Sept. 27, 1932. A. SHMYROFF ET AL 1,880,111

MATCH MAKING MACHINE

Filed July 11, 1930 3 Sheets-Sheet 1

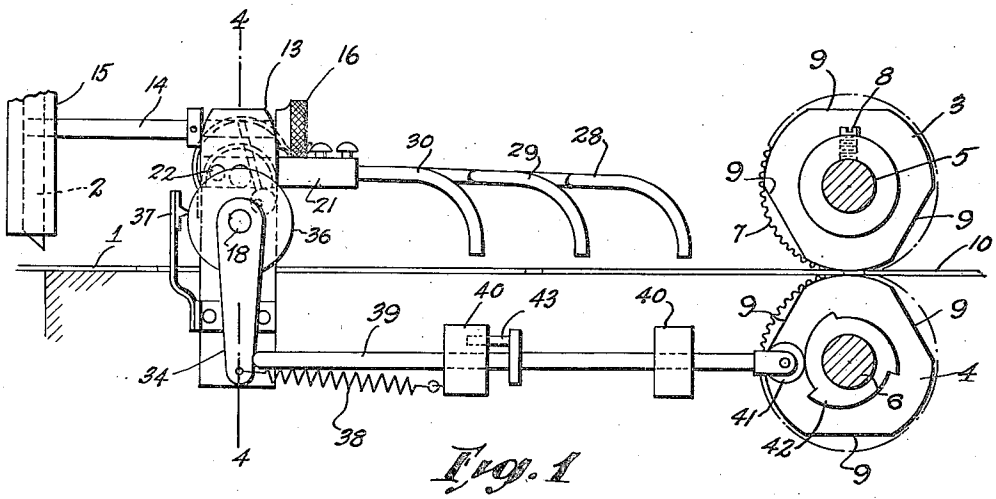


Fig. 1

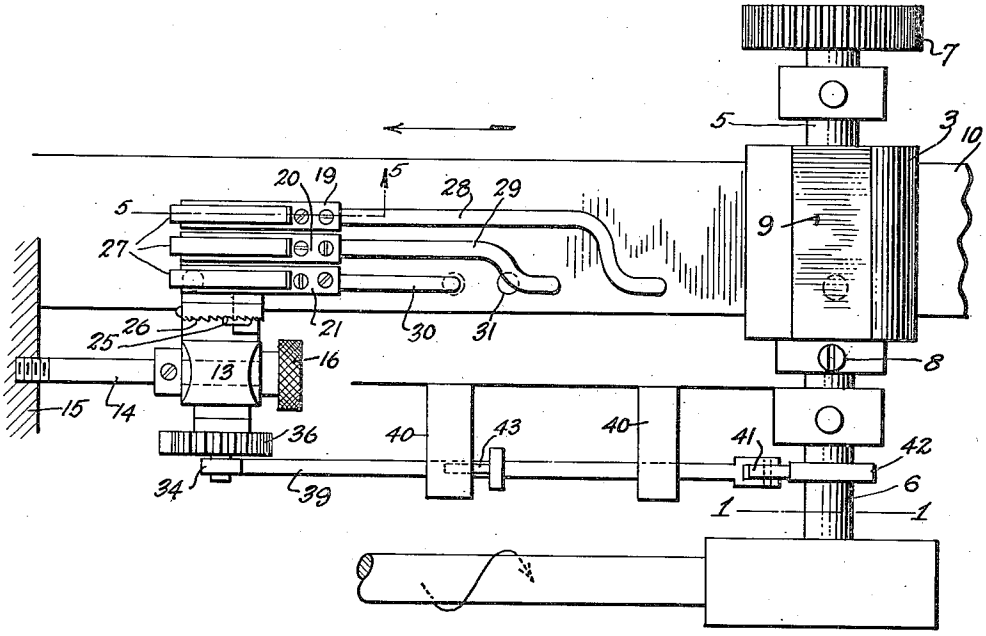


Fig. 2

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Filed July 11, 1930 3 Sheets-Sheet 2

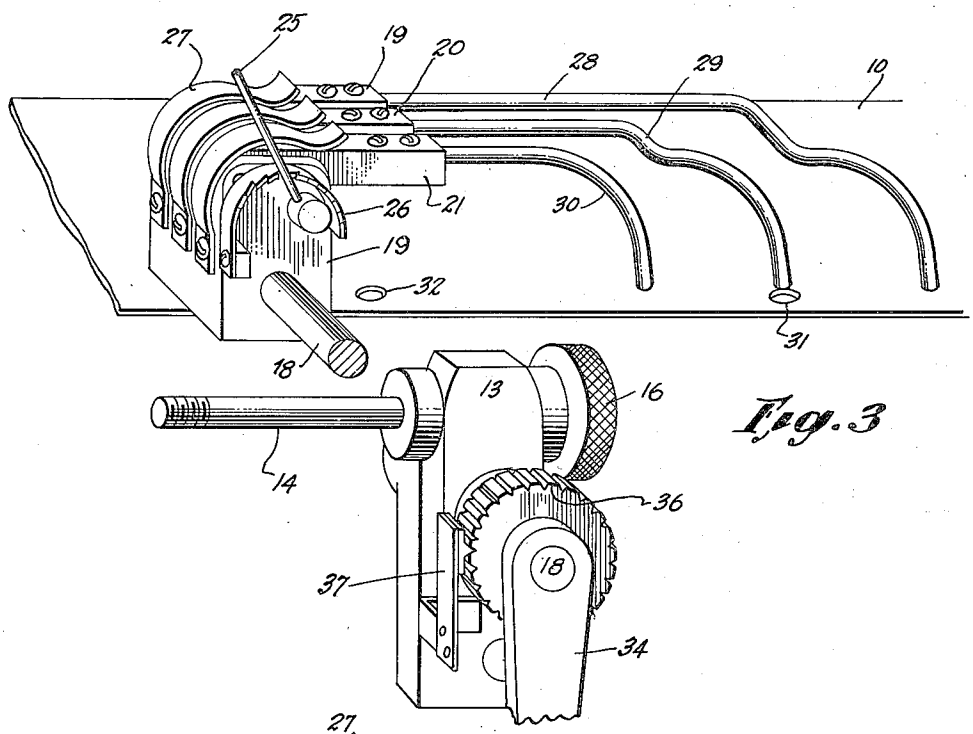


Fig. 3

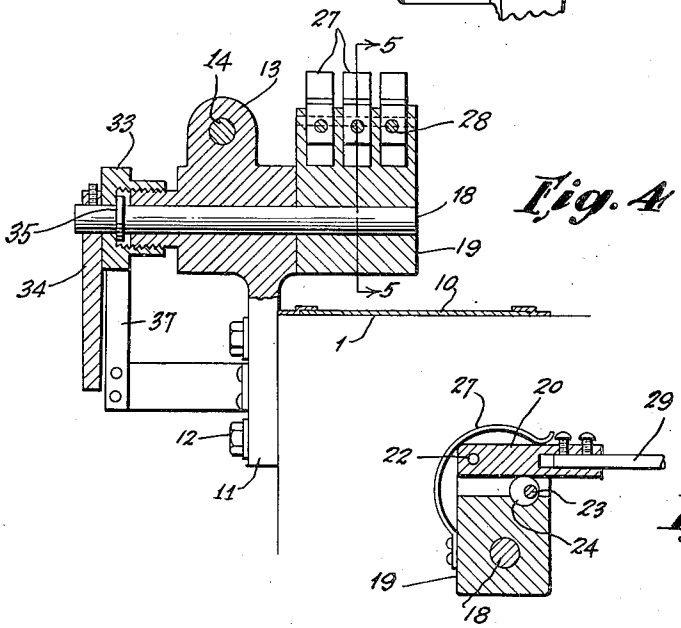


Fig. 4

Fig. 5

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Filed July 11, 1930 3 Sheets-Sheet 3

Fig. 6

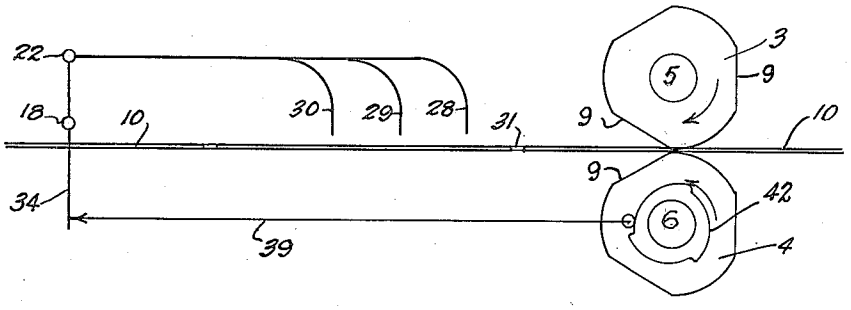


Fig. 7

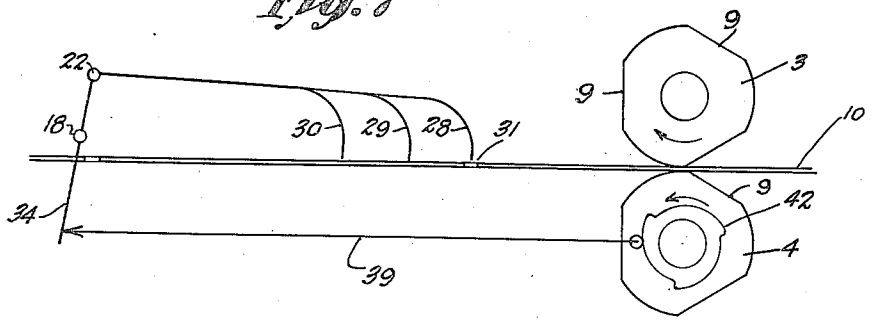
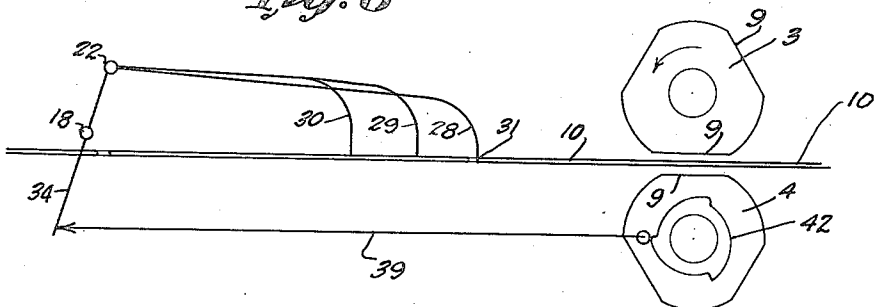


Fig. 8



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Patented Sept. 27, 1932

1,880,111

UNITED STATES PATENT OFFICE

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MATCH MAKING MACHINE

Application filed July 11, 1930. Serial No. 467,256.

This invention relates to match making machines and is directed more particularly to the feeding of splint or cover stock in absolutely accurate predetermined quantities. In the manufacture of book matches, it is highly desirable that a nice degree of accuracy be obtained in dimensions of the constituent parts of the book. In other words, in order that the parts may be manipulated in automatic machinery, the dimension of these parts must be constant otherwise jamming of the machines results and proper feeding of the parts and their assemblies throughout steps of the manufacturing operations are difficult unless the parts are of uniform size. Furthermore, uniformity of size is of first importance in the assembly of the parts in order that they may be properly positioned with respect to one another and in the final or finished article a uniformity of size is desirable in order to facilitate packaging and to provide in such product a neat and pleasing appearance. It therefore becomes essential that in the cutting of the parts from the stock from which they are formed that this cutting be accomplished in an accurate manner as stated and it is the object of the present invention to insure, in an absolutely automatic manner, the accuracy to which we have referred.

As stated, the mechanism of this invention may be employed to act upon either cover or comb stock without departing from the invention, but for the purpose of concrete illustration the mechanism shown in the accompanying drawings is designed to manipulate cover stock. It is common practice to feed cover stock from a roll to appropriate knives in order to cut, from the stock, blanks of predetermined size. The mechanism of this invention is utilized in the manufacture of book matches to feed this cover stock from the roll to an appropriate cutter where the material is blanked.

In its preferred practical form, the present invention embodies an oscillating head carried by and adapted to oscillate upon a rock shaft to which oscillating movement is imparted from any suitable prime mover, so as to synchronize the operations of this mechanism with the other operating parts of match making machinery with which it is associated. On the oscillating head are supported a plurality of so-called positioning fingers preferably spring pressed or of inherent resilient character and all extending in the same direction. These several fingers are so shaped or offset that their free ends are positioned in tandem and in a line parallel to the edge of a web of paper stock adapted to be fed along an associated predetermined path. The stock is fed along said path by a pair of cooperating rolls geared to to one another and having flat sides because of which the feed of the stock is intermittent and the oscillating head is operatively connected to the operating mechanism of these rolls in such manner that the fingers will act while the rolls are not feeding whereas the fingers will be inactive while the rolls are feeding.

According to this invention, the feed of the stock of the rolls may be varied and is preferably so regulated that there will be a slight overfeed. Thus at each feeding operation of the rolls the stock is slightly overfed and at the next operation of the positioning fingers, one of these fingers is adapted to engage with accurately spaced perforations in the stock to move the stock in a retrograde direction slightly in order that the stock may be accurately positioned with respect to its path of travel with the result that if end portions of the stock are cut off at successive operations as stated, all of these end portions will be of uniformly constant size.

The apparatus is relatively simple, operates with a high degree of efficiency and is unfailing in such operation.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawings.

The accompanying drawings illustrate one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

Figure 1 is a side elevation of a machine

embodying the present invention, partly in section on the line 1—1 of Figure 2.

Figure 2 is a plan view of the structure of Figure 1.

Figure 3 is a perspective view with certain parts broken away in order to show the invention more clearly.

Figure 4 is a section on the line 4—4 of Figure 1.

Figure 5 is a section on the line 5—5 of Figure 4.

Figures 6, 7 and 8 are diagrammatic views showing the manner in which the parts cooperate in the feeding and positioning of paper stock.

Referring to the drawings, 1 designates a feed table of a book match making machine, along which it is desired to feed paper stock to appropriate cutting or blanking mechanism diagrammatically indicated in Figure 1 by a cutter 2.

Positioned back of the cutting mechanism 2 an appropriate distance are a pair of feed rolls 3 and 4. These feed rolls are mounted on shafts 5 and 6, respectively, geared together by the gears 7, so that the rolls are driven at a uniform speed and in timed relation. The roll 4 is fixed on the shaft 6 permanently, but the roll 3 is circumferentially adjustable on the shaft 5 and is adapted to be locked in regulated position by means of a set screw 8 as indicated in Figs. 1 and 2.

It will be noted from Figure 1 in particular that the rolls 3 and 4 are provided with flat faces 9. Each roll is shown as having three such faces although there may be a greater or lesser number if desired, but if the rolls operate at the same speed, they should have a like number of flat faces, be of the same size and the intervening curvilinear circumferential surface of the rolls should be correspondingly placed. The rolls are regulatable toward and away from one another in order that the curvilinear faces of the rolls may engage with and drive interposed paper stock 10. Thus as the rolls are rotated in opposite directions stock is fed between and by them so long as the curvilinear faces of the respective rolls are juxtaposed, but during the period of such rotation that the flat faces 9 are juxtaposed the driving or feeding of the stock will cease until the next succeeding curvilinear surfaces engage with and drive the web through the next feeding operation. These rolls therefore produce in effect intermittent feeding and the extent of each feeding operation may be regulated by slight circumferential adjustment of the roll 3 on its shaft 5 so as to shorten or lengthen the cooperative relation between the curvilinear faces of the respective rolls by increasing or decreasing the overlap of such faces. In this way, a fairly accurate feed of the stock is obtained.

In practice, the rolls are preferably so adjusted as to produce a slight overfeed and the positioning fingers which will be hereinafter fully explained are adapted during non-feeding periods of the rolls to act upon the stock in order to compensate for the slight overfeed to which we have referred through a well regulated retrograde movement of the web to the extent necessary to compensate for the overfeed as stated.

Mounted on one side of the table is a bracket 11 pivotally secured to the table for adjustment on a bolt or screw 12. The upper portion of this bracket has a perforated lug 13 and through this lug extends an adjusting screw 14 which is screwed into a tapped hole in the cutter guide 15 as shown in Figures 1 and 2. The adjusting screw 14 has a knurled operating finger piece 16 and is provided with a fixed collar 17, the lug 13 being positioned between the finger piece and collar so that by screwing the screw 14 in one direction or the other, the bracket is adjusted on the axis of the screw 12 to move it closer to or further away from the feed rolls 3 and 4, or from the cutting knife 2.

Extending through the bracket in a direction transversely of the table 1 is a shaft 18 for which the bracket forms a bearing. Fixed to the inner end of this shaft is the oscillating head 19. This head is in the form of a metal block of substantially rectangular form and in the upper surface of the block are formed three slots in each of which is positioned one end of a finger holder. Three finger holders 19, 20 and 21 are shown and consequently there are three slots formed in the block. A pin 22 passes through the block and through all of the finger holders as shown best in Figs. 4 and 5 and this pin forms a fulcrum or pivot on which the holders are supported for pivotal movement. Also extending through the block in parallel relation to the pin 22 is a rod 23 and positioned in the base of each slot below the corresponding holder is an eccentric portion 24 fixed on the rod. The outer end of the rod 23 is provided with an adjusting handle 25 (see Fig. 3) and to the end of the block 18 is secured a serrated locking plate 26 of arcuate contour. The serrated edge of this locking plate coacts with the handle 25 to lock the handle in any position of adjustment to which it may be manually moved, and through such manual movement the eccentric portions 24 of Figure 5 are caused to adjust the several finger holders as may be desired to insure proper cooperation of their fingers with respect to the paper stock to be fed. Leaf springs 27 secured to the head 18 bear upon the holders 19, 20 and 21 and maintain them in engagement with the eccentric portions 24.

The three finger holders carry and support positioning fingers 28, 29 and 30, respectively, the fingers 28 and 29 being bent

laterally as shown in Fig. 2, so that the free ends of all of the fingers will be arranged in tandem with respect to the path of the stock 10 and will be in a line parallel to the edge of the stock, so that these fingers can consecutively cooperate with perforations 31 and 32 formed in the stock adjacent one edge thereof and adapted to travel into and out of cooperation with the fingers as will be presently explained. It may be here noted, however, that throughout the entire length of the stock are holes similar to 31 and 32 as stated, and these holes are positioned a distance apart equal to three times the distance between the ends of the fingers 28 and 29 or between the free ends of the fingers 29 and 30. This is the preferable spacing although it may be otherwise without departing from this invention.

The outer end of the shaft projects through an interiorly threaded finger piece 33 which is screwed on to a threaded boss of the bracket 11 and exteriorly of the finger piece 33 the shaft carries an operating arm 34 to which the shaft is fixedly secured. The finger 33 is between the arm 34 and the fixed collar 35, so that by screwing the finger piece 33 in one direction or the other, the shaft 18 may be shifted longitudinally to adjust the several fingers laterally with respect to the holes 31 and 32. The finger piece is milled as shown at 36 and with its milled surface cooperates a spring locking finger 37 and serves to hold the finger piece against inadvertent rotation.

The operating arm 34 is impelled in one direction by a spring 38 shown in Figure 1 and is acted upon in the opposite direction by a push rod 39 guided in brackets 40 on the frame of the machine and provided at its opposite end with a cam follower 41 coacting with the cam 42 fixed on the shaft 6. A fixed collar with a pin 43 precludes the push rod from turning.

The operation of the structure is as follows. As the rolls 3 and 4 turn to the position of Figure 6, two arcuate surfaces of said rolls engage the stock 10 and feed it to the right to the shaft in this figure, until the parts reach the position of Figure 7 whereat the stock is again disengaged. During this intervening period, however, the cam follower has been acted upon by the cam to shift the push rod 39 to the left, and to thus oscillate the head 18 in a clockwise direction, so that by the time the position of Figure 7 is reached, the positioning fingers will have been depressed sufficiently to engage with the upper face of the stock. As the rolls 3 and 4 continue to rotate from the position of Figure 7 to the position of Figure 8, the stock remains stationary so far as the operation of the feed rolls is concerned, but the oscillation of the head in the direction stated continues so that the fingers while pressed against the surface of the stock are moved bodily in the direction of the feed roll 3 and are in effect "feeling" for one of the holes in said stock. As soon as one of these holes comes into the path of any one finger, said finger drops into the holes and the continued movement of the finger in a rearward direction shifts the stock rearwardly, it being noted from Figure 8 that during this interval the flat surfaces of the rolls are juxtaposed and the stock therefore free from engagement with either roll. This state of facts continues until through a continued rotation of the rolls, the parts return to the position of Figure 6, where the rolls again grip the stock and impart thereto the next forward impulse, the follower 41 in the meantime having passed to the low phase of the cam, so as to permit the fingers to elevate and be disengaged from the stock.

The operation of this mechanism necessarily requires proper adjustment. The rolls 3 and 4 should be adjusted to slightly overfeed and the fingers should in turn be adjusted to correct this overfeed to such extent as to produce accuracy in the operation of the cutter 2. The bodily position of the oscillating head is of course controlled by manipulation of the finger piece 16. The lateral positions of the fingers are controlled by the finger piece 33, the vertical adjustment of the fingers is regulated by the handle 25 through the eccentric portions 24. The yielding quality of the fingers is provided for by the springs 27 which of course will yield as the fingers move rearwardly in engagement with the stock.

The structure which has been described is relatively simple for the work which it accomplishes. It may be adjusted to absolute accuracy through the positive operations of the fingers in positioning the stock with respect to the cutting mechanism and the adjustments of the various parts may be readily accomplished while the machine is in operation and without necessitating the stopping of the machine.

The foregoing detailed description sets forth the invention in its preferred practical form, but the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, what we claim as new and desire to secure by Letters Patent is:

1. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path in the direction of positioning fingers hereinafter defined, said means being constituted to slightly overfeed the stock and to release the stock between successive periods of feeding, a member mounted to oscillate and positioned along the path of the stock beyond the feeding means, a plurality of positioning fingers carried by said member with their ends ar-

ranged in tandem and extending from the oscillating member in the direction of the feeding means, means for oscillating said member to move the fingers into and out of engagement with the strip and to shift them in the direction of the feeding means while in engagement with the strip, said means for oscillating said member being operatively connected to the means for intermittently feeding the stock to cause the fingers to engage with the stock during non-feeding periods for the purpose of longitudinally adjusting the stock in a retrograde direction.

2. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path in the direction of positioning fingers hereinafter defined, said means being constituted to slightly overfeed the stock and to release the stock between successive periods of feeding, a shaft extending transversely of the path of the stock beyond the feeding means, a plurality of positioning fingers resiliently supported on the shaft off center thereof and extending toward the feeding means with their free ends arranged in tandem, means to oscillate said shaft to move the fingers into engagement with the stock and to thereupon shift said fingers in the direction of the feeding means for the purpose of longitudinally adjusting the stock in a retrograde direction, said means for oscillating the shaft and the means for feeding the stock being timed to engage the fingers with the stock during non-feeding periods.

3. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path, a plurality of positioning fingers arranged in tandem and all operable upon the stock in a direction counter to the feed, and means to periodically engage said fingers with the stock simultaneously at different points in the length of the stock and thereupon shift the fingers in such counter direction to move the stock backwardly, the means for operating the fingers being timed to engage them with the stock during non-feeding periods of the feeding means.

4. In a book match making machine, means for intermittently feeding a perforated strip of stock along a predetermined path, a plurality of resilient positioning fingers arranged in tandem and all operable upon the stock in a direction counter to the feed, and means to periodically engage said fingers with perforations in the stock and thereupon shift the fingers in such counter direction to move the stock backwardly, the means for operating the fingers being timed to engage them with the stock during non-feeding periods of the feeding means.

5. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path, a plurality of positioning fingers arranged in tandem and all operable upon the stock in a direction counter to the feed, means to periodically engage said fingers with the stock and thereupon shift the fingers in such counter direction to move the stock backwardly, the means for operating the fingers being timed to engage them with the stock during non-feeding periods of the feeding means, and means regulating the counter shifting movement of the fingers.

6. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path, said means being constituted to release the stock between successive periods of feeding and to slightly overfeed the stock at each feeding operation, a shaft extending transversely of the path of the stock beyond the feeding means, a plurality of positioning fingers resiliently supported on the shaft off center thereof and extending toward the feeding means with their free ends arranged in tandem, means to oscillate said shaft to move the fingers into engagement with the stock and to thereupon shift said fingers in the direction of the feeding means to compensate for the overfeed of the feeding means, said means for oscillating the shaft and the means for feeding the stock being timed to engage the fingers with the stock during non-feeding periods, means for regulating the distance between said shaft and the feeding means to insure accurate positioning of the stock, and means for regulating the elevation of said fingers.

7. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path, said means being constituted to release the stock during non-feeding periods and to slightly overfeed the stock at each feeding operation, a shaft arranged transversely of said path, an oscillating head mounted on said shaft, a plurality of positioning fingers resiliently supported on said head and all extending in a direction counter to the feed of the feeding means, and means for oscillating said shaft to oscillate the head to move the fingers into engagement with the stock and thereupon shift the fingers in a direction counter to the food to insure accurate positioning of the stock, said means for oscillating the shaft being timed with respect to the feeding means to cause the fingers to engage with the stock during non-feeding periods.

8. In a book match making machine, means for intermittently feeding a strip of stock along a predetermined path, said means being constituted to release the stock during non-feeding periods, a shaft arranged transversely of said path, an oscillating head mounted on said shaft, a plurality of positioning fingers resiliently supported on said head and all extending in a direction counter to the feed of the feeding means, means for

adjusting the elevation of the free ends of said fingers, means for regulating the distance of the shaft from the feeding means, and means for oscillating said shaft to oscillate the head to move the fingers into engagement with the stock and thereupon shift the fingers in a direction counter to the feed, said means for oscillating the shaft being timed with respect to the feeding means to cause the fingers to engage with the stock during non-feeding periods.

9. In a book match making machine, a pair of feed rolls having circumferentially spaced apart flat faces and so positioned that when the arcuate faces of the rolls cooperate strip stock will be fed between them, with non-feeding periods while the flat faces are in cooperative relation, said rolls being adapted to overfeed the strip stock at each feeding operation, shafts supporting said rolls and geared together, an oscillating head mounted to oscillate on an axis transversely of the path of the stock and beyond the rolls, fingers carried off center of the head and yieldable with respect thereto, said fingers extending in the direction of the rolls with their ends in tandem and adapted, through oscillation of the head to be moved into and out of engagement with the strip stock and to be shifted in the direction of the rolls while in engagement with the strip to compensate for the overfeed of the rolls, and operating connections between the head and one of said shafts to cause the fingers to be operated in timed relation with the feed rolls to act upon the strip during non-feeding periods.

10. In a book match making machine, a pair of feed rolls having circumferentially spaced apart flat faces and so positioned that when the arcuate faces of the rolls cooperate strip stock will be fed between them, with non-feeding periods while the flat faces are in cooperative relation, said rolls serving to slightly overfeed the stock at each feeding operation, shafts supporting said rolls and geared together, a cam on one of said shafts, an oscillating head mounted to oscillate on an axis transversely of the path of the stock and beyond the rolls, fingers carried off center of the head and yieldable with respect thereto, said fingers having their ends arranged in tandem and extending in the direction of the rolls and adapted, through oscillation of the head to be moved into and out of engagement with the strip stock and to be shifted in the direction of the rolls while in engagement with the strip to compensate for the overfeed of the rolls, and operating connections between the head and the cam to cause the fingers to be operated in timed relation with the feed rolls to act upon the strip during non-feeding periods.

11. In a book match making machine, a pair of feed rolls having circumferentially spaced apart flat faces and so positioned that when the arcuate faces of the rolls cooperate stock will be fed between them, with non-feeding periods while the flat faces are in cooperative relation, shafts supporting said rolls and geared together, means for circumferentially adjusting the relation of the rolls to vary the feed thereof to maintain a slight overfeed, an oscillating head mounted to oscillate on an axis transversely of the path of the stock and beyond the rolls, fingers carried off center of the head and yieldable with respect thereto, said fingers having their ends arranged in tandem and extending in the direction of the rolls and adapted, through oscillation of the head to be moved into and out of engagement with the strip stock and to be shifted in the direction of the rolls while in engagement with the strip, and operating connections between the head and one of said shafts to cause the fingers to be operated in timed relation with the feed rolls to act upon the strip during non-feeding periods, for the purpose of shifting the strip in a direction counter to the feed to compensate for the overfeed of said rolls.

In testimony whereof we have signed the foregoing specification.

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JOHN DILL.
EDWARD VAN HOOFSTADT.