

July 12, 1938.

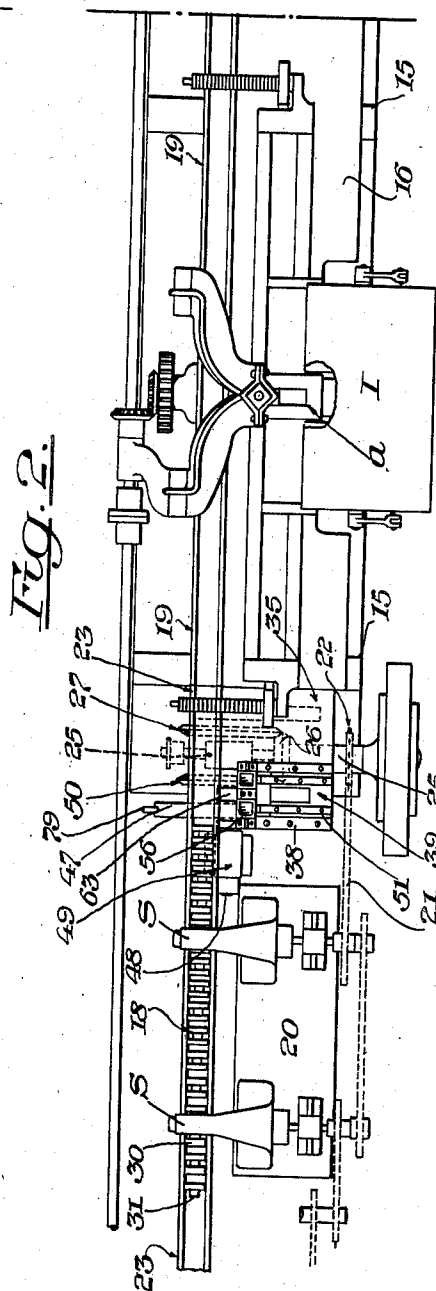
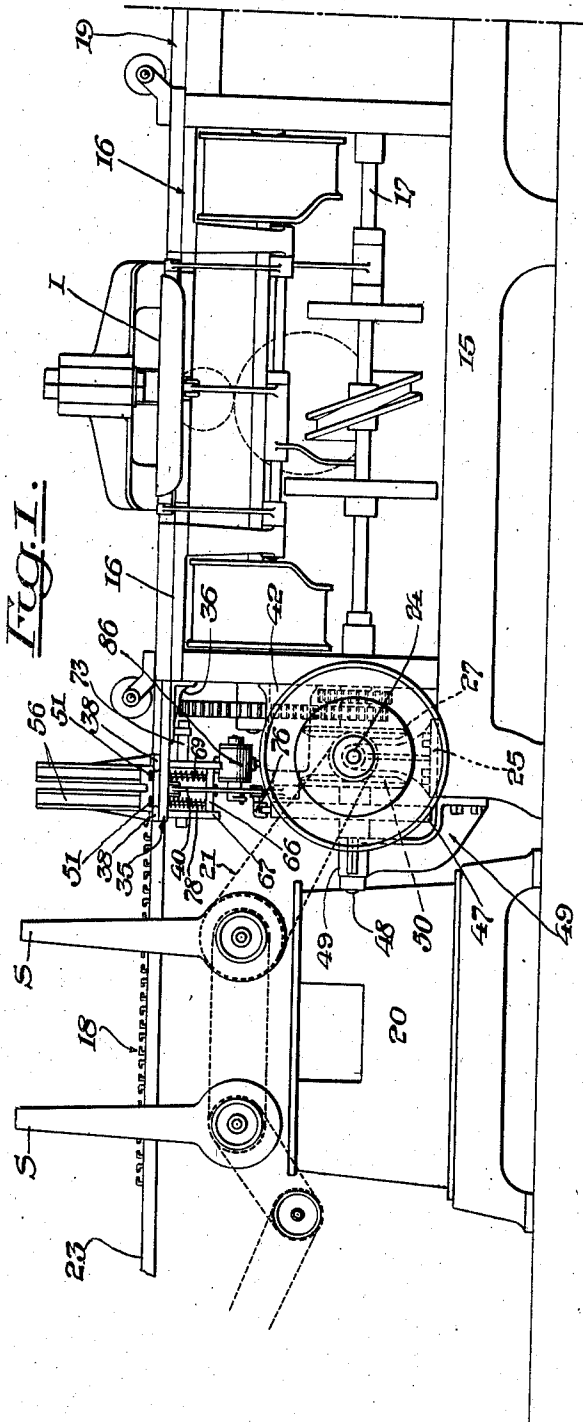
J. R. NOLAN

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MACHINE FOR BOOKING MATCHES

Filed July 8, 1936

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John R. Nolan

July 12, 1938.

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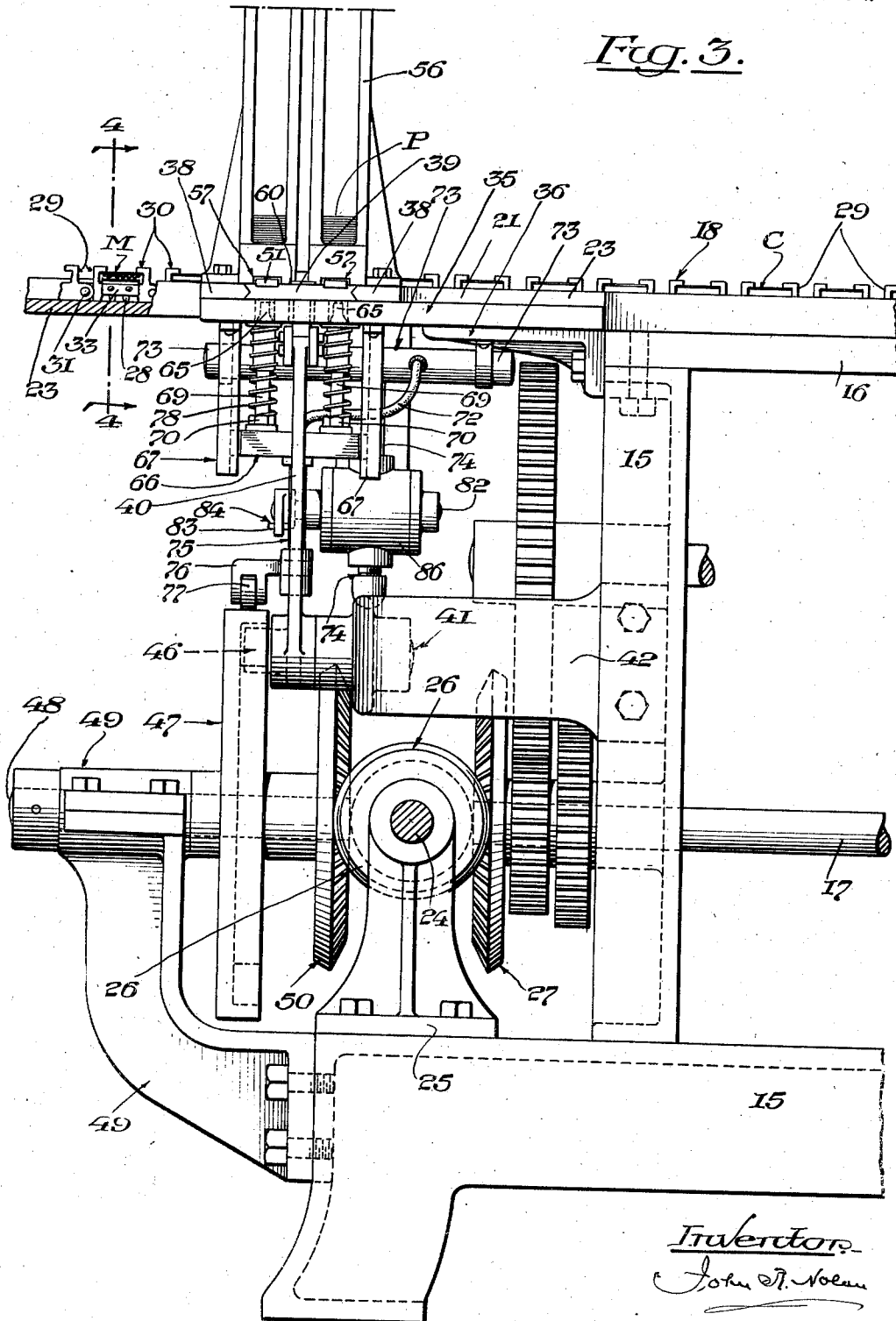
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MACHINE FOR BOOKING MATCHES

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Fig. 3.



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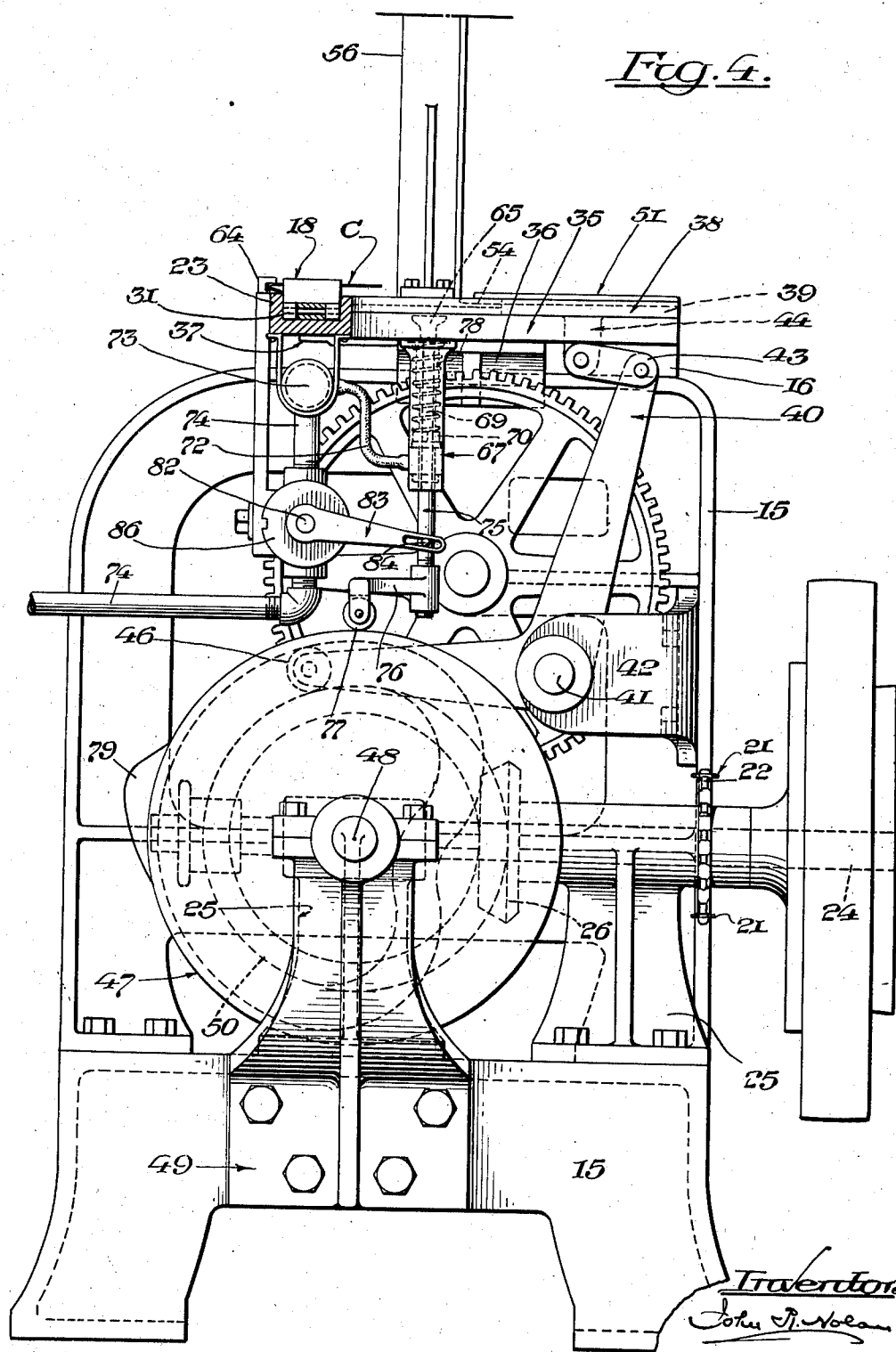
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MACHINE FOR BOOKING MATCHES

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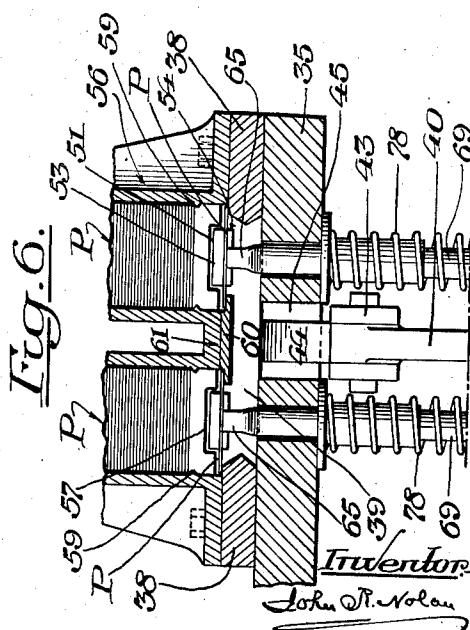
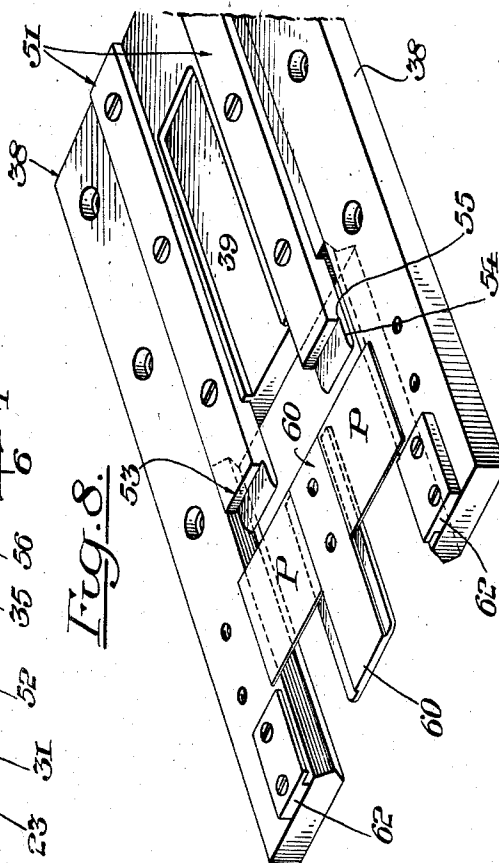
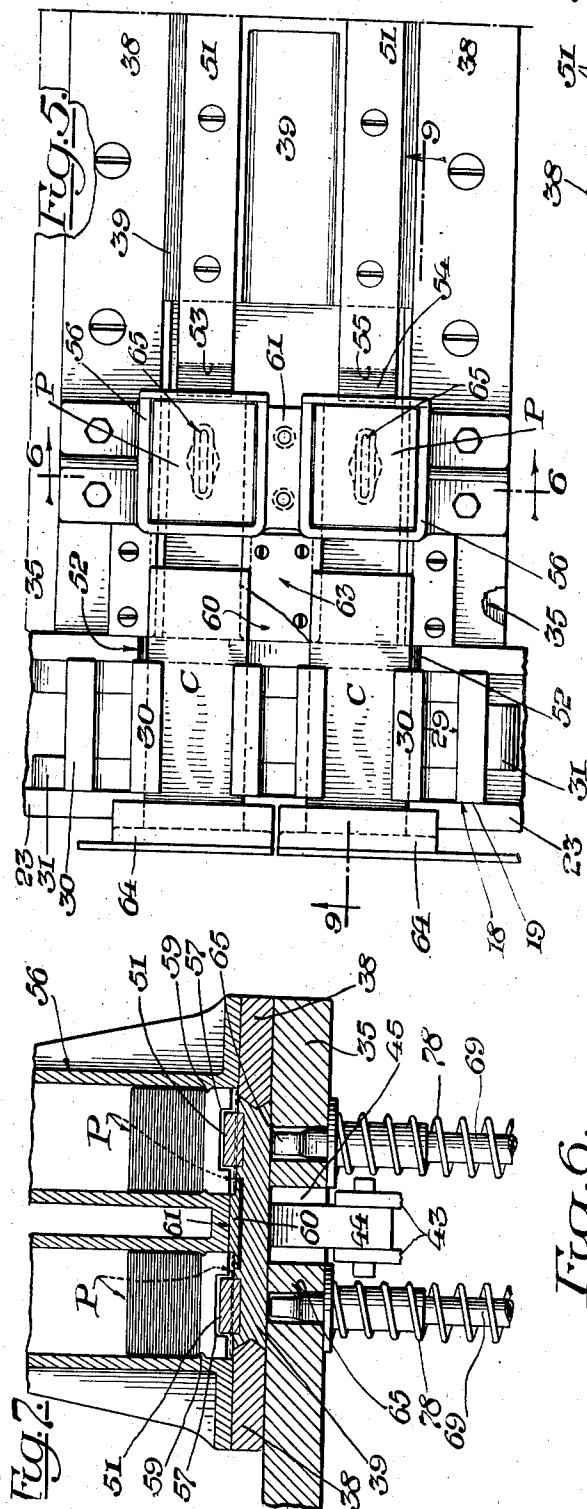
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MACHINE FOR BOOKING MATCHES

Filed July 8, 1936

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John P. Nolan

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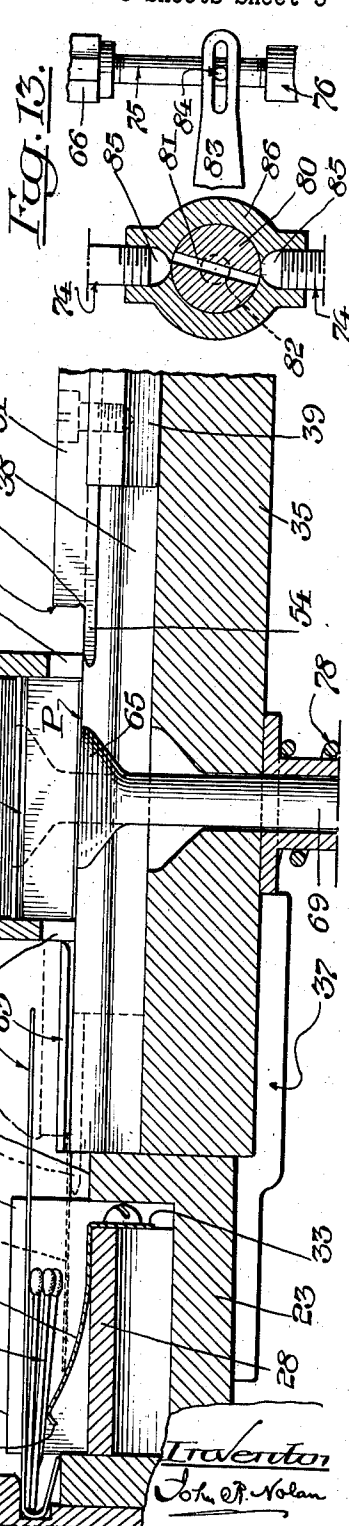
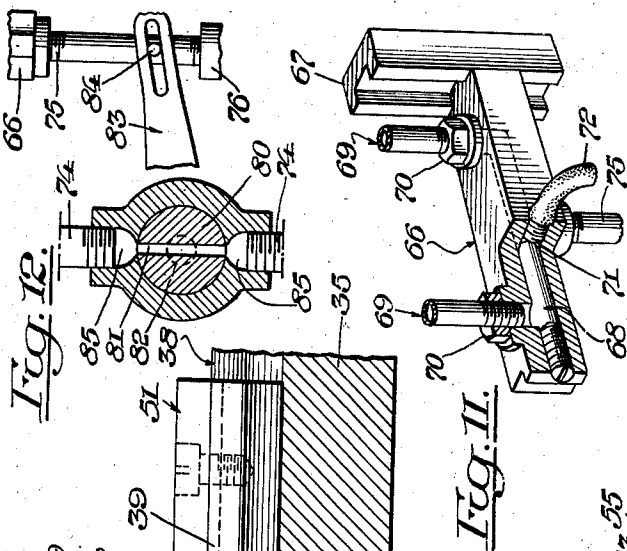
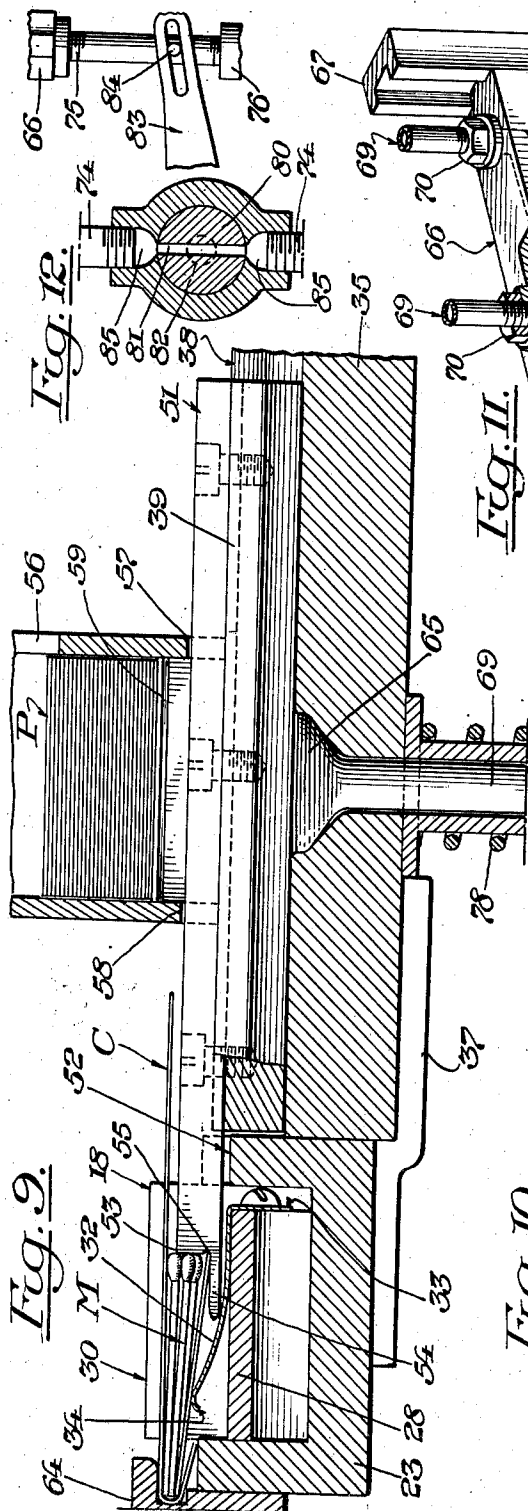
J. R. NOLAN

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MACHINE FOR BOOKING MATCHES

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UNITED STATES PATENT OFFICE

2,123,252

MACHINE FOR BOOKING MATCHES

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a corporation of Delaware

Application July 8, 1936, Serial No. 89,575

11 Claims. (Cl. 93—2)

This invention relates to machines for booking matches, and more particularly to a high speed machine of the type disclosed in United States Patent No. 1,042,472, dated October 29, 1912. The machine forming the subject-matter of said patent comprises a carrier consisting of an endless chain of pocketed links, (each including a resilient clamping member) constructed and arranged for intermittent movement along an extended path in which are included in succeeding order mechanism whereby flat covers for match books are folded at one end and inserted into the adjacent links in such manner that the folds project rearwardly of and the bodies of the covers are clamped in the links; mechanism whereby conventional match cards are severed from match strips and pushed flatwise into the respective links and with the bases of the cards within the end folds of the covers, the match cards thus being clamped against the bodies of the respective covers, and mechanism whereby the associated cards and covers are stapled together or otherwise bound while they are borne by the carrier.

An object of my invention is to accomplish in a simple and efficient manner the association of a supplemental protection element with the match and cover elements of each match book after the insertion of the match cards in the cover and before the stapling or binding operation, and this without reducing the speed of the machine or curtailing its normal productive capacity of several hundred match books per minute.

Another object of my invention is to ensure the adjustment of the match cards and the protection element in proper relation to the cover.

With these and other objects in view my invention comprises novel features of construction and combinations of parts which in a preferred embodiment of my invention will be hereinafter described; the scope of the invention being expressed in the appended claims.

In the annexed drawings—

Fig. 1 is a partial side elevation of a match booking machine equipped with protection-card applying mechanism embodying the principle of my invention, only so much of the machine being shown as is necessary to illustrate the invention.

Fig. 2 is a partial plan of the machine, including the protection-card applying mechanism.

Fig. 3 is an elevation of the protection-card applying mechanism and the adjacent portion of

the match booking machine illustrating gearing for transmitting motion to the said mechanism from the drive shaft of the machine.

Fig. 4 is a transverse vertical section, as on the line 4—4 of Fig. 3.

Fig. 5 is a plan of a portion of the protection-card applying mechanism, showing the thrust bars and their slide in retracted position and also showing the adjacent carrier links and the match book covers therein.

Fig. 6 is a vertical section through the plural hopper for the protection cards, as on the line 6—6 of Fig. 5, showing a suction head as positioning protection cards in the paths of the respective thrust bars.

Fig. 7 is a similar section when the slide and its thrust bars are in rearward position, showing the suction head at the limit of its downward stroke.

Fig. 8 is a perspective view of the slide and thrust bars and the mounting therefor, showing protection cards positioned in the effective path of said bars and also showing the guides for said cards.

Fig. 9 is a vertical section, as on the line 9—9 of Fig. 5, but showing the thrust bar and the nozzle of the suction head in their relative positions when the bar is at the limit of its rearward or inserting stroke and the protection card thereby associated with the complementary match cards and cover in the carrier.

Fig. 10 is a similar section showing the thrust bar and the suction nozzle in their relative positions when the slide is at the limit of its forward stroke, a protection-card being represented as positioned in the effective path of the thrust bar.

Fig. 11 is a sectional perspective view of the ported base of the suction head, showing a portion of one of the vertical guides for said base.

Fig. 12 is a sectional detail of a rotary valve and adjuncts for controlling the air exhaust from the suction head, the valve being represented as open.

Fig. 13 is a similar view showing the valve in its cut-off position for the release of the protection card at the instant the latter is positioned in the effective path of the thrust bar.

Referring to the drawings, 15 designates the supporting frame including the table 16 of a match booking machine; 17 the main cam shaft which extends longitudinally of the frame and beneath the table; 24 a transverse drive shaft mounted in bearings 25 on the bed of the main frame and having a bevel gear 26 in mesh with

a similar gear 27 on the cam shaft, and 18 a portion of a carrier which is intermittently actuated by and from the cam shaft 17 through suitable gearing. The carrier comprises an endless chain of clamping links adapted to travel in a longitudinally extending guide trough 19 which is suitably supported at the rear of the table. Flexible covers C, each folded at one end, are inserted flatwise in each succeeding pair of links so that the folded ends project through the rear of the respective links while the bodies of the covers are clamped in the latter, which covers, as the carrier progresses, are presented to mechanism I including a pusher *a* whereby match cards M are inserted in the links, with the uncut bases of the match cards within the confines of the folded ends of the complementary covers. Usually two counterpart cards of matches, one card superposed on the other, are inserted in each link. As the carrier continues its progress the complementary cards and covers are presented to wire stitchers S which are supported by a frame 20 spaced from the adjacent end of the frame 15. The stitchers are actuated in timed relation to the carrier 18 by suitable gearing, including a chain 21 passing about a sprocket wheel 22 fast on the drive shaft. A channel section 23, constituting an extension of the trough 19, spans the space between the two frames and underlies the stitcher heads, thus guiding the carrier below the heads and presenting thereto, for binding, the basal ends of the complementary cards and covers. The assembled book elements, when bound, are transported by the carrier to succeeding stations in the book making cycle.

As herein illustrated, each carrier link comprises a base 28, with parallel side walls 29 having inwardly overhanging flanges 30 and having also suitably disposed ears 31 by means of which the adjoining links are hingedly connected by pins. Within each link is arranged in the space between the side walls 29 a spring clamping leaf 32 having at its forward end an angular lip 33 which is secured to the adjacent end of the base 28. The leaf is inclined upwardly and rearwardly so that its free upper end yieldingly co-acts with the opposing under surfaces of the flanges, such end being slightly curved downwardly, as at 34, in order to present a smooth bearing surface to the cover and cards as they are being forced into and through the link as described in the aforementioned Patent No. 1,042,472.

In accordance with my invention an attachment embodying mechanism for inserting supplemental protection elements is interposed between the match card inserting mechanism and the stitching mechanism in such manner that the protection elements are accurately incorporated with the associated covers and matches of the respective books immediately before the stitching of the book elements, which attachment, in an efficient form, is as follows:

A horizontal bed plate 35 extends forwardly from the trough section 23 spanning the space between the frame 15 and the stitching mechanism, such plate being conveniently supported by bracket members 36 and 37 which are bolted to the frame 15 and trough section 23, respectively. Mounted in spaced parallel gibs 38 on the bed 35 is a slide 39 which is reciprocative toward and from the trough section 23 in timed relation to the intermittent travel of the carrier 18. In the present instance the means for reciprocating

the slide includes a bell crank 40 fulcrumed on a stud 41 which is supported by a bracket 42 fixed to the adjacent end of the main frame 15. One of the crank arms is hingedly connected by means of a link 43 to a lug 44 which depends from the slide 39 through a suitable slot 45 in the bed. The other arm of the bell crank is provided with a roll 46 which is operatively fitted in the race of a face cam 47 fast on a short shaft 48 which is mounted in co-axial alinement with the main shaft. The shaft 48 is journaled in a bearing bracket 49 conveniently fixed to the bed of the main frame, and is provided with a bevel gear 50 in mesh with the gear 26 on the drive shaft, the ratio of the gears being such that the shaft 48 and its cam 47 are driven at the same speed as the main cam shaft 17. The contour of the race of the cam 47 is such that during one half rotation of that cam the slide is reciprocated toward and from the trough section, and in the other half rotation of the cam the slide is at rest at the limit of its forward stroke.

Fixed on and longitudinally of the upper surface of the slide, which is flush with the tops of the gibs 38, are two spaced parallel bars 51 whereof the rearward or acting ends project somewhat beyond the adjacent end of the slide and constitute thrust members adapted to engage and impel protection cards P which are positioned in the paths of the respective members. The distance between the longitudinal median lines of the bars 51 is equal to that between the centers of two adjoining links of the carrier, so that in the reciprocation of the slide during each dwell of the carrier the projecting ends of the bars, together with the opposing protection cards, are moved into and from the forward or receiving ends of the pockets of two carrier links which are positioned in central alinement with the respective bars. The forward wall of the trough section 23 is suitably recessed, as at 52, for the free passage therethrough of the acting ends of the bars 51 and the cards engaged thereby. These bars are of rectangular cross-section and are each angularly recessed at its rearward end to provide a shoulder 53 and a projecting basal tongue 54, which shoulder is preferably grooved or notched at the tongue, as indicated at 55. The bars 51 are also preferably inset in the slide to such a depth that the upper surfaces of the tongues 54 are flush with the top of the slide, or substantially so.

Spaced forwardly from the trough section 23 and overhanging the slide 39 is a vertical hopper 56 having, in the present instance, two parallel magazines which overlie the paths of the respective bars 51. This hopper is conveniently supported on the respective gibs 38, the front and back walls of the magazines being recessed, as at 57 and 58, respectively, for the free passage therethrough of the bars 51 during the reciprocation of the slide. Each of the magazines is of proper size to contain a stack of cards P, each card being of proper dimensions to constitute a protection element to cover the matches of a match book. The lowermost card of each stack is supported at its longitudinal edges on beveled ribs 59 which are formed on or affixed to the inner walls of the hopper magazine at a level slightly above the path of the thrust bar.

Mechanism is provided whereby each succeeding lowermost protection card is separated from the stack when the slide 39 is at the limit of its rearward stroke, during each movement of the

carrier, which card is at once deposited in proximity to the upper surface of the slide and in proper position to be engaged at the forward end by the acting end of the adjacent thrust bar in the next succeeding rearward stroke of the latter toward the carrier 18 while the carrier is at rest. That is to say, during each rearward stroke of the slide the tongue 54 extends under and the shoulder squarely engages the opposing edge of the protection card. A lateral margin of the card thus positioned in the path of the bar 51 is supported on the adjacent gib and the opposite margin is supported on the adjacent longitudinally recessed edge of a guide plate 60 which is conveniently attached to the foot of the hopper midway between the magazines, as at 51, and in parallelism with the gibs 38. The guide plate 60 extends beyond the rear of the hopper and to the end of the bed 35 at the trough section 23. The opposite longitudinal edge of the guide plate, which is also recessed, extends below the other magazine and in position to support the adjacent lateral margin of each succeeding lowermost card when it is separated from the stack of cards in that magazine, the opposite margin of such card being supported on the adjacent gib 38.

Parallel plates 62 and 63 are secured on the gibs 38 and guide plate 60, so as to provide horizontal ways for the guidance of the protection cards in flatwise condition between the hopper and the carrier.

In the rearward stroke of the slide the projecting ends of the thrust bars 51 enter the opposing links of the carrier to such an extent that the shouldered portions 53 move in close proximity to the heads of the contained matches while the tongues 54 pass freely below the heads and move a substantial extent under the match splints. (See Fig. 9.) During such stroke of the slide the forward ends of the protection cards are well supported upon the respective tongues 54, and the shoulders 53, abutting the opposing edges of such cards, push them rearwardly through the parallel guideways and into the links. In their travel through the links the rearward ends of the protection cards impinge against the opposing spring leaves 32 and pass between the latter and the match cards contiguous thereto, the leading ends of the protection cards being placed at the bases of the match cards in the folded rearward portions of the respective covers. Hence the spring leaves exert a yielding clamping action on the assembled card and cover elements. Spring supported backer members 64 for the end folds of the covers C, during the insertion of the protection cards in the links of the carrier, are arranged on the trough section 23 at the rear of such links.

As the slide approaches the limit of its rearward stroke the shoulders 53 of the thrust bars bear squarely against the opposing heads of the matches if the match cards be displaced, thus positioning the match cards in orderly relation to the book covers and the inserted protection cards. Such shoulders in conjunction with the basal tongues 54 also effect and insure the orderly guidance of the protection cards into and through the links in a path unobstructed by the match heads and against the yielding pressure of the opposing clamping leaves, which result is contributed to by the notches 55 at the bases of the shoulders in that the notches receive the opposing edges of the protection cards and tend to prevent their vertical displacement.

In the forward or return stroke of the slide the

thrust bars are retracted from the links to the forward part of the hopper thus being in position to engage the succeeding protection card presented thereto, as seen in Fig. 10.

Simple and efficient means to separate the lowermost protection cards from the respective stacks and position them in the effective paths of the acting ends of the bars 51 as hereinbefore indicated, includes a vertically reciprocative suction head having a pair of nozzles 65 which are movable to and below the midportions of the lower surfaces of the lowermost cards of the respective stacks. In the upward stroke of the suction head the nozzles approach and draw thereto the two overlying bottom cards, and in their down stroke the nozzles, by the force of the partial vacuum, pull the cards from the stacks and deposit them upon the respective gibs 38 and the intermediate guide plate 60. In the descent of the suction head the nozzles sink below the path of the slide, (as seen in Fig. 9) thus remaining during the acting and return strokes of the slide, whereupon the suction head and its nozzles are again raised and lowered preparatory to the succeeding reciprocation of the slide to and from the carrier, and so on.

As herein illustrated the suction head comprises a base 66 which is slidably mounted in depending guide members 67 fixed to the bed 35 and which base has formed therein and lengthwise thereof a duct 68 that communicates at its ends with upstanding tubes 69 terminating in the nozzles 65. The tubes are threaded into the base and are firmly secured thereto by suitably-disposed lock nuts 70 on the tubes. The duct 68 has an outlet 71 which is flexibly connected, as by a hose 72, with a suitably located vacuum chamber or barrel 73. This chamber, which is conveniently supported beneath the bed 35, is, in turn, connected to a pipe 74 leading to a suitable air exhaust line.

Depending from the base member 66 is a rod 75 having a foot bracket 76 equipped with a roll 77 which rests on the periphery of the cam 47, being resiliently held in this position by compression springs 78 which encircle the respective tubes 69 of the suction head. Suitably located on the periphery of the cam is a cam projection 79 which is so disposed that when the slide 39 is at rest at the limit of its forward or outer stroke, the projection passes under and escapes the roll, which projection, in conjunction with the springs, effects the requisite vertical reciprocation of the base member and its appurtenances.

In order to relieve the cards from the suction action of the nozzles when the cards have been thereby removed from the respective stacks and seated in the paths of the thrust bars 51, the pipe 74 leading to the vacuum chamber is provided with a rotary valve 80 whereof the port 81 is in open and closed positions respectively at determined intervals during the reciprocation of the suction head. In the present instance the projecting axial stud 82 of the valve has affixed thereto an arm 83 having a sliding pin and slot connection 84 with the actuating rod 75 for the base 66, and the relation of the valve port 81 to the co-operatively related ports 85 of the valve casing 86 are such that in the upstroke of the rod the valve is partially turned to open the ports and thereby avail of the force of the vacuum, and that in the succeeding stroke of the rod, the valve is reversely moved to close the ports and thus reduce the pressure as and

when the protection cards are positioned in the paths of the acting ends of the respective thrust bars 51.

From the foregoing it will be seen that my invention provides protection card applying mechanism which efficiently cooperates with the units of a high speed match booking machine to the full capacity of the machine.

It is to be understood that the invention is not limited to the particular exemplifying form thereof herein disclosed, as the mechanisms may be modified within the principle of the invention and the scope of the appended claims.

I claim—

1. In a match booking machine having a carrier constructed to clamp and transport a succession of assembled covers and match cards, mechanism for associating protection cards with the complementary match cards and covers previously clamped in the carrier and including a thrust member having a notch for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the said complementary match cards and covers, said thrust member also having a match engaging member for assuring the orderly relation of said match cards and said protection cards in the covers, and means for supplying protection cards to the effective path of the thrust member at determined intervals.

2. In a match booking machine having a carrier constructed to clamp and transport a succession of assembled covers and match cards, mechanism for associating protection cards with the complementary match cards and the covers previously clamped in the carrier and including a thrust member having an angular end portion constituting a shoulder and tongue for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers, said thrust member also having a match engaging member for assuring the orderly relation of said match cards and said protection cards in the covers, and means for supplying protection cards to the effective path of the thrust member at determined intervals.

3. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport a succession of covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier, and means for binding together the assembled cards and covers, of mechanism for associating protection cards with the complementary match cards and covers previously clamped in the carrier and including a thrust member having a notch for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate clamped match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers, said thrust member also having a match engaging member for assuring the orderly relation of said match cards and said protection cards in the covers, and means for supplying protection cards to the effective path

of the thrust member at determined intervals, said mechanism being located adjacent the path of the carrier and between the match card inserting means and the binding means.

4. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport a succession of covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier and means for binding together the assembled cards and covers, of mechanism for associating protection cards with the complementary match cards and covers previously assembled and clamped in the carrier and including a thrust member for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers, and means for supplying protection cards to the effective path of the thrust member at determined intervals, the acting end of said thrust member having a card-engaging notch and a match engaging shoulder for assuring the orderly relation of said match cards and said protection cards in the covers, the said mechanism being located adjacent the path of the carrier and between the match card inserting means and the binding means.

5. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier, and means for binding together the assembled cards and covers, of mechanism including a reciprocative thrust member having an angular end portion constituting a notch, a shoulder and tongue for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers previously assembled and clamped in the carrier, and means for supplying protection cards to the effective path of the thrust member at determined intervals, the said mechanism being located adjacent the path of the carrier and between the match card inserting means and the binding means, the said notch and shoulder of the thrust member assuring the orderly relation of said match cards and said protection cards in the covers.

6. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier, and means for binding together the assembled cards and covers, of mechanism including a reciprocative thrust member having an angular end portion constituting a shoulder and tongue for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers previously assembled and clamped in the carrier, and means for supplying protection cards to the effective path of the thrust member at determined intervals, said shoulder having a card

receiving notch at the base thereof and the said mechanism being located adjacent the path of the carrier and between the match card inserting means and the binding means, the said notch and shoulder of the thrust member assuring the orderly relation of said match cards and said protection cards in the covers.

7. In a match booking machine comprising a carrier adapted to transport a succession of assembled covers and match cards, means including a thrust member for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards, and means for positioning protection cards in the path of the thrust member comprising protection card supply means, a reciprocative air suction element in co-operative relation to said supply means, and means for actuating said suction element in timed relation to the thrust member.

8. In a match booking machine comprising a carrier adapted to transport a succession of assembled covers and match cards, means including a thrust member for engaging succeeding protection cards and inserting them in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards, means for supplying protection cards to the path of the thrust member comprising protection card supply means, a reciprocative air suction element in co-operative relation to said supply means, means for actuating said suction element in timed relation to the thrust member, and means for controlling the active and idle periods of the suction element.

9. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier, and means for binding together the assembled cards and covers, of a slide located laterally of the carrier and between the card inserting means and the binding means, a thrust member carried by said slide for inserting protection cards in the carrier in a path unobstructed by the match heads and longitudinally of the

proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers, a driven shaft, a cam thereon, operative connections between the cam and the slide, protection card supply means, an air suction element in co-operative relation to the supply means, and means for actuating said suction element in timed relation to the thrust member.

10. In a match booking machine, the combination with a carrier including a plurality of clamping elements to transport covers, means for inserting cards of matches in the said elements and assembling them with the respective covers borne by the carrier, and means for binding together the assembled cards and covers, of a slide located laterally of the carrier and between the match card inserting means and the binding means, a thrust member carried by said slide for inserting protection cards in the carrier in a path unobstructed by the match heads and longitudinally of the proximate match cards and for positioning said protection cards in clamping relation to the complementary match cards and covers, a driven shaft, a cam thereon, operative connections between the cam and the slide, protection card supply means, an air suction element in co-operative relation to said supply means, means for actuating said suction element in timed relation to the thrust member, and means for controlling the active and idle periods of the suction element.

11. A match booking machine having a protection card supplying station, a carrier for successively presenting assembled covers and match cards to protection card receiving position at said station, means for inserting a protection card into each cover over the match card therein while at the said station, said inserting means having a notch for engaging the card and a shoulder for engaging the heads of the matches for assuring the orderly relation of the match cards and the covers during the insertion of the protection card, and means for actuating the carrier and protection card inserting means in timed relation.

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