March 21, 1950 C. F. WRIGHT 2,501,626

MECHANISM FOR CENTERING ASSEMBLED BOOK ELEMENTS IN MATCH-BOOKING MACHINES

Filed May 3, 1948 5 Sheets-Sheet 1

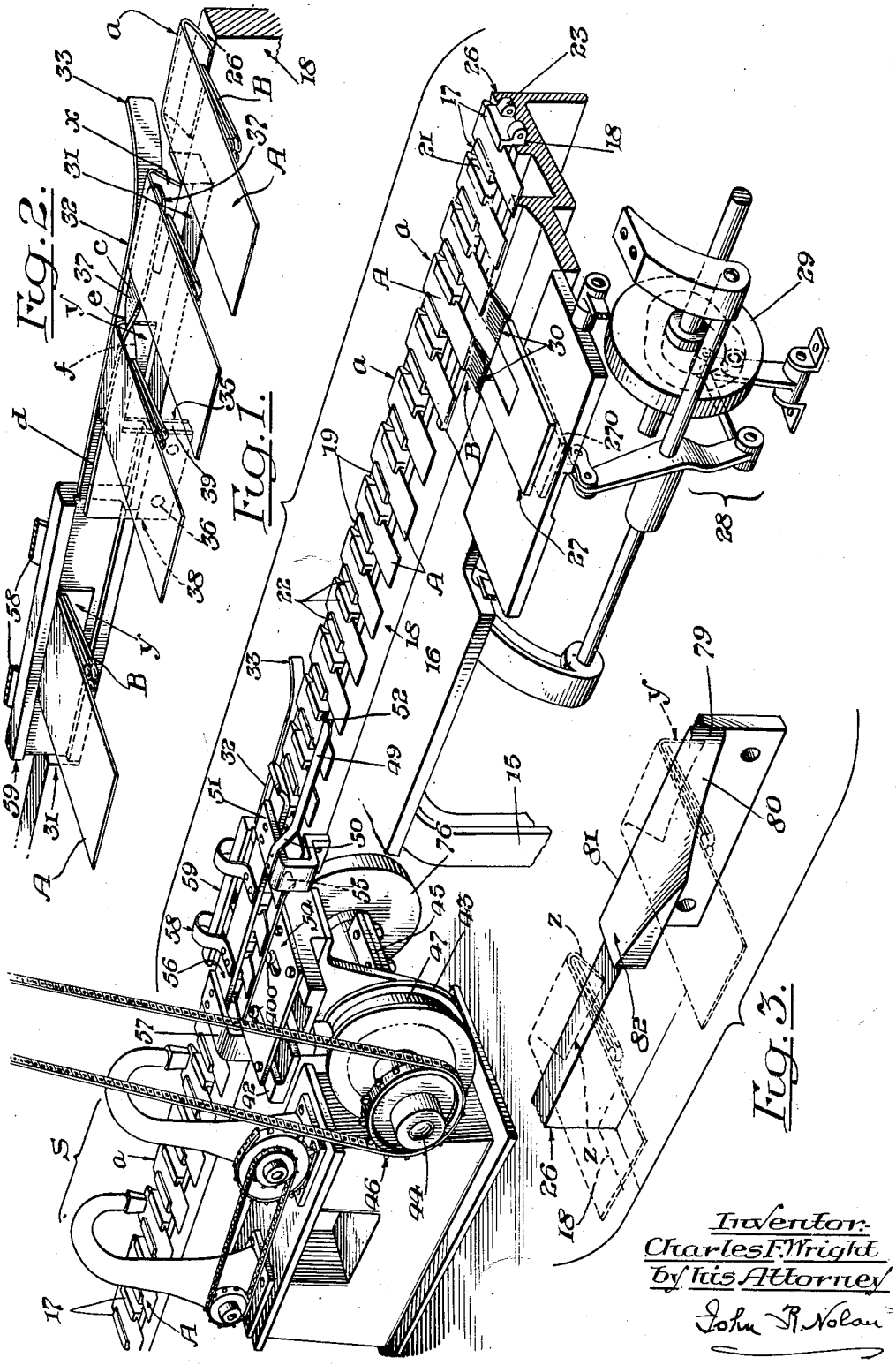


Fig. 1.

Fig. 2.

Fig. 3.

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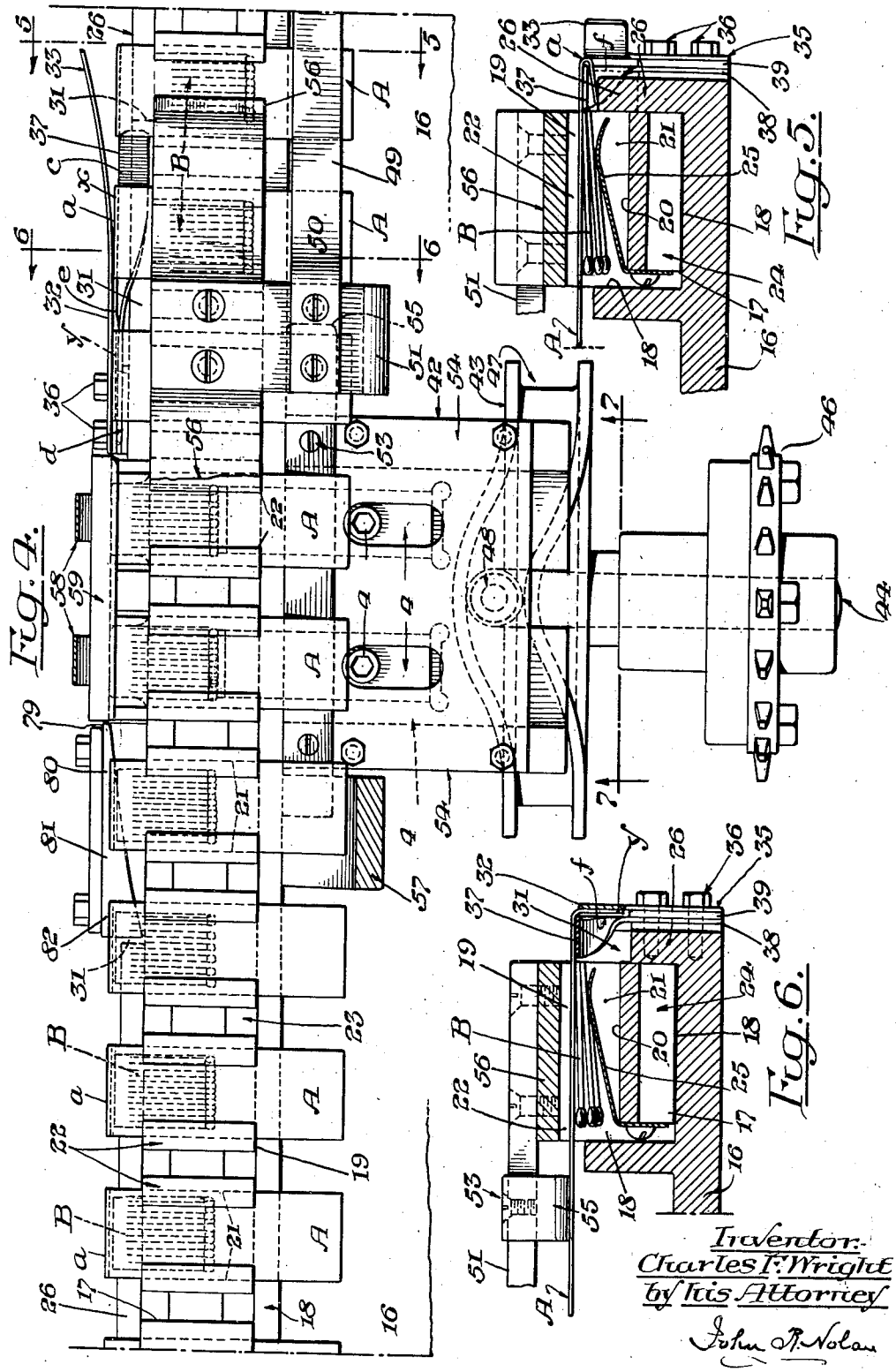


Fig. 4.

Fig. 5.

Fig. 6.

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Fig. 8.

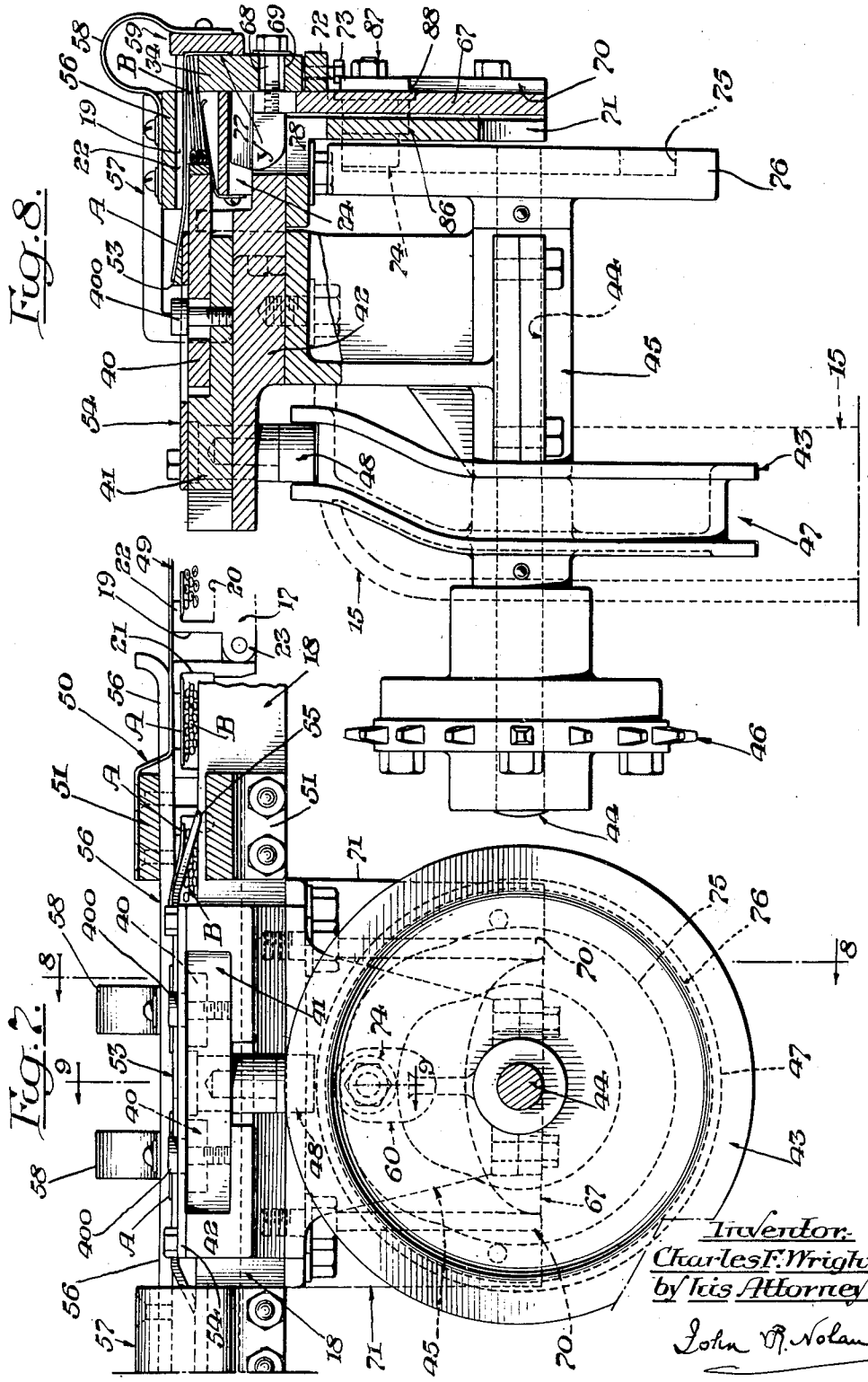


Fig. 2.

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MECHANISM FOR CENTERING ASSEMBLED BOOK ELEMENTS IN MATCH-BOOKING MACHINES

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Fig. 10.

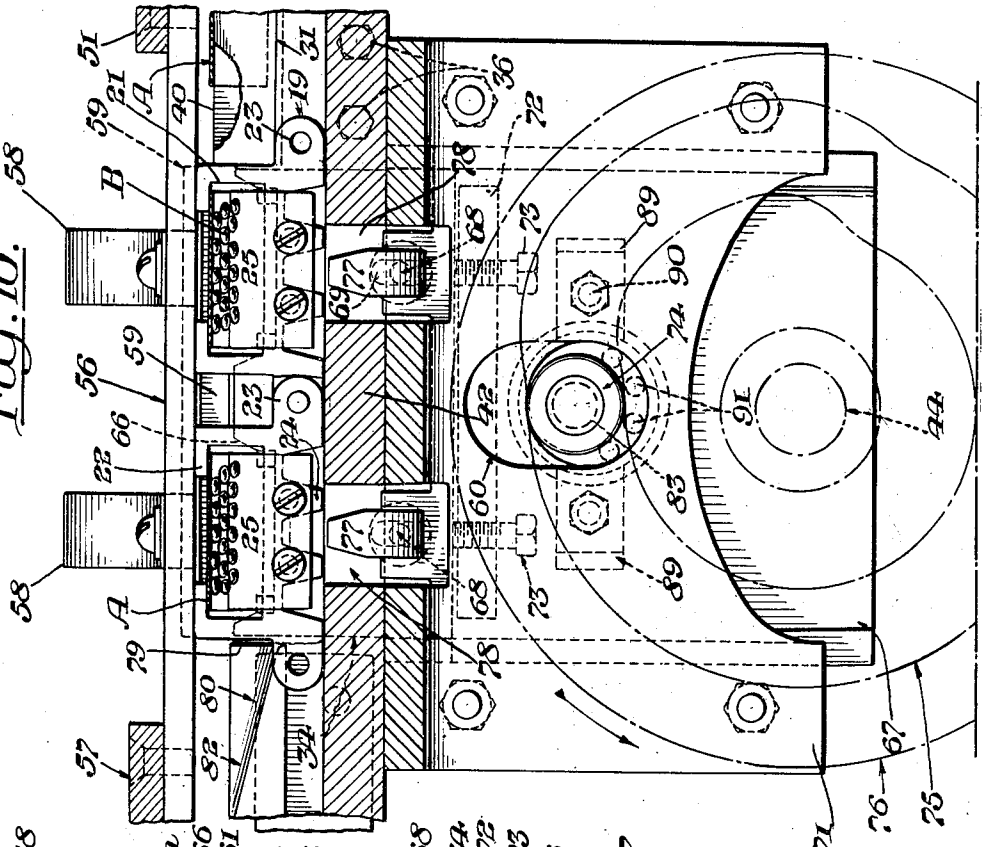
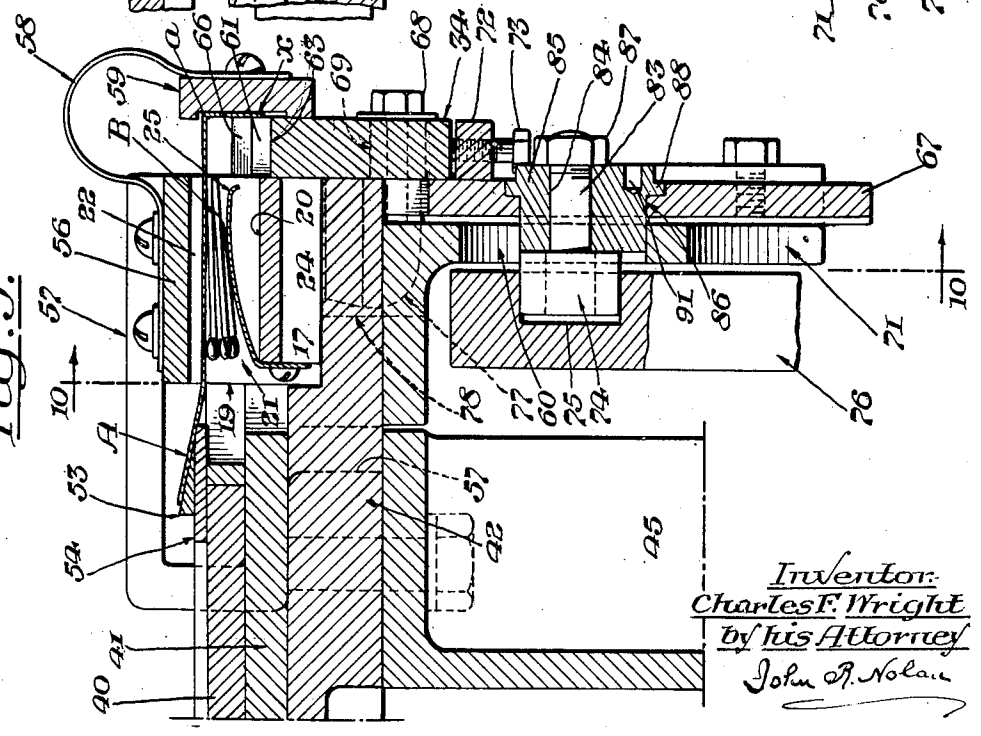


Fig. 9.



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Filed May 3, 1948 5 Sheets-Sheet 5

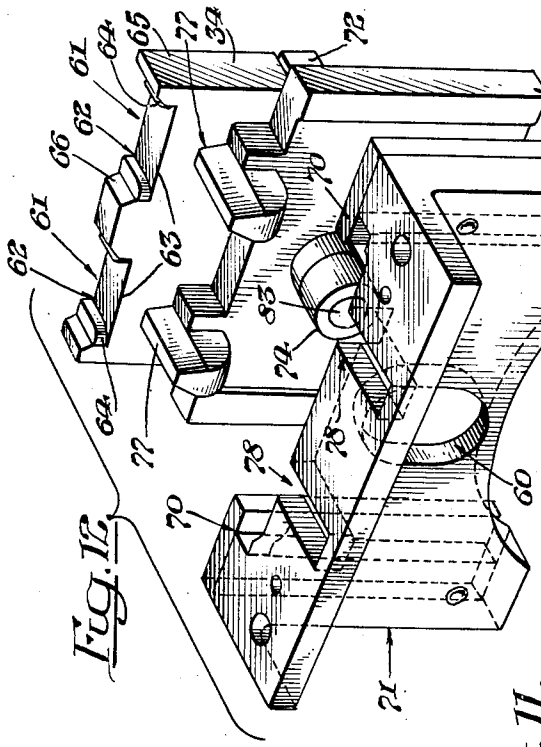


Fig. 12.

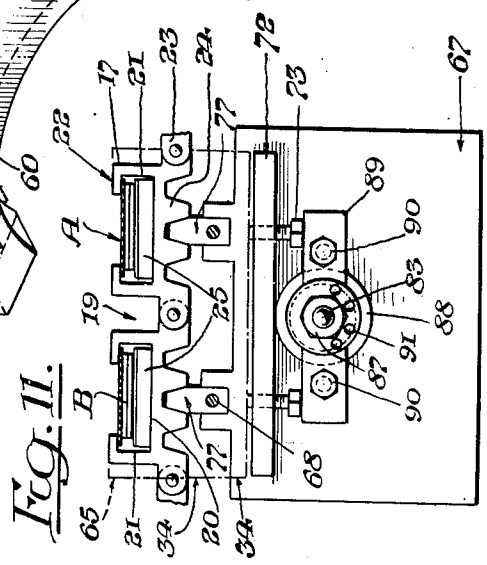


Fig. 11.

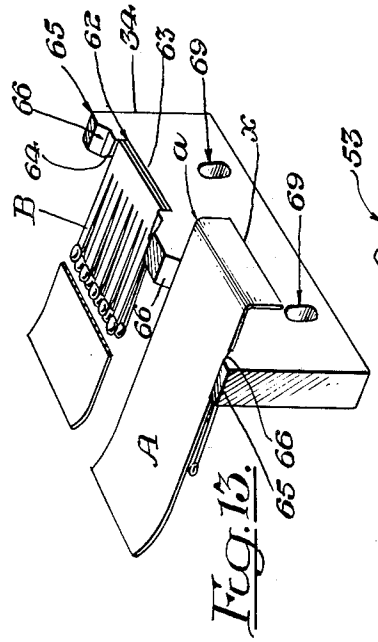


Fig. 13.

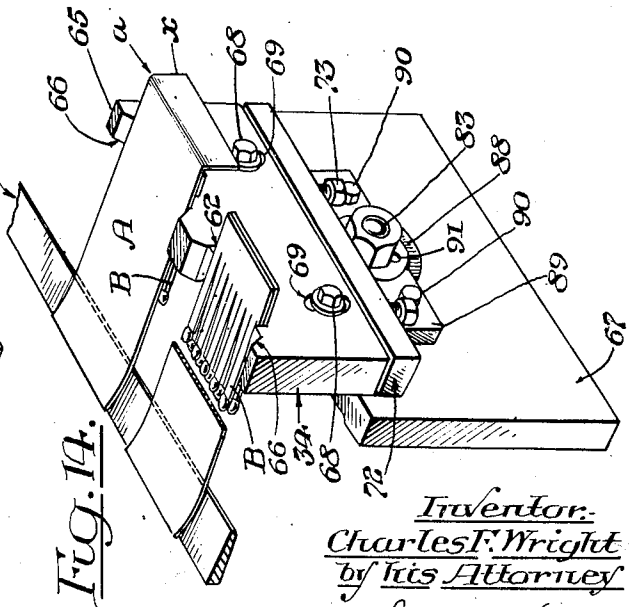


Fig. 14.

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Patented Mar. 21, 1950

2,501,626

UNITED STATES PATENT OFFICE

2,501,626

MECHANISM FOR CENTERING ASSEMBLED BOOK ELEMENTS IN MATCH-BOOKING MACHINES

Charles F. Wright, Akron, Ohio, assignor to The Diamond Match Company, New York, N. Y., a corporation of Delaware

Application May 3, 1948, Serial No. 24,765

13 Claims. (Cl. 93—2)

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This invention relates to match booking machines, having reference more especially to machines embodying instrumentalities whereby match combs and complementary covers therefor are introduced and assembled in a carrier at suitable locations in its path, and whereby each assembly thus effected is transported to successive units, including stitching mechanism for binding the associated cover and combs at the butts of the latter.

A machine of the type mentioned is disclosed in Letters Patent No. 1,042,472, dated October 29, 1912, wherein, briefly described, the carrier is represented as comprising an intermittently movable endless chain of pocketed links into the pockets of which links covers with under-folded rear end portions are inserted, the folds projecting rearwardly beyond the faces of the respective links. At a succeeding station a reciprocative plunger is effective to set match combs flatwise within the pockets of the links and under the covers, the butts of the combs entering the opposing cover folds. Thence the assembled match combs are advanced to stitching mechanism which binds the folded ends of the covers to the butts of the match combs.

In the previous machine the space between the walls of the pocket of each link of the carrier was equal in width, or substantially so, to the width of a cover, but as the width of a conventional match comb is somewhat less than that of a cover there was likelihood of play between the edges of the comb and the walls of the link, thus permitting lateral displacement of the comb in relation to the cover, particularly during the endwise insertion of the comb within the pocket of the link, thereby resulting in an imperfect connection of the book elements at the stitcher.

To overcome this objection is the principal object of my present invention, and to that end I modify the previous booking machine in certain particulars, and provide between the comb setting and binding mechanisms devices of simple and efficient construction and operation whereby the unattached associated match combs and covers are arranged in proper relation to each other while they are in the carrier and before their presentation to the binding mechanism, thus effecting the centering of the associated covers and combs in relation to each other and ensuring their uniform disposition in the path (or paths) of the binding mechanism.

With this object in view and other objects which will presently appear, the invention comprises novel features of construction and combinations of parts which in a preferred form will be hereinafter described, the scope of the invention being expressed in the appended claims.

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In the drawings—

Figure 1 is a general perspective view, partly in section, of a portion of a match booking machine embodying the principle of my invention.

Fig. 2 is a fragmentary view showing devices for progressively opening the under end folds of the covers of the successive book assemblies in their passage to mechanism for centering the associated combs and covers in relation to each other.

Fig. 3 is a view representing the fold closing element.

Fig. 4 is a plan, partly in section, of a portion of the machine between the comb inserting and binding mechanisms.

Fig. 5 is a transverse section through the carrier, on the line 5—5 of Fig. 4, showing a book assembly in which the end fold of the cover is in its initially closed position and the comb is seated under the body of the cover and in front of the free edge of the fold.

Fig. 6 is a similar section, on the line 6—6 of Fig. 4, showing the end fold of the cover in depending open position.

Fig. 7 is a sectional elevation, on the line 7—7 of Fig. 4.

Fig. 8 is a transverse vertical section, on the line 8—8 of Fig. 7.

Fig. 9 is a similar section, on the line 9—9 of Fig. 7.

Fig. 10 is a longitudinal section, on the line 10—10 of Fig. 9.

Fig. 11 is an elevation of two adjoining carrier links with the book assemblies therein when they are located in the path of a reciprocating cover and comb centralizing element, showing a toothed slide for periodically engaging the adjacent rack teeth of the carrier and for supporting and actuating said element.

Fig. 12 is a perspective view of said slide and centralizing element, and also the guide for the slide, which guide is represented as separated from the element for clearness.

Fig. 13 is a perspective view of the centralizing element in its uppermost position and in engagement with the match covers and combs of two adjoining book assemblies while the combs are being moved rearwardly to the depending folds of their covers, one of the covers being shown in section to expose the underlying comb or combs.

Fig. 14 is a similar view showing the actuating slide for the centralizing element, the combs be-

ing represented as fully moved toward the end folds of the cover. In this view is shown a supporting member for elevating the forwardly extending ends of the covers imposed thereon.

Referring to the drawings, 15 designates a portion of the supporting frame including the table 16 of a match booking machine. 17 designates a portion of the intermittently-movable pocketed carrier whereof the upper run is guided in a longitudinally extending channel 18 in the table and is actuated through suitable transmission mechanism from the usual power driven cam shaft. The carrier illustrated embodies an endless chain of clamping links 19 whereof each link comprises a base 20 having parallel side walls 21 with inwardly overhanging flanges 22 and having also suitably disposed ears 23 by means of which the adjoining links are hingedly connected by pins. The under surface of the link is provided with rack teeth 24 with which meshes gearing included in the mechanism for intermittently actuating the carrier. Within each link is arranged in the space between the side walls 21 a spring clamping leaf 25 which co-acts with the under surfaces of the respective flanges of the link to maintain temporarily within the link a cover or an associated cover and comb, as hereinafter mentioned.

At the usual cover supply station covers, as A, each folded at its rearward end (as at *a*), are inserted in the space between the walls of the adjacent links and upon the respective clamping leaves so that the end folds extend rearwardly beyond the faces of the respective links, the free edges of the projecting folds resting upon and being supported by the upper surface of the rear wall 26 of the channel 18.

At a succeeding station match combs, B, heads forward, are entered in pairs in the adjacent links of the carrier by means of a horizontal pusher plate 27 on a reciprocating plunger 270 which is actuated in timed relation to the carrier by suitable lever and link connections, 28, under the influence of a cam 29 (Fig. 1) on the main shaft, as shown and described in the aforementioned Patent No. 1,042,472.

In the present construction embodying my invention the leading end 30 of the pusher plate 27 is foreshortened sufficiently to locate the butts of the match combs in spaced relation to the line of flexure and adjacent the open mouths of the rearwardly projecting folds of the cover instead of setting the butts between the folds and the bodies of the respective covers.

The upper surface of the rear wall of the guide channel 18 is interrupted for an interval of its length between the comb inserting and the succeeding binding station by an elongated recess 31 which is so located as to receive the end folds of the progressing covers after the match combs have been inserted in the links of the carrier, thus permitting such folds, by virture of the inherent elasticity of the cover material, to swing downwardly into the recess 31 after the book elements have passed from the comb inserting station, as seen at *x*, Fig. 2.

Slightly spaced from the rear of and in parallel relation to the recess 31 is a blade 32 whereof the free end extends beyond the receiving end of the recess and is outwardly flared, as at 33, the opposite end of the blade terminating short of the path of a centering head, 34, hereinafter described, and having a downward projection 35 which is secured, as by bolts 36, to the rear wall of the channel 18. As the book assemblies approach the recess 31 the down swung folds of the covers enter the space at the flaring portion of the blade 32, and as they progress within the parallel space between the blade and the recess such fold portions are moved to a depending position at right angles, or substantially so, to the path of the carrier links, as seen at *y*, Figs. 2, 6 and 8.

Overhanging the recess 31 in the region of and in spaced parallel relation to the body of the blade 32 is a tongue 37 which is formed and arranged to intercept and support the bodies of the covers adjacent the flexure lines of their end folds, so as to coact with the blade to ensure the accurate downward flexing of the end folds of the respective covers. The tongue shown consists of a metal strip having a downward end projection 38 which is secured by the bolts 36 to the channel wall, a suitable spacer 39 being interposed between the wall and the projections 35 and 38, and the body of the strip being spirally twisted to provide for the bodies of the covers situated at the receiving end of the recess a flat supporting surface *c* merging with an edge support *d*, and also for the end fold of the cover a flexing cam *e* merging with a vertical supporting surface *f* (see Figs. 2 and 6).

The assembled covers and combs progress from the cover supporting tongue 37 to a location in which the combs of two adjacent assemblies are in the active path of spaced pusher plates 40 each plate constituting a comb-positioning member and being adjustably secured by a bolt and slot connection, as at 400, to a horizontally reciprocative plunger 41 which is slidably mounted in a forwardly projecting housing 42 forming a part of the table.

In the present instance the means for actuating the plunger 41 and therewith the pusher plates 40 in timed relation to the carrier comprises a barrel cam 43 fast on a shaft 44 having its bearing in a suitably-disposed hanger 45 depending from the table (see Figs. 7 and 8). Fast on the shaft is a sprocket wheel 46, or other gear, which is suitably connected with and driven by a rotating element of the booking machine. Operatively fitted in the race 47 of the cam is a roll or stud 48 depending from the plunger, the contour of the race being such that in each dwell of the carrier the plunger 41 is recprocated and in each successive movement of the carrier the plunger is at rest in retracted position. In its movement toward and into the adjacent links of the quiescent carrier the pusher plates abut the heads of the opposing match combs underlying the covers and bodily push the combs rearwardly to project their butts beyond the faces of the respective links and in proximity to the lines of flexure of the projecting foldable end portions of the respective covers.

In order to hold down the forwardly projecting portions of the covers while the rearward ends of the bodies of the covers are supported upon the tongue 37, a blade 49 parallel with the tongue 37 is suitably arranged to overhang such portions at the front of the carrier. The end of the blade adjacent the plunger housing 42 is slightly flared upwardly (as at 50) and affixed to a suitable bracket 51 attached to the front wall of the channel, the opposite end of the blade 49 being free and slightly flared upwardly (as at 52) to ensure the passage of the advancing covers under the blade (see Figs. 1, 4 and 7).

As the forwardly projecting portions of the covers escape the fixed end of the blade 49 they

pass to and upon the inclined supporting surface of a member **53** which is secured to the cap plate **54** of the plunger housing **42**. This member consists of a wedge-shaped strip having a downwardly flared end portion **55** projecting beyond the side of the housing adjacent the fixed end of the blade, so as to ensure the passage of the opposing ends of the covers to and upon the strip. Thus such cover ends are inclined upwardly from the plane of the associated match combs to permit the free and unobstructed passage of the pusher plates **40** to and against the forward or head ends of the combs (see Figs. 7, 8 and 9).

Overhanging the carrier links adjacent the cover supporting member **53** is a spanner plate **56** which is supported at its respective ends by the bracket **51** and a companion bracket **57** that is also fixed to the front wall of the channel **18**. The spanner plate **56** has secured thereto bowed springs **58** which resiliently support in spaced parallel relation to the rear of the carrier, a backer-bar **59** for the depending end folds of the covers located under the spanner plate, which bar faces the acting ends of the reciprocative pusher plates **40** (see Figs. 9 and 10).

Vertically reciprocable within the space between the backer bar **59** and the carrier during each dwell of the latter, is the centering head **34** which is so constructed as to ensure in its upper stroke the centralization of the elements of the overhanging book assembly in the carrier. This head **34**, in its preferred form, comprises a vertically disposed rectangular block having its upper surface suitably recessed to afford two adjacent guideways **61**, each of step formation at its respective ends; that is to say, the corner shoulders **62** at the bottom **63** of each recess are outwardly flared at their entrant ends **64** and are spaced to afford a lower guide for the butt of a match comb that is being pushed rearwardly of the carrier and toward the backer bar **59**. The upstanding end walls **65** of each guide recess are bevelled, as at **66**, to provide a flaring mouth which receives the rearward end of the overlying cover of the assembly as the head approaches the limit of its upward movement, thus ensuring the accurate positioning of the cover upon the underlying comb in the recess (see Figs. 12, 13 and 14).

The lower portion of the head **34** is adjustably secured to the upper portion of a vertically movable slide member **67** by means of bolts **68** which pass freely through elongated openings **69** in the head and are threaded into the upper part of such member. This member is slidably fitted in spaced vertical guides **70** which are bolted to a suitably located supporting bracket **71** at the rear of the table. The slide **67** is provided with a rearwardly projecting horizontal rib **72** slightly spaced below the head **34**, which rib has threaded therein a pair of spaced vertical set-screws **73** upon which the head is supported. Hence by the manipulation of the set-screws, when the bolts **68** are retracted, the head can be nicely adjusted vertically in relation to the slide, and then securely locked by a tightening turn of the bolts.

The slide **67** is provided with a forwardly projecting roll **74** which is operatively fitted in the race **75** of a face cam **76** fast on the driven shaft **44** previously referred to, the contour of the race being such that in the rotation of the cam the slide **67** and therewith the centralizing head **34** are vertically reciprocated in timed relation to the carrier. A preferred means for adjustably

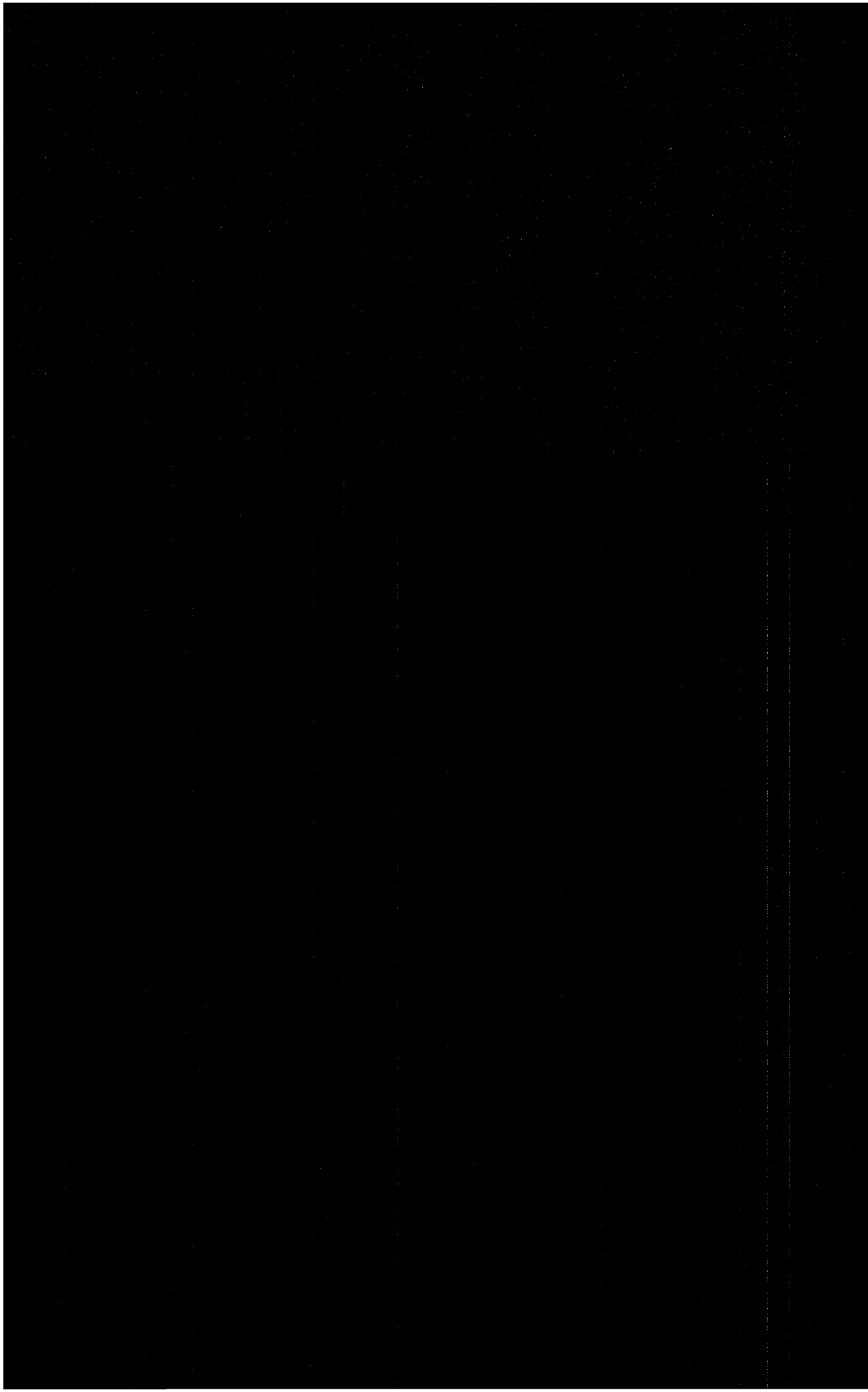
mounting the roll on the slide will presently appear.

Formed on or fixedly fitted into the top of the slide, are upstanding tapering teeth **77** (two in the present instance) which are so disposed that in the upward stroke of the slide during each dwell of the carrier such teeth enter the central interdental spaces of the overlying rack teeth **24** of two adjoining links of the carrier, it being noted that the floor of the channel **18** and the underlying flange of the bracket **71** have suitable openings **78** therein to permit the free up and down movements of the upstanding teeth of the slide **67**. Thus it will be seen that precise location of the carrier links and the covers therein in relation to the acting end of the centering head at the limit of its upward stroke is ensured.

After the covers and combs have been centered in relation to each other, the plunger **41** is retracted by the action of the cam **43**, whereupon the carrier advances the assembled book elements toward the usual stitching mechanism which is generally indicated at S in Fig. 1. In this movement of the carrier the depending folds, *y*, of the covers are intercepted by the vertical nose **79** of the cam face **80** of a folder bar **81**, which bar is seated in the adjacent end of the recess **31** of the rear channel wall and is also bolted or otherwise secured to the back of the wall (see Figs. 3 and 4). As shown, the cam face inclines upwardly and rearwardly from the vertical nose portion **79** to the horizontal rear portion **82** of the bar, and is effective to bend the opposing cover folds progressively under the butts of the match combs. In the next succeeding step of the carrier such folds escape the folder bar **81**, whereupon the free edges of the folds spring against the upper edge of the underlying channel wall (as indicated at *z*, Fig. 3), thus being supported until the book assembly progresses to and is acted upon by the stitching mechanism. In the present instance this mechanism includes two stitcher heads which are arranged in spaced relation to effect the simultaneous binding of two spaced book assemblies borne by the carrier.

As a simple and efficient means for adjusting the positioning teeth **77** of the slide **67** in relation to the overlying rack teeth **24** of the carrier, in order to insure the registering engagement of the opposing teeth, the cam roll **74** of the slide is mounted on the forwardly projecting end of a stud **83** which is slidably fitted in the eccentric bore **84** of a bushing **85** rotatably seated in a transerse bore **86** of the slide, the rearward end of the stud projecting beyond the bushing and being threaded to receive a locking nut **87**. The rearward end of the bushing is formed with a circumferential flange **88** with which co-act clamp pieces **89** overlapping the adjacent edge of the flange, which pieces are supported by screws **90** threaded in the slide and manipulative to effect the clamping or unclamping of the bushing, as desired.

The flange of the bushing has spaced sockets **91** adapted to receive a suitable wrench for partially turning the bushing to adjust the eccentric stud **83** and its cam roll **74** when the bushing is released. Hence if a slight adjustment of the positioning teeth **77** of the slide be necessary the bushing can be partially rotated while the cam roll is held in position in the race of the cam **76**, thereby enabling the slide to be raised or lowered to the extent of the eccentricity of the cam roll **74**, it being noted that the bracket **71** has formed therein an opening **60** of sufficient area to afford



ments of book matches, one end of each cover element projecting beyond said carrier and having an inwardly-foldable end portion whereof the line of flexure is spaced from the adjacent end of the complementary comb element, comb-positioning means to act upon the comb elements of unattached book assemblies advanced thereto by the carrier, thereby moving such comb elements in relation to their cover elements and in proximity to the lines of flexure of the foldable portions of the latter, a centering member movable in angular relation to and from the projecting portions of the covers and between the paths of said carrier and said lines of flexure, said centering member having a guide portion to embrace the opposing edges of such projecting cover ends and the associated combs while the centering member and the comb-positioning means approach the limits of their respective acting movements, a reciprocative slide for actuating said centering member, said slide and said carrier having mating parts engageable at determined intervals in the travel of the carrier in order to ensure the alinement of the proximate cover element with the guide portion of the centering member during the active movement of the latter, a cam-engaging member on said slide, a cam co-acting with said cam-engaging member to effect the reciprocation of the slide, and means for adjusting said cam-engaging member to regulate the stroke of the slide.

7. In a match-booking machine having a carrier for the assembled cover and comb elements of book matches, one end of each cover element projecting beyond said carrier and having an inwardly-foldable end portion whereof the line of flexure is spaced from the adjacent end of the complementary comb element, comb-positioning means to act upon the comb elements of unattached book assemblies advanced thereto by the carrier, thereby moving such comb elements in relation to their cover elements and in proximity to the lines of flexure of the foldable portions of the latter, a centering member movable in angular relation to and from the projecting portions of the covers and between the paths of said carrier and said lines of flexure, said centering member having a guide portion to embrace the opposing edges of such projecting cover ends and the associated combs while the centering member and the positioning means approach the limits of their respective acting movements, a reciprocative slide for actuating said centering member, adjustable connection between said slide and centering member, said slide and said carrier having mating parts engageable at determined intervals in the travel of the carrier in order to ensure the alinement of the proximate cover element with the guide portion of the centering member during the active movement of the latter, a cam-engaging member on said slide, a cam co-acting with said cam-engaging member to effect the reciprocation of the slide, means for adjusting said cam-engaging member to regulate the stroke of the slide, and means for operating the comb-positioning means in timed relation to said slide and the carrier.

8. In a match-booking machine, the combination with a carrier for assembled cover and comb elements of book matches, one end of each cover element projecting beyond said carrier and having an inwardly-foldable end portion whereof the line of flexure is spaced from the ends of the complementary comb elements, said carrier comprising an intermittently-movable chain of pocketed

links whereof each link is provided with rack teeth, of comb-positioning means to act upon the comb element of unattached book assemblies advanced thereto by the carrier, thereby moving such comb elements in relation to their cover elements and in proximity to the lines of flexure of the foldable cover portions, a centering member movable in angular relation to and from the projecting portions of the cover elements and between the paths of said carrier and said lines of flexure, said centering member having a guide portion to embrace the opposing edges of such projecting cover portions and the associated comb elements while the centering member and the comb-positioning means approach the limits of their respective acting movements, a reciprocative slide for actuating said centering member, said slide having a toothed portion which meshes with the opposing rack teeth of the carrier at determined intervals in the travel of the carrier in order to ensure the alinement of the proximate cover element with the centering member during the active movement of the latter, and means for operating said slide and the comb-positioning means in timed relation to each other and to said carrier.

9. In a match-booking machine, the combination of an intermittently-movable carrier having pocketed links to receive match book covers with folded end portions projecting beyond the links, means adjacent the path of said carrier for inserting comb elements in said pocketed links and in association with the complementary covers to position said comb elements with their butts short of the folds of the covers, means adjacent the path of the carrier whereby the cover folds are caused to assume an open condition in their progress from said comb-inserting means, means whereby the previously inserted combs are moved to position their butts in proximity to the open end folds, means for centering said associated combs and covers in relation to each other during the second positioning movement of the combs, means whereby said folds are closed to encase the butts of the complementary combs, and means whereby the associated covers and combs are bound together.

10. In a match-booking machine, the combination of an intermittently-movable carrier having pocketed links to receive match book covers with folded end portions projecting beyond the links, means adjacent the path of said carrier for inserting comb elements in said pocketed links and in association with the complementary covers to position said comb elements with their butts short of the folds of the covers, means adjacent the path of the carrier whereby the cover folds are caused to assume an open condition in their progress from said comb-inserting means, means whereby the previously inserted combs are moved to position their butts in proximity to the open end folds, means for centering said combs and covers in relation to each other during the second positioning movement of the combs, means whereby said folds are closed to encase the butts of the complementary combs, and means whereby the associated covers and combs are bound together, said centering means including a cover and comb guiding head located between the paths of the carrier and the line of flexure of the projecting end folds of the cover.

11. In a match-booking machine, the combination of an intermittently-movable carrier having pocketed links to receive match book covers with folded end portions projecting beyond the

links, means adjacent the path of said carrier for inserting comb elements in said pocketed links and in association with the complementary covers to position said comb elements with their butts short of the folds of the covers, means adjacent the path of the carrier whereby the cover folds are caused to assume an open condition in the progress of the covers from said comb-inserting means, means whereby the previously inserted combs are moved to position their butts in proximity to the lines of flexure of the open end folds, means for centering said combs and covers in relation to each other during the second positioning movement of the combs, means whereby said end folds are closed to encase the butts of the complementary combs, and means whereby the associated covers and combs are bound together, said centering means including a cover and comb guiding head located between the paths of the carrier and the lines of flexure of the projecting end folds of the covers, and said fold opening means including a fold-supporting member extending longitudinally of the path of the carrier and having a portion interrupted in its length by an elongated recess which permits the angular opening of the folded portion in its passage to the said comb-positioning means.

12. In a match-booking machine, the combination of an intermittently-movable carrier having pocketed links to receive match book covers with folded end portions projecting beyond the links, means adjacent the path of said carrier for inserting comb elements in said pocketed links and in association with the complementary covers to position said comb elements with their butts short of the folds of the covers, means adjacent the path of the carrier whereby the cover folds are caused to assume an open condition in their progress from said comb-inserting means, means whereby the previously inserted combs are moved to position their butts in proximity to the lines of flexure of the open end folds, means for centering said combs and covers in relation to each other during the second positioning movement of the combs, means whereby said end folds are closed encase the butts of the complementary combs, and means whereby the associated covers and combs are bound together, said centering means including a cover and comb guiding head

located between the paths of the carrier and the lines of flexure of the projecting end folds of the covers, and said opening means including a fold-supporting member extending longitudinally of the path of the carrier and constructed to permit the angular opening of the folded portions of the covers after the association of the combs therewith, and means located adjacent the second positioning means for effecting further angular opening of the folded ends of the covers as the assembled book elements approach said second positioning means.

13. In a match-booking machine, the combination of an intermittently-movable carrier having pocketed links to receive match book covers with folded end portions projecting beyond the links, means adjacent the path of said carrier for inserting comb elements in said pocketed links and in association with the complementary covers to position the combs with their butts short of the folds of the covers, means adjacent the path of the carrier whereby the cover folds are caused to assume an open condition in the progress of the covers from said comb inserting means, means whereby the previously inserted combs are moved to position their butts in proximity to the lines of flexure of the open end folds, means for centering said combs and covers in relation to each other during the second positioning of the combs, means whereby said end folds are closed to encase the butts of the complementary combs, and means whereby the associated covers and combs are bound together, said centering means including a cover and comb guiding head located between the paths of the carrier and the lines of flexure of the projecting end folds of the covers, and said cover-opening means including a fold-supporting member extending longitudinally of the path of the carrier and constructed to permit the angular opening of the folded portions of the covers in the progress of the assemblies to the second positioning means, and means for effecting further angular opening of the folded ends of the covers and supporting the bodies of the covers at the end folds as the assembled book elements approach said second positioning means.

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No references cited.