhesive of a cover.

Heretofore the trimming of the signature-group has frequently been effected by a cutting mechanism in which a knife is pressed forcibly against a cutting block. This arrangement has involved certain disadvantages. Thus it was necessary either to feed the books intermittently in order to maintain them stationary during the trimming, or, on the other hand, reciprocate longitudinally the trimming mechanism. Moreover, the trimming was not entirely satisfactorily and uniformly effected, since the rapid wear upon the knife affected the result of the trimming action. In consequence frequent removal and replacement or readjustment of the knife was necessary.

The main object of the present invention is to afford a book trimming mechanism adapted to use in the art of bookbinding which is superior to heretofore known trimming mechanisms in its greater efficiency, convenience and durability. It is a further object to overcome the specific defects of the prior mechanisms referred to.

A further object hereof is to afford a book trimming mechanism wherein a continuous trimming knife or blade is caused to travel at high speed constantly in one direction and to effect the trimming of the book by reason of relative feed movement between the book clamp and the band knife.

This advantageous arrangement further permits the books to be fed continuously if desired, rather than intermittently, since either mode of travel of the books furnishes the necessary relative feed for the cutting operation by the rapidly traveling band knife.

Another object of the present invention is to provide constantly acting means for automatically maintaining the sharpness of the cutting edge of the band knife, and the adaptability of this type of trimming mechanism to such automatic sharpening constitutes another advantage therein.

Another object hereof is to provide certain advantageous guiding and supporting means which insure the proper relation at all times between the book and the band knife at the cutting point.

Other and further objects and advantages hereof will be elucidated in the hereinafter following description, and further advantages in the present invention will be apparent to those skilled in the art.

This application, showing book trimming mechanism, and my co-pending application, Serial No. 108,994, filed July 13th, 1916, showing a pervious-strip applying mechanism, illustrate detached portions of a complete bookbinding machine, the remainder of which is shown in my co-pending application, Serial No. 120,133, filed September 14th, 1916.

In the accompanying drawings which contain an illustration of one form in which the present invention may be embodied, Figure 1 is what may be considered a right end elevation showing a mechanism embodying the present invention and showing general parts of a bookbinding machine, partly in transverse cross section on the plane 1—1 of Fig. 2.

Fig. 2 is a plan view of the mechanisms shown in Fig. 1.

Fig. 3 is an enlarged detail elevation of certain parts seen in Fig. 1.

Fig. 4 is a front elevation of certain parts taken partly in section upon the plane 4—4 of Fig. 1.

Fig. 5 is a detail left elevation taken partly in section on the plane 5—5 of Fig. 4.

Fig. 6 is a section on the plane 6—6 of Fig. 3, showing the relation of knife and fork.

Referring first to some of the general machine parts not particularly concerned with the present invention, the machine has a base 9 or sometimes a series of such bases, as the machine may have considerable length. Upright longitudinal frame parts 10 and upright transverse frame parts 11 are indicated. Extending forwardly and rearwardly from the upright frame parts are a series of upper and lower cross arms 12—12 which, at their extremities, carry clamp tracks or guides 13 of a construction adapted to support and guide a succession of traveling book clamp devices 14. Only a few of these are shown in the drawings, but there may be an endless series of them which may be connected together in train, as is usual in the art, these clamps traveling longitudinally along the front of the machine in the tracks 13 and at the end of the machine passing around and returning by way of the corresponding tracks at the rear side, as is partly indicated in Figs. 1 and 2.

During the forward travel of each of the book clamps it may, at a certain point in its travel, be closed upon a book or signature-group 15, fed into the clamp in any convenient manner. Clamp closing springs 16 are shown, which is the usual method of imposing pressure upon the book between the clamp members. Connected with each clamp is a controlling arm 17 having a roller stud which coöperates with a fixed clamp-controlling cam 18. In Fig. 2 an arm 17 is shown in such relation to cam 18 as to hold the clamp 14 open. At or before this point in the travel, which is in the direction of the arrows, the signature-group or book is supposed to have been positioned within the clamp. The control arm roller is about to pass upon the inclined part of the cam 18, thereby permitting the clamp closing springs 16 to assert themselves and to secure the book in the clamp. Thereafter the forward travel of the clamp holding the book is adapted, according to the present invention, to carry the book past the trimming mechanism hereof, so as to smoothly and effectively trim off the downwardly protruding back edge of the book or signature-group.

In combination with the book clamping device for holding the signature-group with its back edge protruding, this invention provides a constantly acting cutter or knife 20 which is preferably in the form of a band or strip rapidly actuated at a high rate of speed for the purpose of trimming the book edges through the relative travel, for example, the described forward travel of each book clamp and book. The band cutter is preferably a continuous band traveling always in one direction, being mounted for this purpose at the periphery of a pair of spaced apart guide pulleys 21—21.

As will be seen, the preferable arrangement is that the plane of the band knife is substantially at right angles to the plane of the book so as to trim off the back of the book in square fashion, and preferably also the direction of the length or motion of the knife is at right angles to the advancing travel of the book. The book travels horizontally in its own plane with its protruding edges standing downwardly from the clamp and the band knife travels horizontally in a direction at right angles to the plane of the book.

It will also be observed that the trimming mechanism hereof is adapted to operate upon the book during the advancing travel of the book; and instead of employing the long known plan of bodily reciprocating an operating mechanism along the path of book travel, this invention dispenses with the need thereof and constitutes a non-advancing mechanism adapted to operate progressively upon the advancing book, which is a simpler and more effective plan.

The knife band 20 may be of suitable material, thickness and width. Its cutting edge which faces the advancing book is produced by a bevel at its under side, whereby the actual trimming takes effect in the plane of the upper side of the knife.

It is intended that the knife shall be continuously ground to maintain its cutting edge, as a result of which, the knife will be worn to narrower and narrower dimensions until required to be replaced by a new one.

The cutting operation imposes a certain pressure or strain upon the book, the knife and other parts, and herein are shown complete means for preventing displacement or detrimental action.

Thus, to hold the knife up to its work against pressure of the advancing book, the guide pulleys 21 are shown as provided with bearing flanges 22 against which the rear edge of the band knife bears.

The front band pulley 21 may be adjustable for taking up slack in the band knife. Thus the bearing block of the pulley may be slidingly supported upon a bracket 23. Upstanding from the base of the machine a pair of adjusting screws 24 are provided, which may be tightened or loosened to give the desired adjustment. The rear band pulley may be journaled in the frame in any desired manner and any convenient sort of gearing or driving connections may be used for rotating it.

At the cutting point certain supports, guides and abutments are shown, which cooperate with each other as will appear in maintaining the advancing knife and the advancing book or signature-group in proper relation for the trimming and in proper condition so as to insure a true, even and uniform trimming. One of these supporting and guiding means is the member 25, which serves the double function of giving support to the advancing book laterally in opposition to the direction of travel of the knife and to the frictional drag that it tends to produce upon the book. The member 25 is shown as generally horizontally arranged, its underneath edge or surface affording a guideway or positioning means for the knife which runs beneath the member, and its front or upright side or edge forming an abutment or support for the book. Preferably the member 25 is not stationary, but is adjusted to advance with the book so that there will be no friction or drag between the member and book, which might tend to injure the book. This is effected by constructing the member 25 in the form of a rotatable disk as shown, it being supported in a bracket 26 fixed for convenience to the rear side of the lower clamp track 13 at the front of the machine. The disk 25 is rotated slowly by the book clamp in the advancing travel of the book.

In order to give more effective supporting and guiding action to the disk member 25, it is shown as having its active portion of slight vertical dimension. Thus it is shown as provided with a small outstanding flange or rim 27 at its lower side. It will be understood that this supporting and guiding flange 27 stands in a position tangent to the face of the advancing book, the point of tangency coinciding with the line of cut or with the cutting edge of the knife. The rear face of the book, the effective edge of the flange, and the cutting apex of the knife are all in the most intimate contact and under pressure so that it is insured that the knife will thoroughly do its work of cutting and trimming off the book with accuracy and regularity from the first to the last leaf of the book with equal or better effectiveness than that of a powerful shear.

The portion of the rotatable disk 25 which extends upwardly above the flange 27 serves not merely to give rigidity to the disk, but, by its contact with the clamp, is caused to revolve as already stated. Since the knife is to be held snugly up against the disk flange 27 as will be later described, it is desirable to prevent any tilting of the disk owing to possible looseness or wear, and for this purpose I have provided a fiber bearing piece 28 supported fixedly at the under side of the bracket 13 above the disk 25 near the book.

Another of the supporting or guiding members at the cutting point is the member 30, which like the member 25, may be in the form of a rotatable disk located above the knife and in contacting relation with the book. The rotatable disk 30, however, is located at the forward side of the book in opposition to the disk 25. It contacts directly with the foremost sheet of paper constituting the book, which is the sheet first encountered by any given portion of the knife, while the disk 25 at the rear contacts the sheet last encountered.

The disk 30 is bodily movable as will be explained, and is adapted to be held by resilient pressure against the book. This serves to compact the sheets, holding them in the most advantageous condition for the cutting operation. Like the disk 25 it, therefore, coöperates with the book and with the knife at the cutting point, the knife bearing directly against the underside or periphery of the disk.

For certain advantageous reasons, the disk 30 is of a different contour from the disk 25. It does not have the vertical upstanding rim by which the clamp rotates the disk, but for this purpose the disk 30 is provided with a supplemental disk 31 located as shown, to afford an equivalent function.

The disk 30 is shown as rotatably supported by a vertical shaft 32 mounted in a bearing 33. This bearing is movable not only to permit the resilient application of the disk to the book, but to permit adjustment of the parts for different thicknesses of books to be trimmed. Thus the bearing 33 is shown as carried at the extremity of a swinging arm 34, the swinging of which causes the bearing and disk to move rearwardly and forwardly, that is, toward and from the disk 25. The swinging arm 34 is vertically pivoted or journaled in a bracket 35, which is fixedly mounted upon a rigid cross bar 36 of the frame of the machine. This cross bar 36 is secured at its rear end to one of the transverse upright frame members 11, and at its forward end is held up by posts 37 supported in turn upon the upstanding bracket 23 already mentioned.

In order to resiliently press the front rotatable disk 30 against the advancing book, a strong plate spring 39 may be employed. This is shown as having one end rigidly secured by screws to the fulcrumed hub of the swinging arm 34. The free end of the spring 39 bears against a fixed stud 40 rigidly mounted on the bracket 35. When the disk 30 is swung from the disk 25 by the entering book, this tends to deflect the spring putting it under strain, which thereby effects the desired pressure of disk 30 against the book.

For adjustment for different thicknesses of books, the bracket 35 is adjustably con-

nected on top of the fixed cross bar 36 by a bolt and slot adjustment 41, so as to permit the bracket and all the parts carried by it, including the disk 30, to be bodily shifted toward and from the line of travel of the books.

Having described the disks 25 and 30 which coöperate in supporting the book being trimmed, and which afford upper guide surfaces for the traveling band knife, there will now be described the means for holding the band knife upwardly in position against the disks.

A pair of fiber supports or blocks 45, 45 are shown. These are spaced apart from each other beneath the band knife when on either side of the path of the advancing book. The book trimmings pass between the two blocks. Each of the blocks 45 opposes one of the disks 25 or 30, confining the band knife between the block and the disk.

The blocks 45 are supported on brackets 46, which, in turn are supported on the frame cross bar 36. Adjustment of the knife under supports or blocks 45 toward and from each other is desirable for obvious reasons, and is herein permitted by reason of an adjustable bolt and slot connection 47 between each of the brackets 46, and the cross bar 36. To take up wear upon the fiber supports, they are vertically adjusted by reason of their shanks 48 having a sliding connection in the respective brackets 46, a set screw 49 serving to lock the parts in the desired adjustment.

Suitable adjustment may be provided to compensate for the change in the position of the knife edge due to its gradual wear. Either the knife or the pulleys about which it passes might be adjustable, but for convenience, I prefer to longitudinally adjust the mountings of the disks 25 and 30. This may easily be effected by slot or groove connections together with bolts or the like for securing of parts in adjusted position.

It is preferred to effect the automatic sharpening of the band knife upon the lower or return run thereof near the base of the machine, and an emery wheel 52 may be employed for the purpose, it being fitted to gradually shift during the operation of the machine so as to follow up the wear of the knife.

The emery wheel is upon a short counter shaft journaled in a yoked bearing 53, a pulley 54 being secured on the shaft with the yoke whereby the wheel may be driven at high speed. The yoke bearing 53 at its upper end has a dove-tailed connection 54′ with an adjustable bracket 55. The dove-tailed connection permits sliding of the bearing and emery wheel longitudinally, that is, toward the edge of the band knife to be sharpened.

The adjustable bracket 55 may be set vertically into different positions, it having a sliding connection with a fixed bracket 56 secured to one of the transverse upright frame members 11. A screw threaded adjusting means controlled by a hand wheel 57 may be employed for effecting the vertical adjustment of the bracket 55 and the emery wheel.

Fig. 4 shows a face view of the emery wheel and a sectional view of the band knife in their normal relations. The wheel is seen to be grinding a knife edge at the lower face of the band knife. This lower face becomes the upper face as the knife passes around the pulleys to the book trimming position.

The traveling band knife requires support at the point where it is ground or sharpened, and for this purpose removable fiber pieces 58 and 59 are provided in pairs below and above the knife respectively. The knife traveling between them is held firmly in place. The emery wheel grinds away the traveling band knife, and, as the knife wears down, the wheel advances between the two fiber blocks of each pair; the wheel to be replaced when the worn-out knife is renewed.

It is desirable to remove the dust and grindings caused by the emery wheel, and for this purpose a covering hood 62 is employed, which incloses the wheel, the fiber supports and the knife. A suction pipe 63 is shown as entering the inclosed space, this having at its mouth a funnel-shaped cap 64 which helps conduct the fine grindings into the suction pipe. The pipe 63 may be connected to a dust box in a usual manner, from which dust box a suction blower draws off the dust and grindings.

In order to effect a very slow automatic advance of the emery wheel toward the band knife, the following may be employed:

A feed screw 66, see Figs. 4 and 5, may be employed for the purpose, it being engaged in a screw threaded recess at the extremity of the bracket 55. One end of the screw 66 is connected to the yoked bearing piece 53 so as to advance the bearing and emery wheel. The other end of the screw 66 is provided with a hand wheel 67, whereby the screw may be turned by hand, for example, for restoring the parts upon the introduction of a new band knife. A gradual rotation of the feed screw 66 will effect the desired feed. This may be accomplished by means of a pawl and ratchet device comprising, for example, a triple ratchet wheel 68 splined upon the feed screw shank. A pawl frame 69 carries three pawls 70 engaging the portions of the ratchet respectively. The upper end of the pawl frame 69 is connected by a rod 71, see also Fig. 1, with a vibrating lever 72 carrying a cam roll at its upper end adapted to be thrust outwardly upon every rotation of the band pulley 21 by means of a cam 73 on the

pulley shaft. By this arrangement, the triple ratchet wheel 68 and the feed screw 66 are given a very slow, step by step movement, which is transmitted so as to gradually advance the emery wheel in the desired manner.

It will be seen that by reason of the construction above shown and described, a bookbinding machine or bookbinding mechanism is provided which answers the objects and affords the advantages of the invention as hereinbefore set forth. It is to be understood that the invention in its broader aspects is not limited to the precise construction shown, nor to any particular feature of construction, since many changes may be made in the details and arrangements and combinations of the parts, without departing from the main principle of the invention or sacrificing its chief advantages.

What is claimed is:—

1. A bookbinding machine including, in combination, a book carrying mechanism for holding a procession of signature groups and advancing them continuously through the machine with each group held so as to travel substantially edgewise in its own plane with its back edge protruding, and a mechanism for progressively trimming off the folded back edges of the successive books in such way as to expose each individual leaf to subsequent operations, said mechanism comprising a movable trimming tool or blade standing across the path of book travel, and means for actuating said tool, whereby the trimming of each book is progressively performed by reason of the advancing travel of the latter in said carrier, and a confining means at each side of the book constructed to advance in unison with the book travel and each of said confining means arranged to contact both the book and the blade at the cutting point whereby to maintain the continuously traveling book constantly in proper relation to the blade during the progressive trimming of the book by the blade.

2. A bookbinding machine including, in combination, a book carrying mechanism for holding a procession of signature groups and advancing them continuously through the machine with each group held so as to travel substantially edgewise in its own plane with its back edge protruding, and a mechanism for progressively trimming off the folded back edges of the successive books, said mechanism comprising a movable trimming tool or blade standing across the path of book travel, means for actuating said tool, whereby the trimming of each book is progressively performed by reason of the advancing travel of the latter in said carrier, and opposed rotary confining devices contacting both the advancing book and moving blade for maintaining the correct relation of blade and book during trimming.

3. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a support with which both the protruding book-edge and the trimming blade contact at the cutting point, said support adapted to compact the book leaves and at the same time co-act with the traveling blade in the trimming of the book.

4. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a revoluble supporting disk arranged tangentially to the book and in bearing contact with the trimming blade at the cutting point.

5. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a support with which both the protruding book-edge and the trimming blade contact at the cutting point, said support adapted to compact the book leaves and at the same time co-act with the traveling blade in the trimming of the book; and a second similar support resiliently opposed to said support at the other side of the book.

6. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a support with which both the protruding book-edge and the trimming blade contact at the cutting point, said support adapted to compact the book leaves and at the same time co-act with the traveling blade in the trimming of the book; and a second similar support resiliently opposed to said support at the other side of the book; and bearing means at the opposite side of the blade holding it to said supports.

7. A bookbinding mechanism including in combination an advancing book clamp

adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a revoluble supporting disk arranged tangentially to the book and in bearing contact with the trimming blade at the cutting point; and a second similar support resiliently opposed to said support at the other side of the book.

8. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a revoluble supporting disk arranged tangentially to the book and in bearing contact with the trimming blade at the cutting point, and means for adjusting said disk transversely of the blade travel to compensate for wear of said blade.

9. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a revoluble supporting disk arranged tangentially to the book and in bearing contact with the trimming blade at the cutting point; and a second similar support resiliently opposed to said support at the other side of the book, and means for adjusting one of said disks transversely of the book for varying thicknesses of book.

10. A bookbinding mechanism including in combination an advancing book clamp adapted to carry a book edgewise and with its untrimmed edge protruding, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, means for causing the travel of the trimming blade to progressively trim the advancing book, and a revoluble supporting disk arranged tangentially to the book and in bearing contact with the trimming blade at the cutting point, and means for adjusting said disk transversely of the blade travel to compensate for wear of said blade and automatically acting means for continuously sharpening the edge of said blade.

11. A bookbinding mechanism including in combination an advancing book clamp, means for guiding the advancing clamp, an endless trimming blade arranged across the path of the advancing book, and means for causing the rapid travel of the trimming blade continuously in one direction during the advance of the book and automatically acting means for continuously sharpening the edge of said blade, comprising a rotating abrasive wheel and means for relatively feeding it to follow up the wear of the blade, and opposed blade guiding plates arranged to be ground with the blade.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

ALFRED BREDENBERG.

Witnesses:

G. O. DUSTIN,

JNO. H. CROOK.