W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 1.

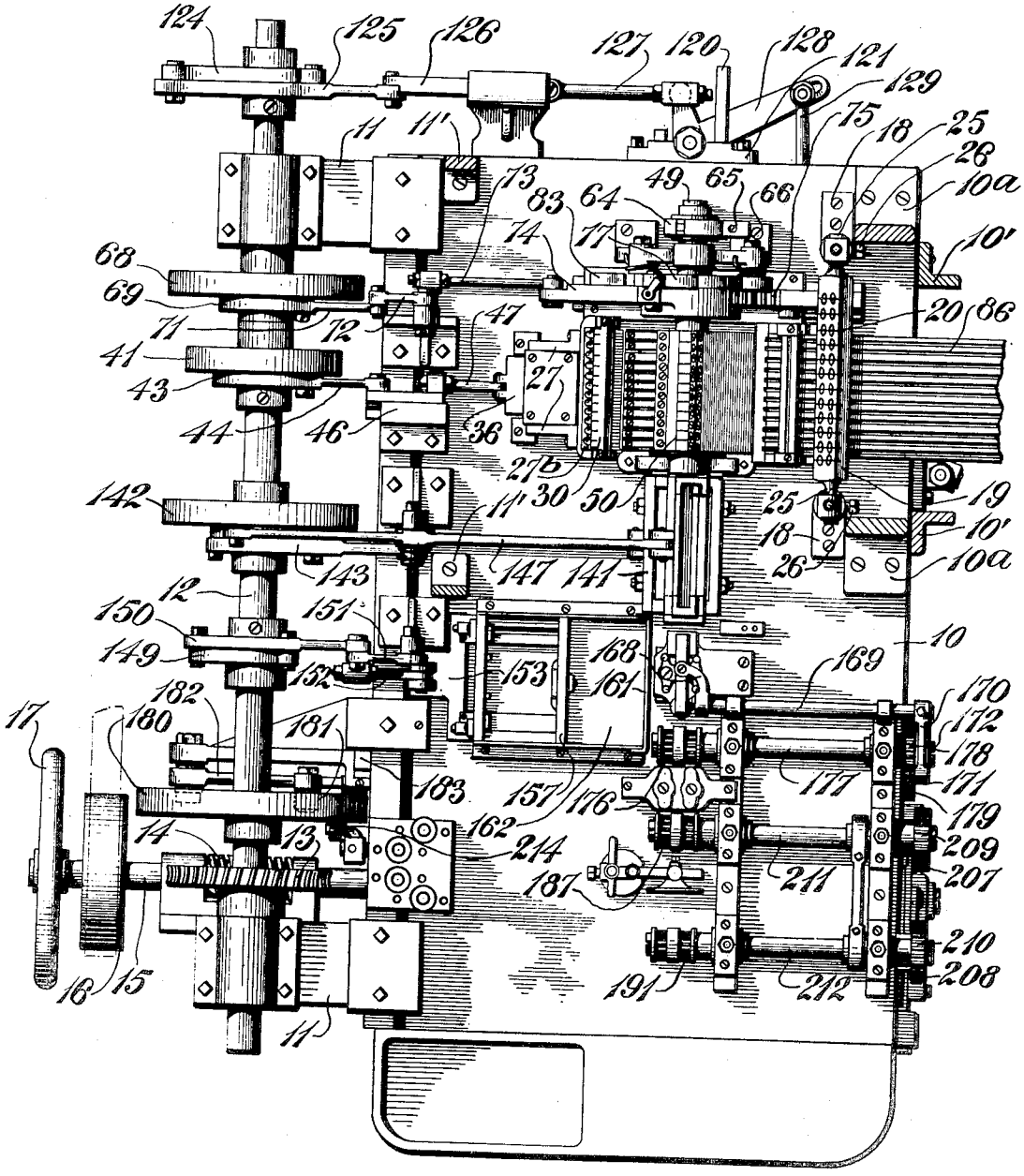



Fig. 1.

Witnesses:
E. M. Allen
S. Grotta.

Inventor:
W. L. Curtis
By Attorneys,
Southgate & Southgate

W. L. CURTIS.

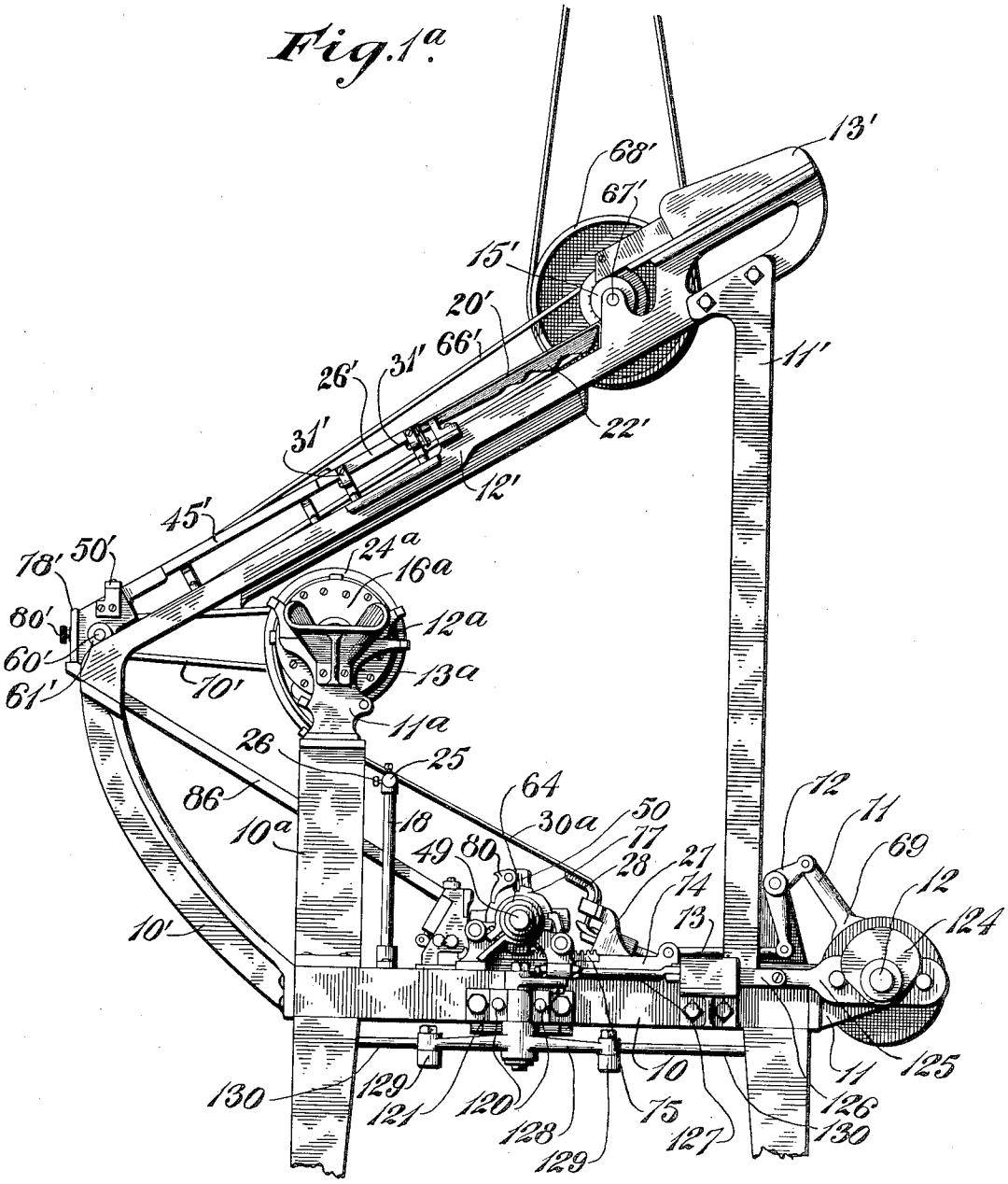
MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457. Patented May 5, 1914.

23 SHEETS—SHEET 2.

Fig. 1a.




Wittnesses:

E. M. Allen

S. Grotta.

Inventor:

W. L. Curtis

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23 SHEETS—SHEET 3.

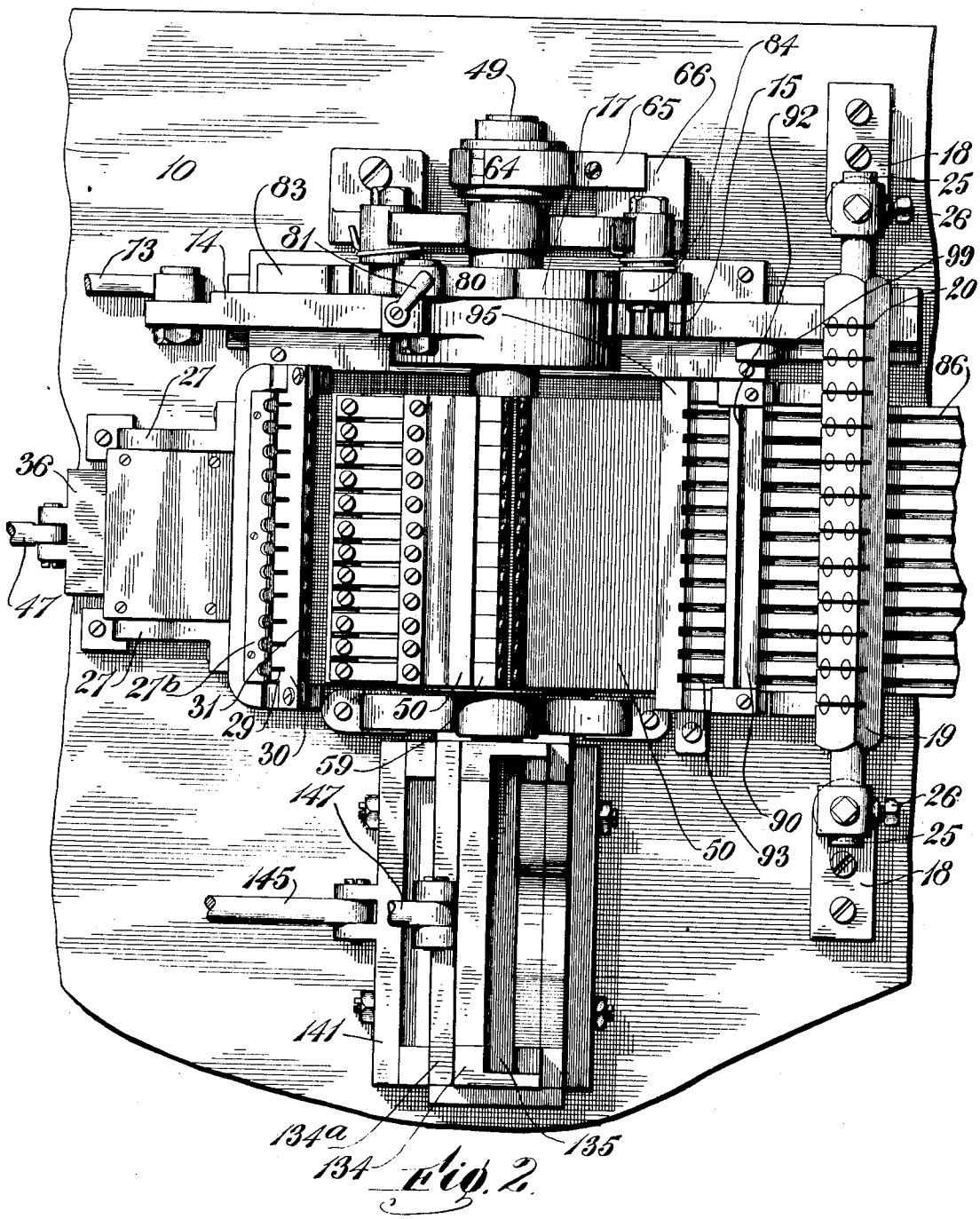



Fig. 2.

Witnesses:
E. M. Allen.
S. Grotta.

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Southgate Southgate

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23 SHEETS-SHEET 4.

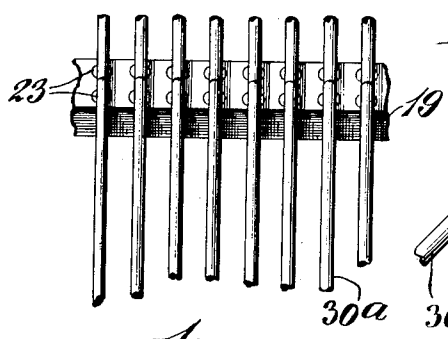



Fig. 4.

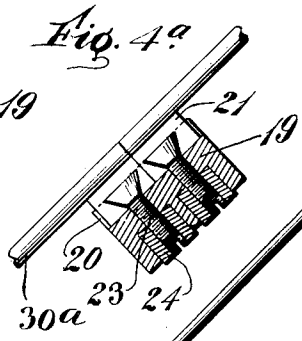



Fig. 4a.




Fig. 3.

Witnesses:
E. M. Allen.
S. Grotta.

Inventor:
W. L. Curtis
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23 SHEETS—SHEET 5.

Fig. 6.

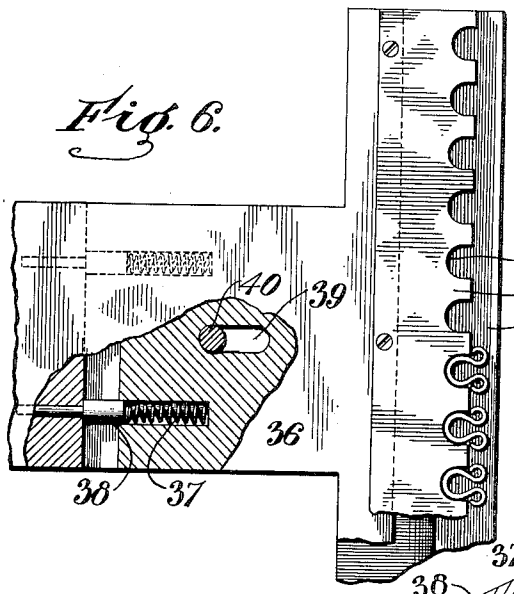
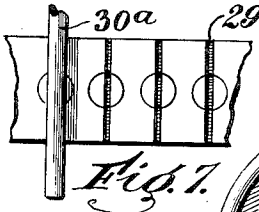



Fig. 7.



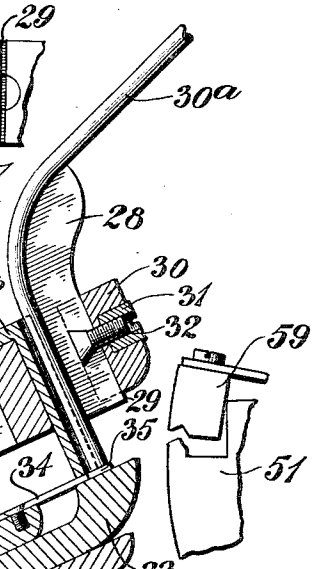




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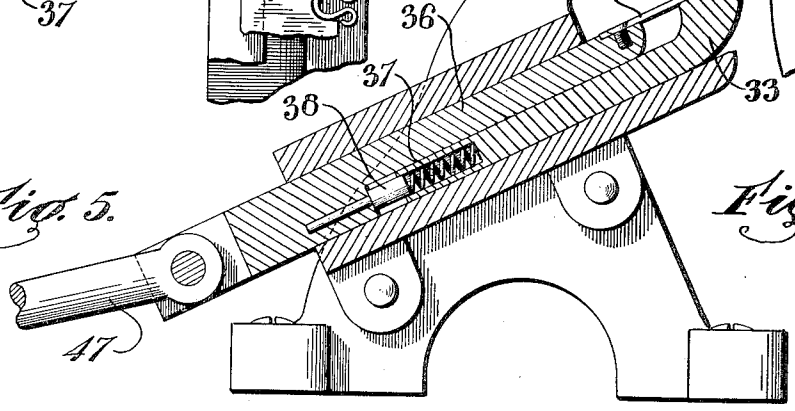
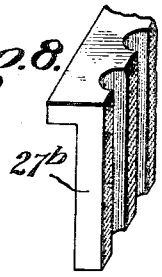



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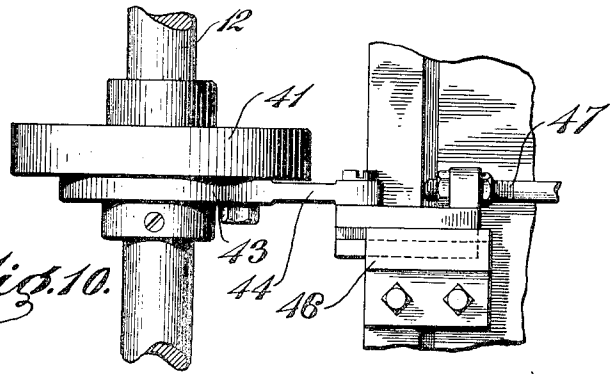




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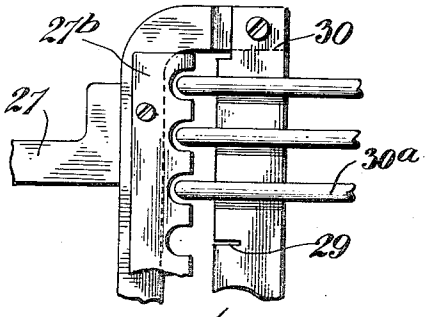



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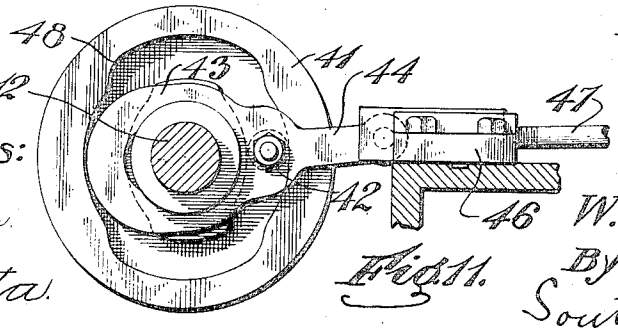



Fig. 11.

Witnesses:

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S. Grotta.

Inventor:

W. L. Curtis

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23 SHEETS—SHEET 6.

Fig. 12.

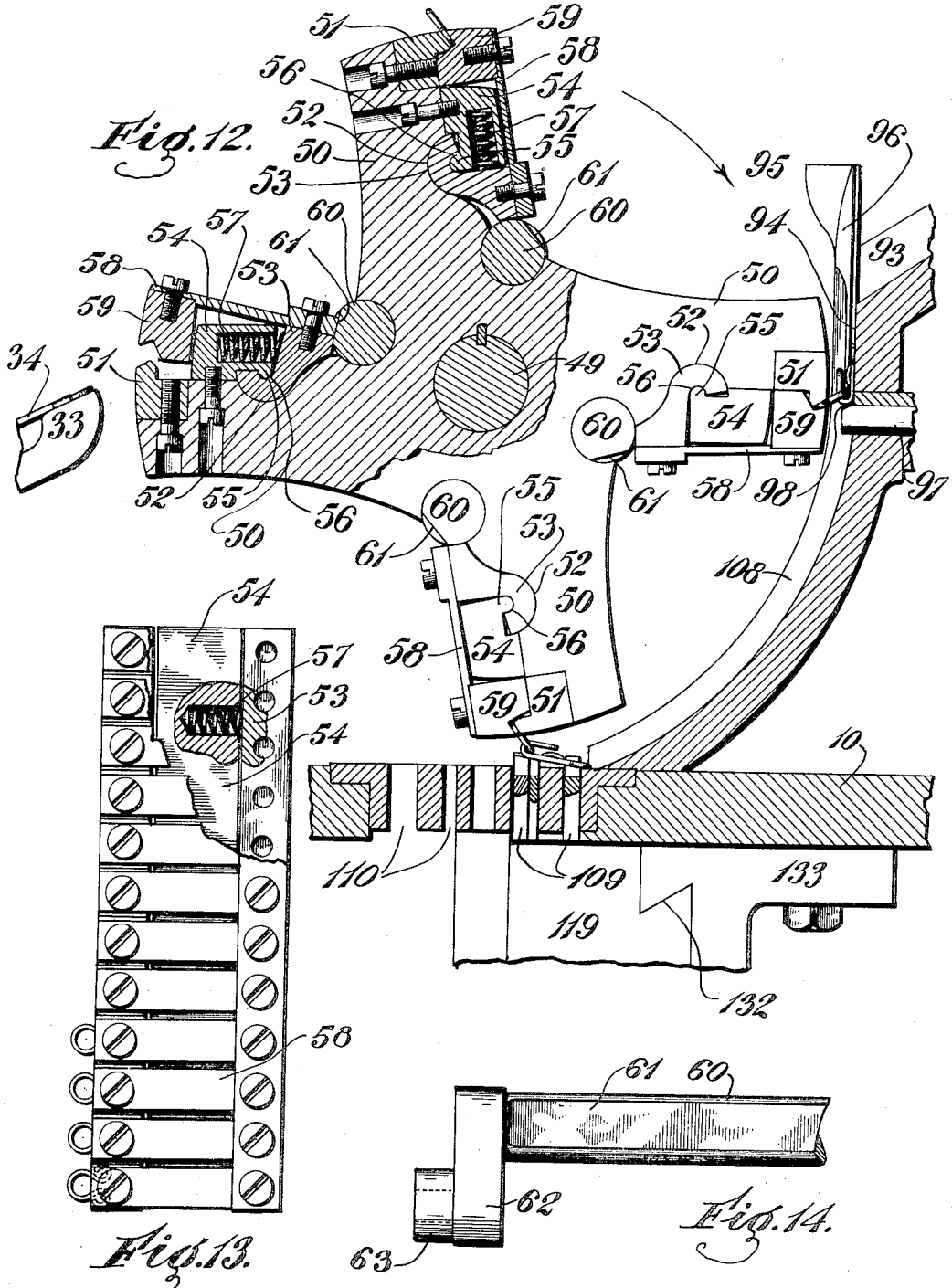



Fig. 13.




Fig. 14.




Witnesses:

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S. Grotta.

Inventor:

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Southgate & Southgate

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23 SHEETS-SHEET 7.

Fig. 15.

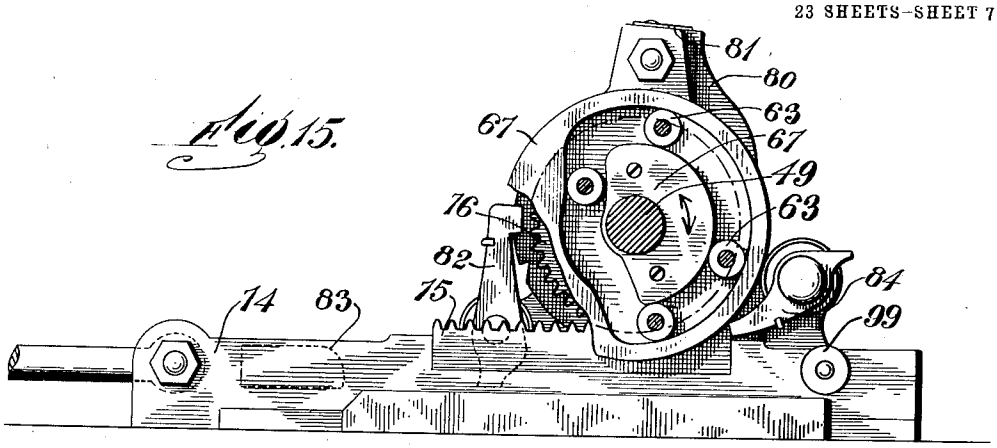



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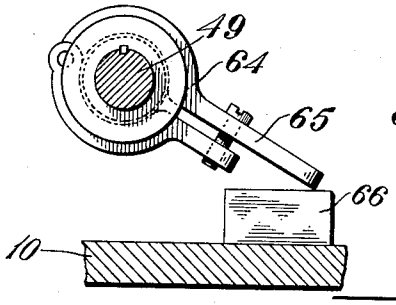
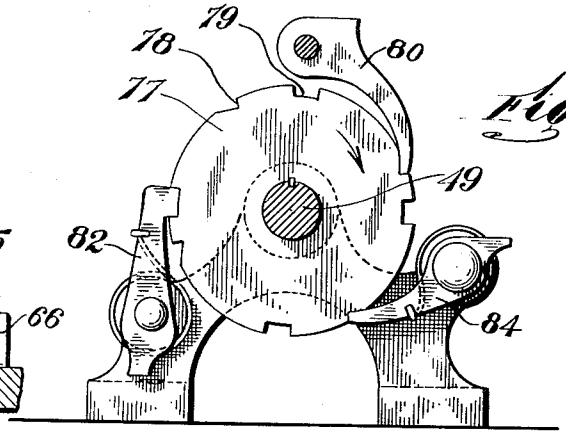



Fig. 16.



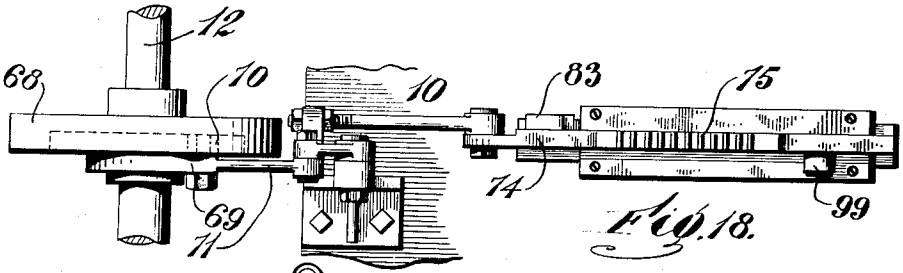




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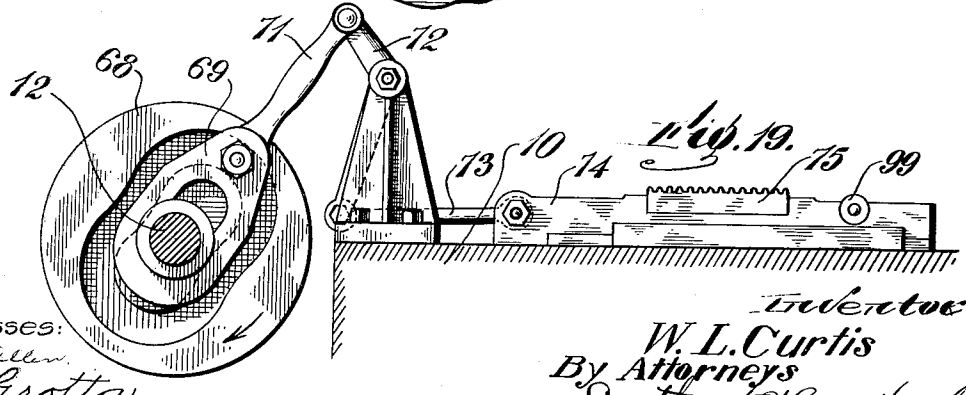



Fig. 19.

Witnesses:
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L. Grotta.

Inventor:
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23 SHEETS—SHEET 8.

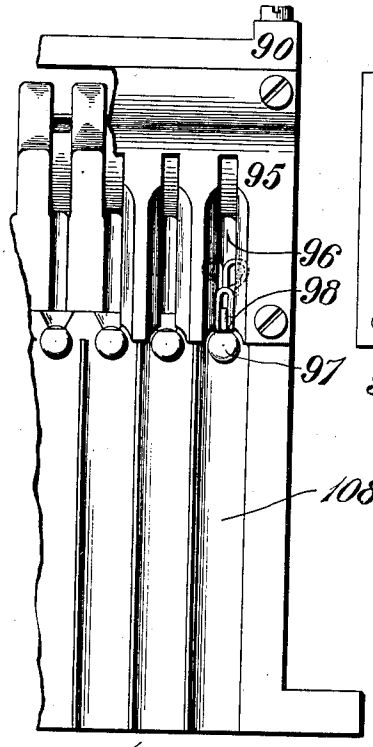



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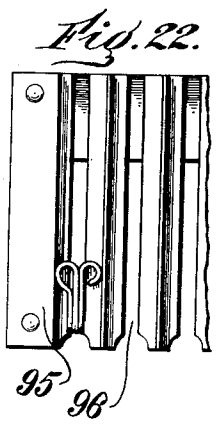



Fig. 22.




Fig. 20.

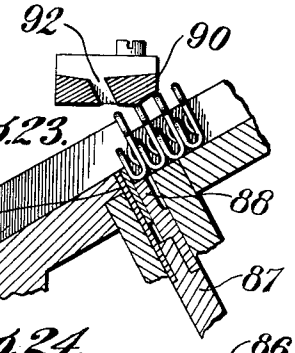



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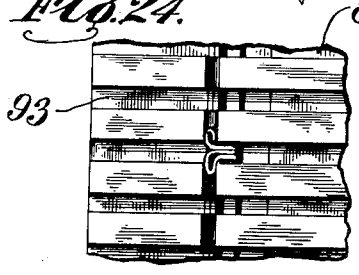



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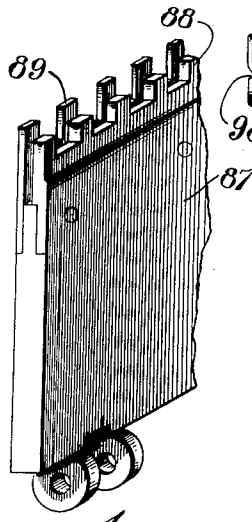



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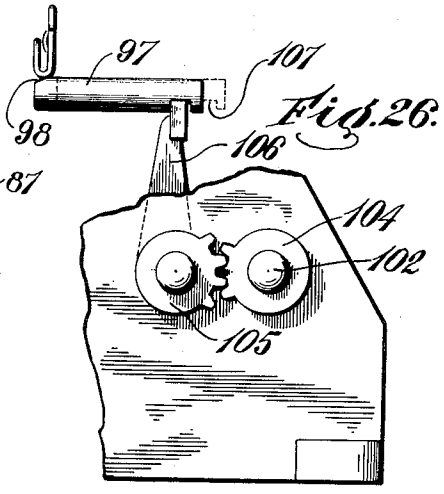



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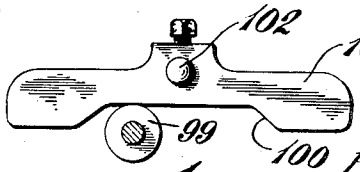



Fig. 27.

Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

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23 SHEETS—SHEET 9.

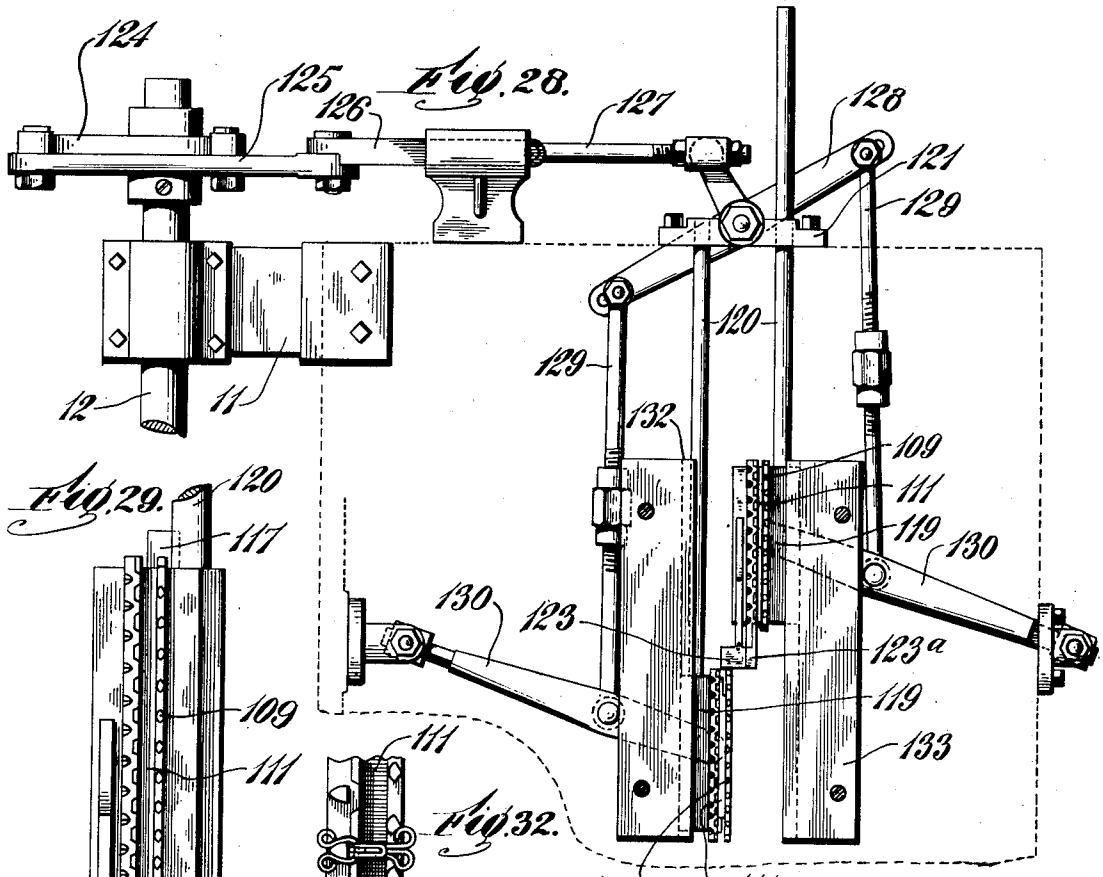



Fig. 28.




Fig. 29.




Fig. 32.

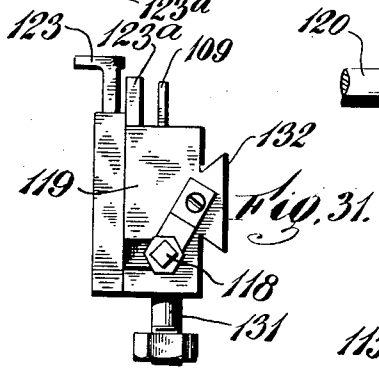



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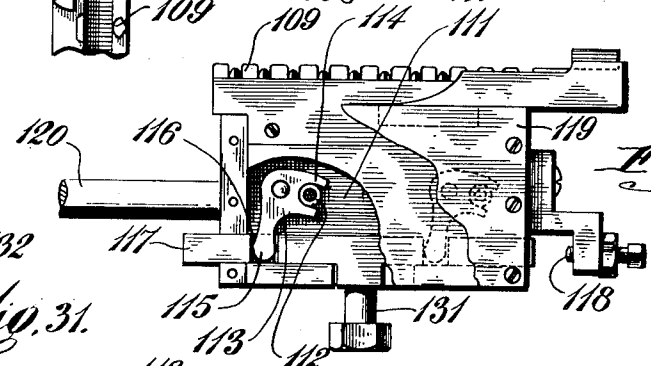



Fig. 30.




Fig. 33.

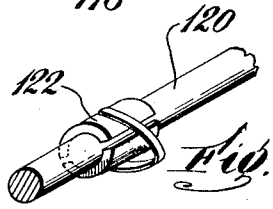
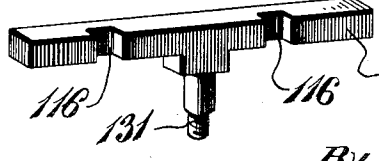



Fig. 34.




Witnesses:
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S. Grotta

Inventor:
W. L. Curtis
By Attorneys
Southgate & Southgate.

W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

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1,095,457. Patented May 5, 1914.

23 SHEETS—SHEET 10.

Fig. 39.




Fig. 38.

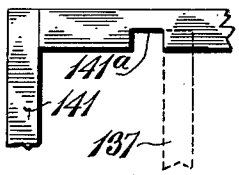



Fig. 40.




Fig. 41.

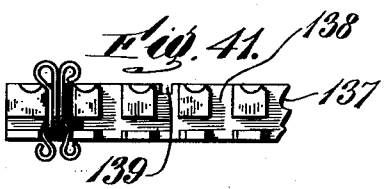



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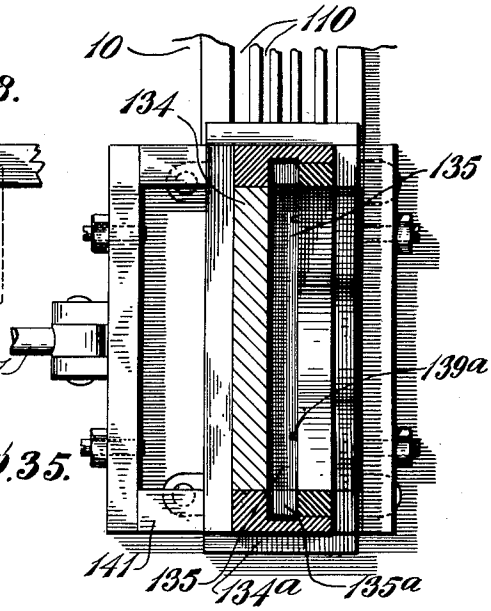



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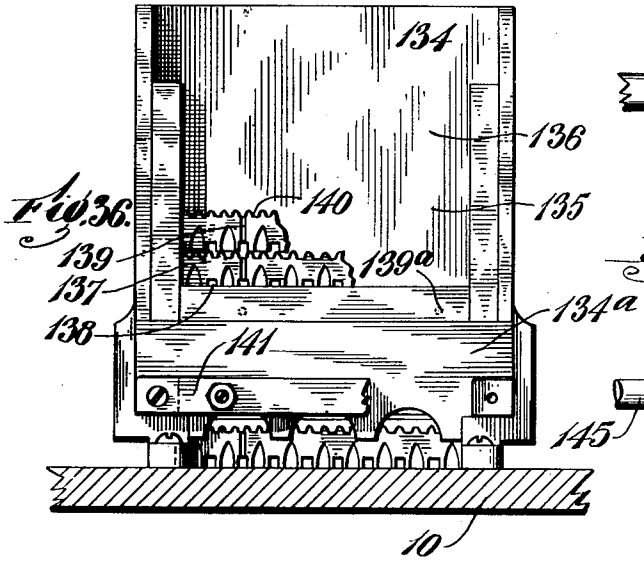



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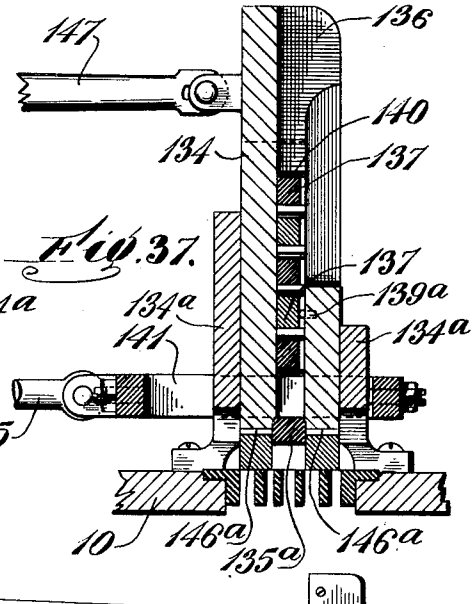
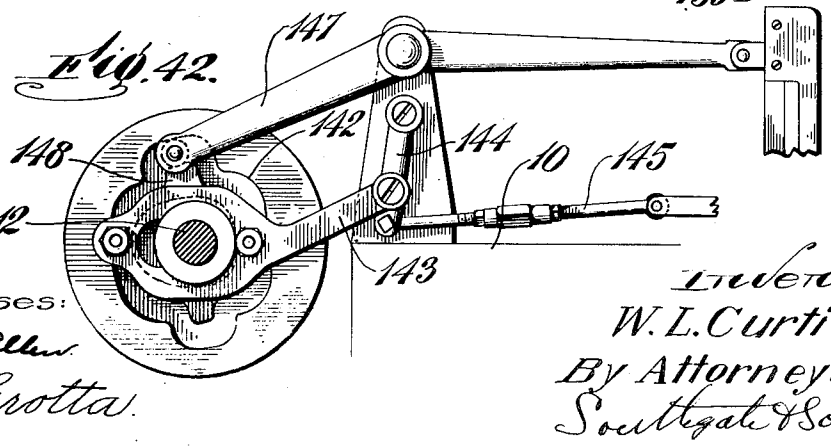



Fig. 42.




Witnesses:
E. M. Allen
S. Grotta.

Inventor:
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Southgate & Southgate

W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

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23 SHEETS-SHEET 11.

Fig. 43.

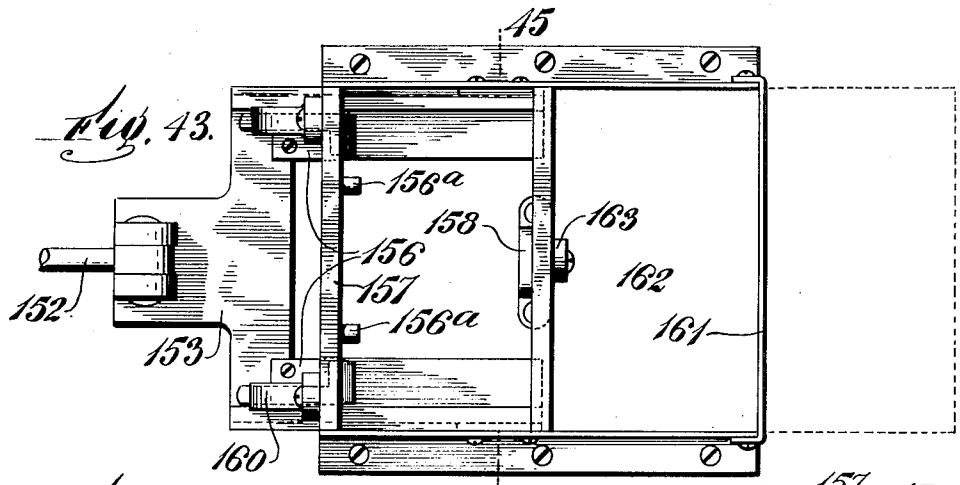



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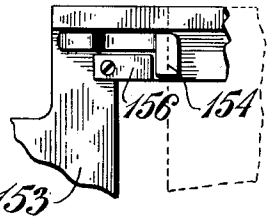



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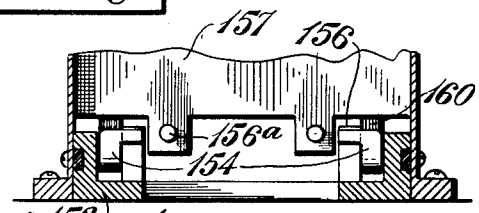




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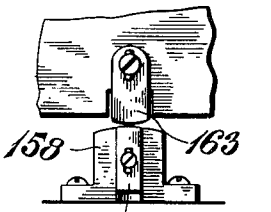



Fig. 47.

Fig. 50.

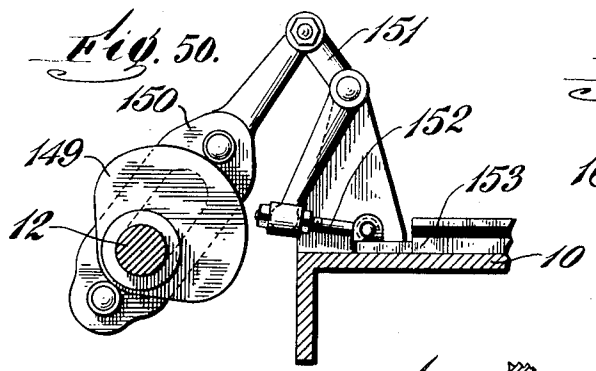



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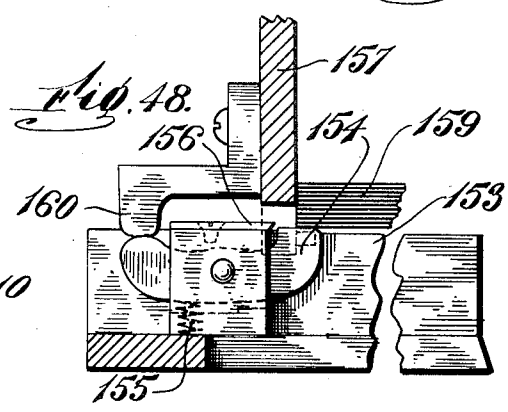
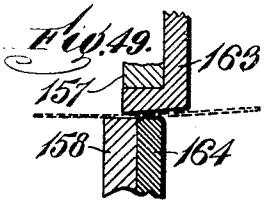



Fig. 49.




Witnesses:
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S. Grotta.

Inventor:
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W. L. CURTIS.

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APPLICATION FILED MAR. 16, 1908.

**1,095,457.** Patented May 5, 1914.

23 SHEETS—SHEET 12.

Fig. 54.

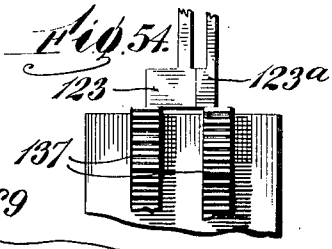



Fig. 51.




Fig. 52

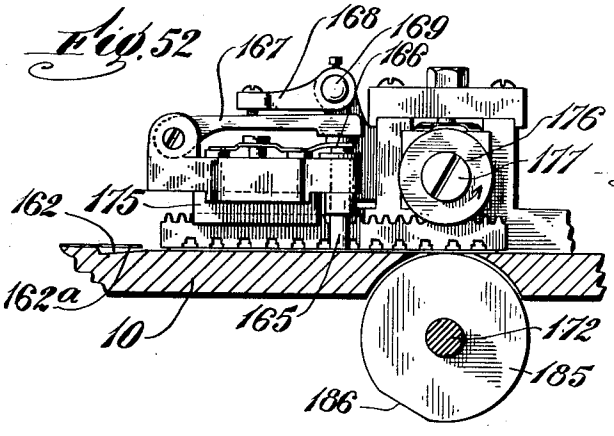



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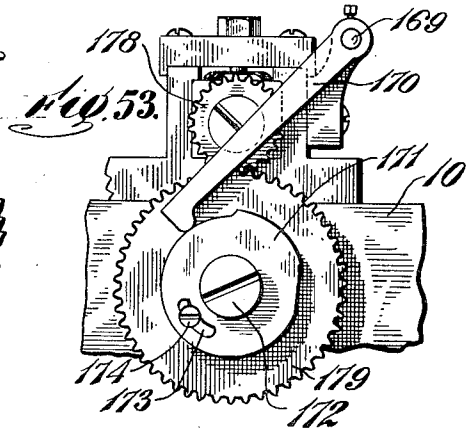



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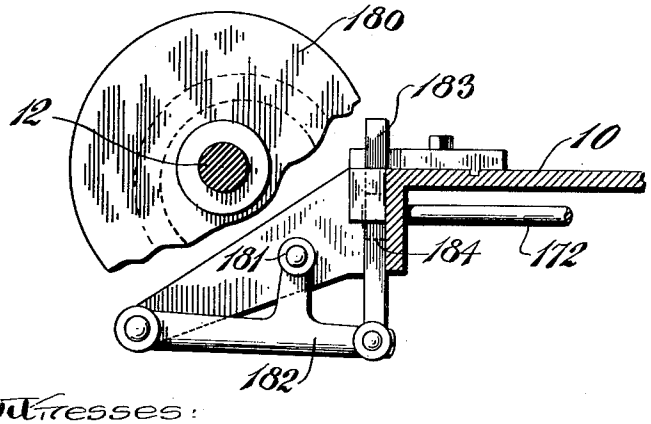
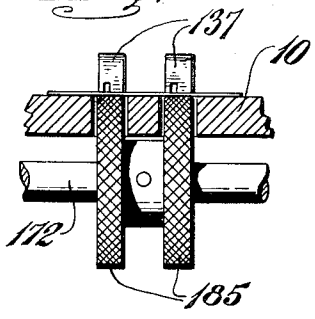



Fig. 55.




Witnesses:
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L. Grotta.

Inventor:
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Southgate & Southgate

W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457. Patented May 5, 1914.

23 SHEETS-SHEET 13.

Fig. 57.

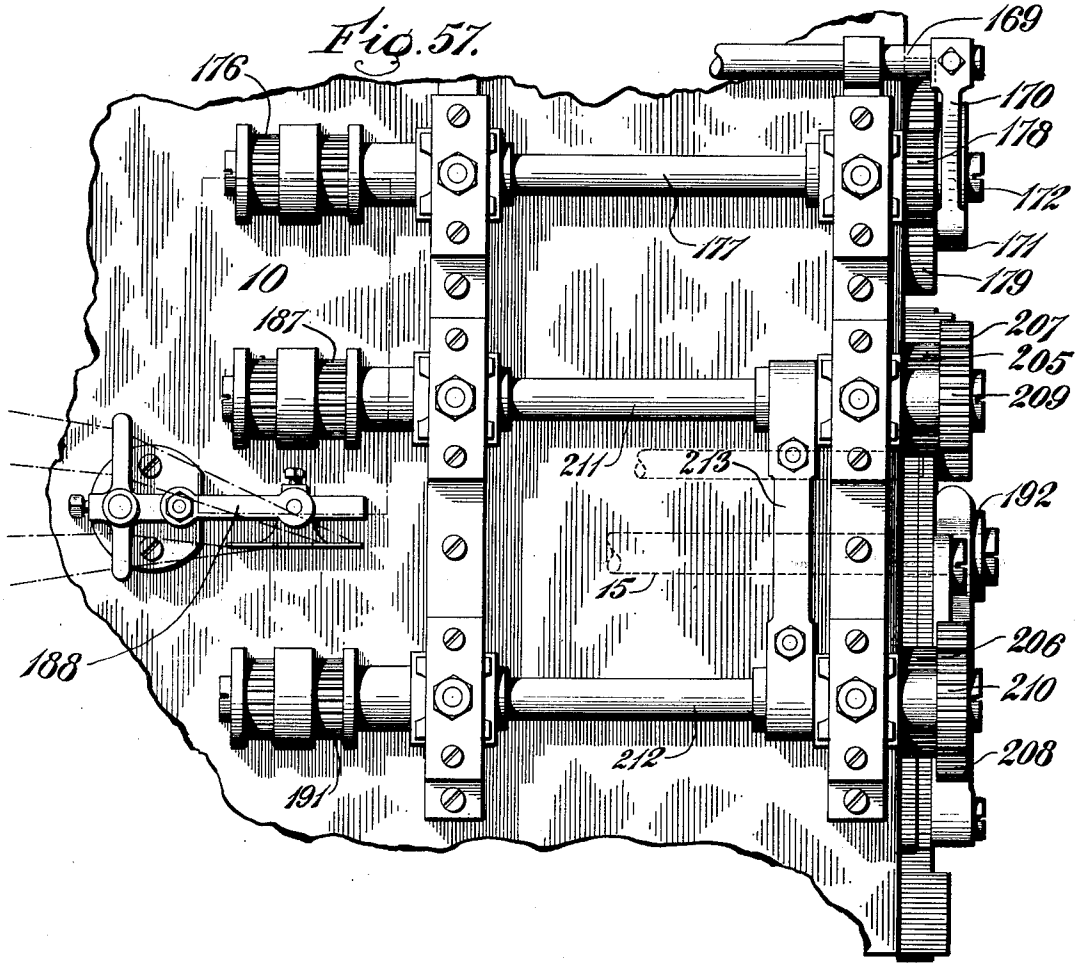



Fig. 63.

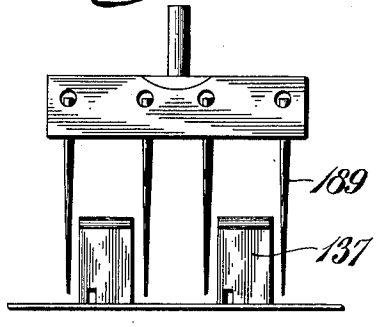
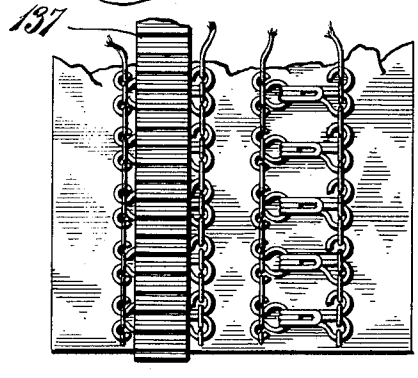



Fig. 64.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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APPLICATION FILED MAR. 16, 1908.

1,095,457. Patented May 5, 1914.

23 SHEETS—SHEET 14.

Fig. 58.

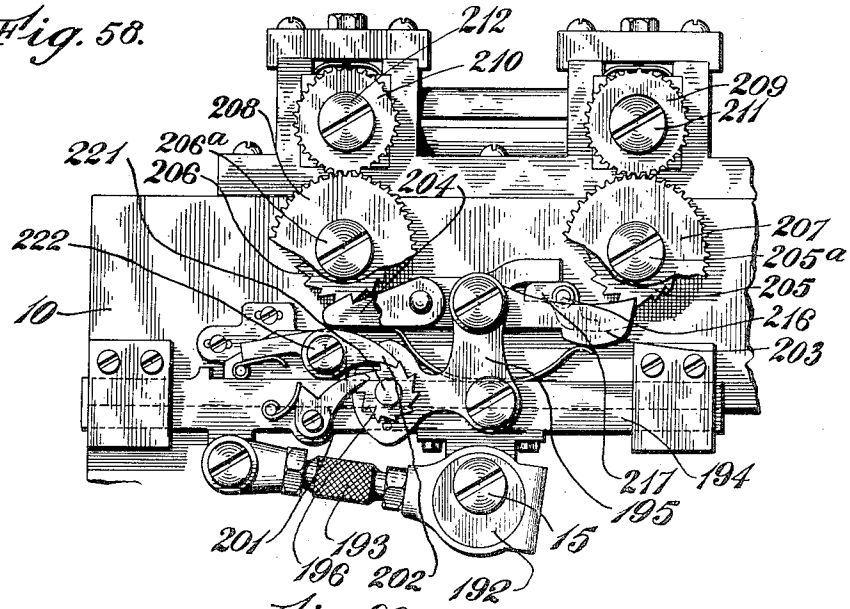



Fig. 60.

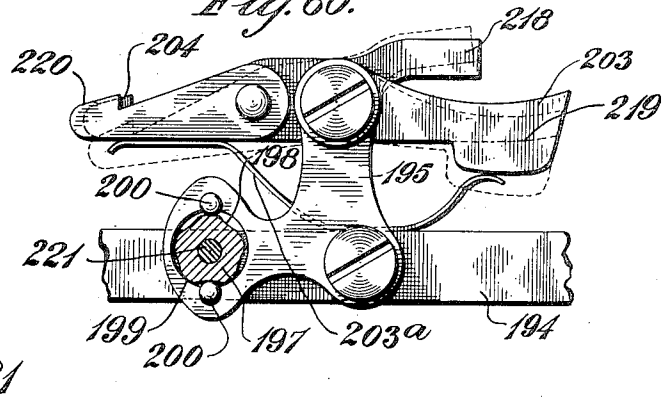



Fig. 61




Fig. 59.

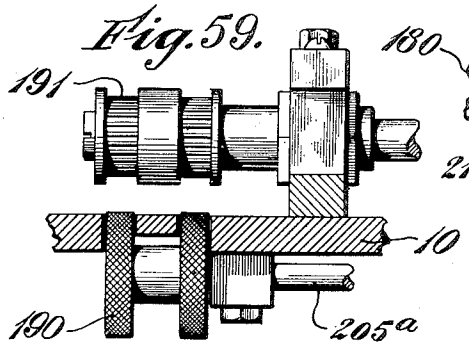



Fig. 65.

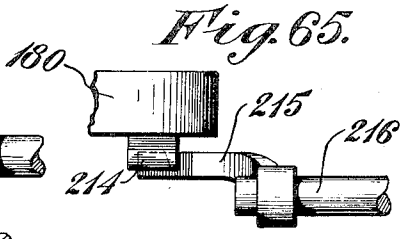



Fig. 62.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

By Attorneys

Southgate & Southgate

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MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS-SHEET 15.

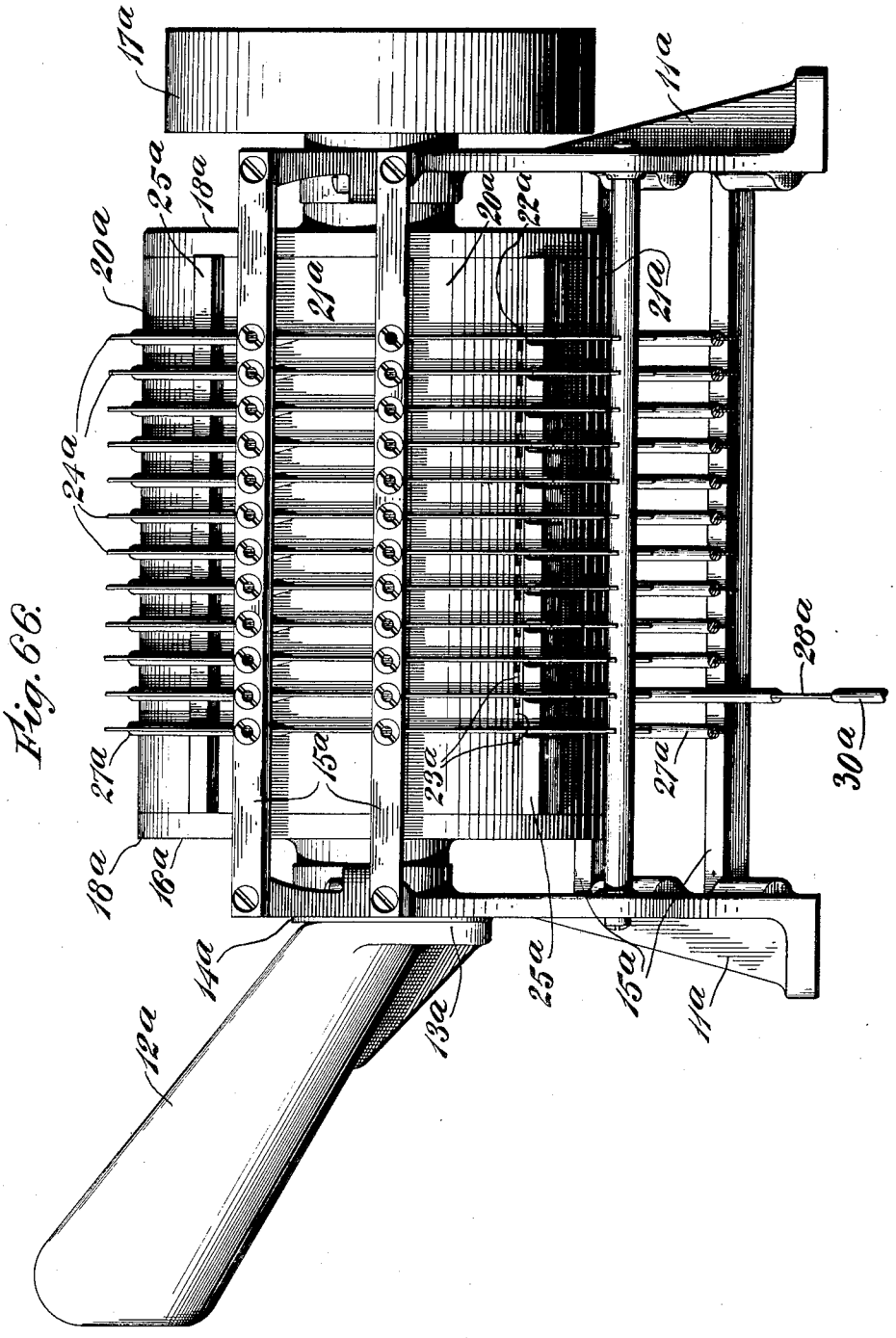



Fig. 66.

Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 16.

Fig. 68.

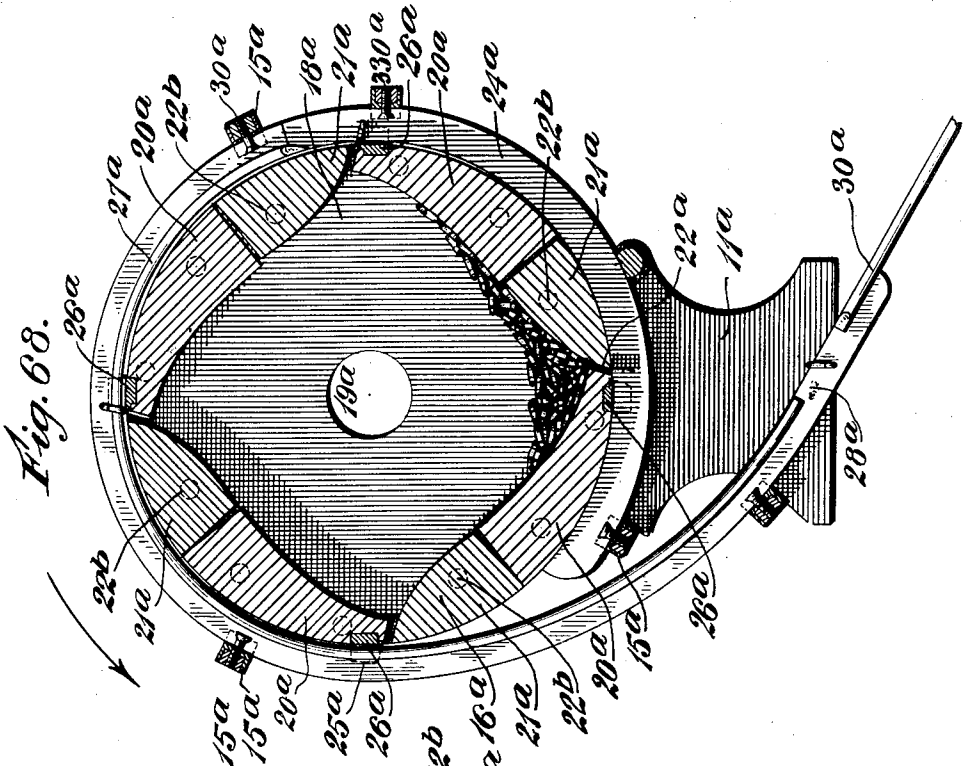
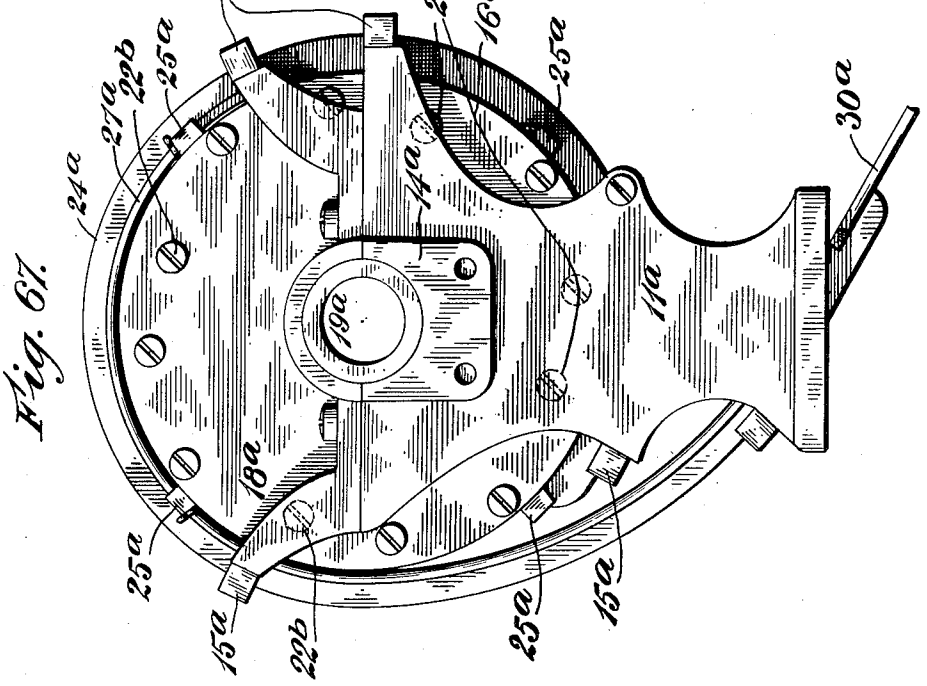



Fig. 67.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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Southgate & Southgate

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MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS-SHEET 17.

Fig. 69.

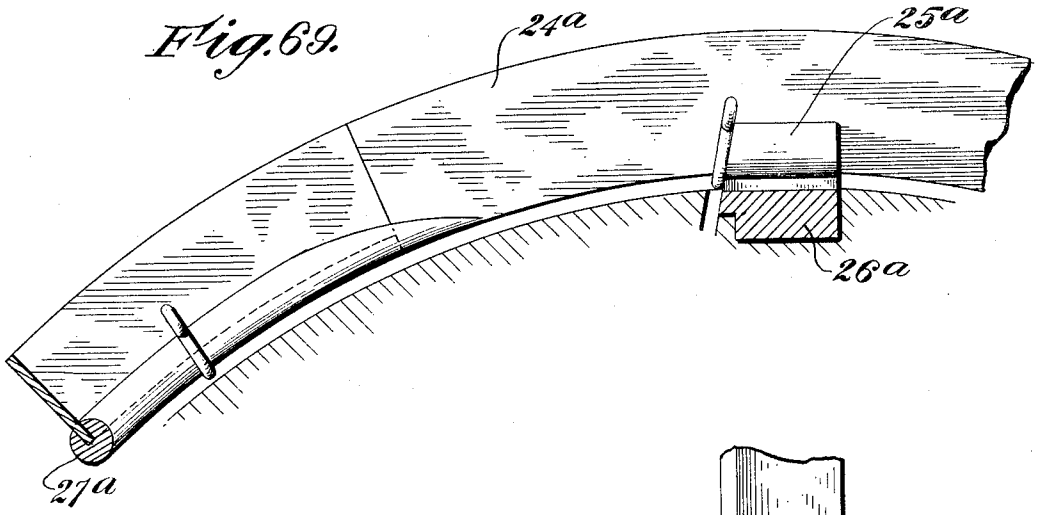



Fig. 10.

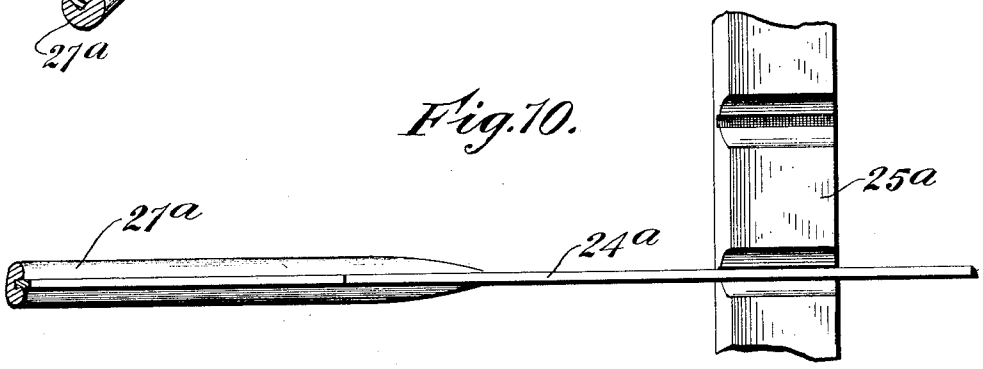



Fig. 11.

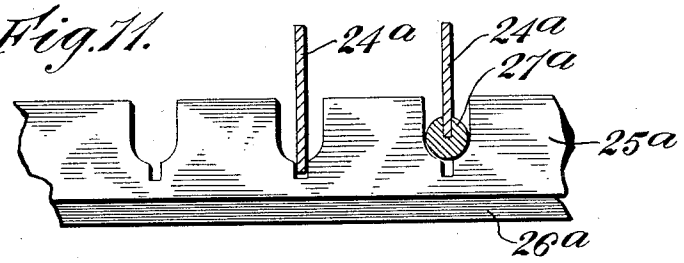
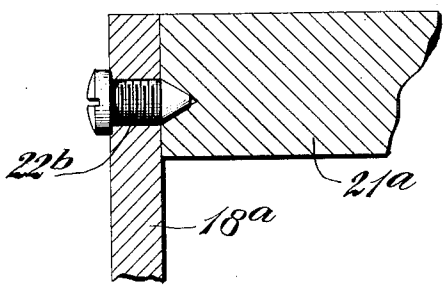



Fig. 12.




Witnesses:

E. M. Allen.

S. Grotta

Inventor:

W. L. Curtis

By Attorneys

Southgate & Southgate

W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 18.

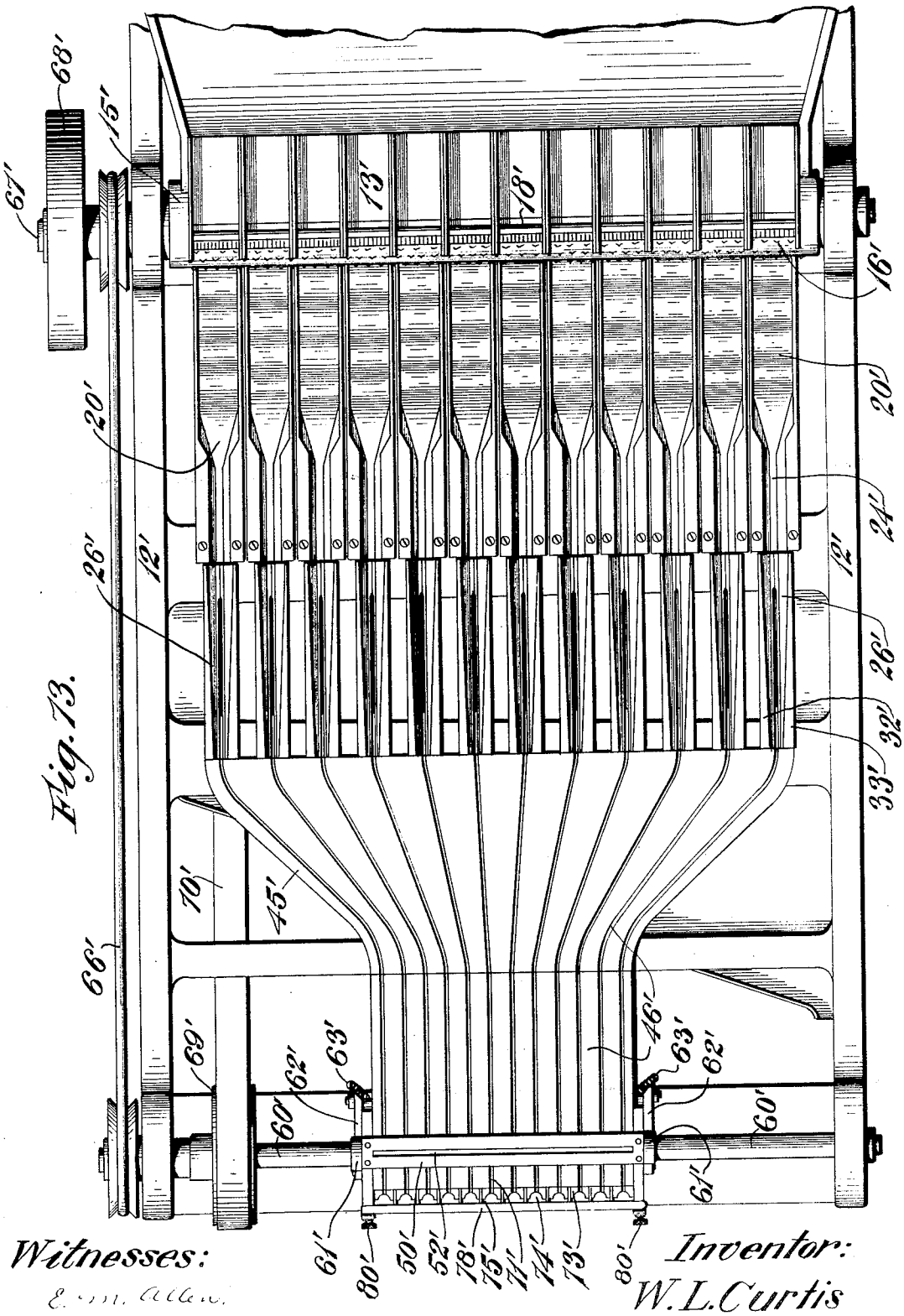



Fig. 13.

Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 19.

Fig. 14.

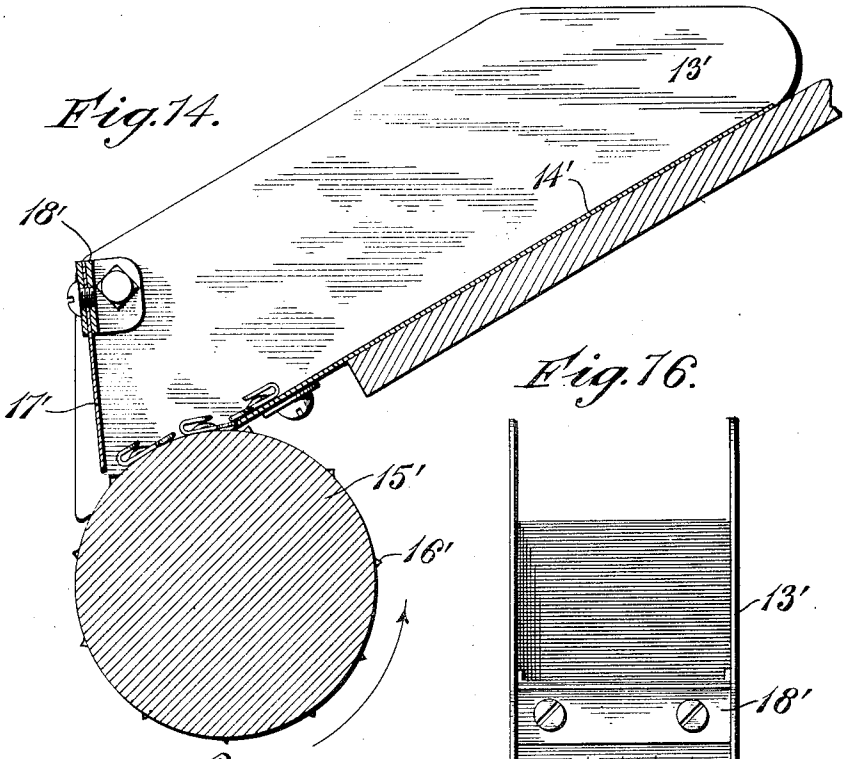



Fig. 16.



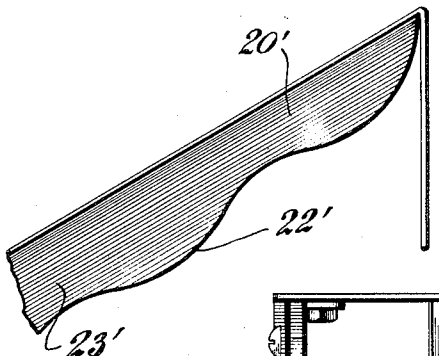
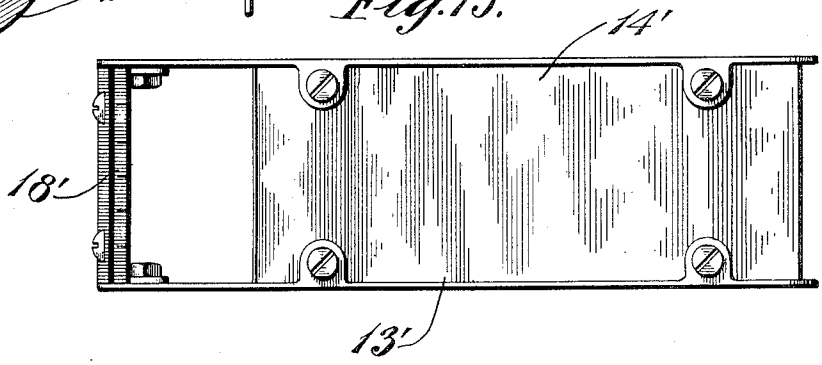




Fig. 15.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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Southgate & Southgate

W. L. CURTIS.

MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 20.

Fig. 81.

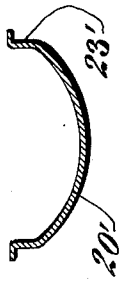



Fig. 80.

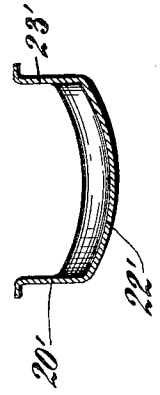



Fig. 77.

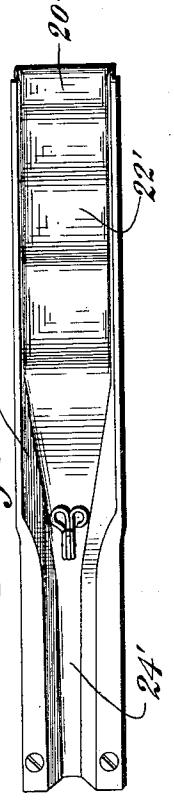



Fig. 79.

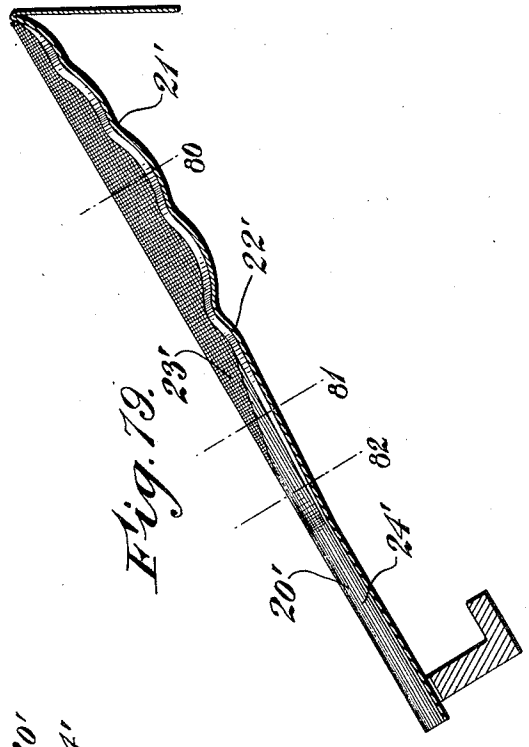



Fig. 78.

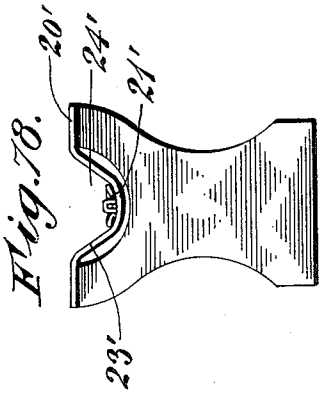



Fig. 82.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

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Southgate & Southgate

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MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 21.

Fig. 83.

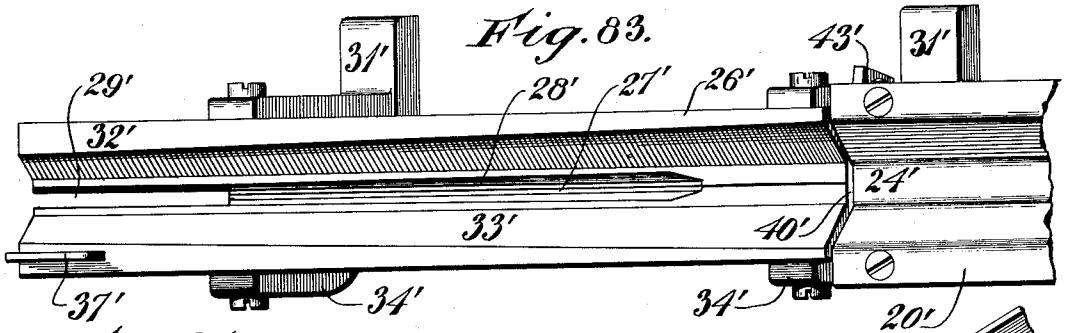



Fig. 87.

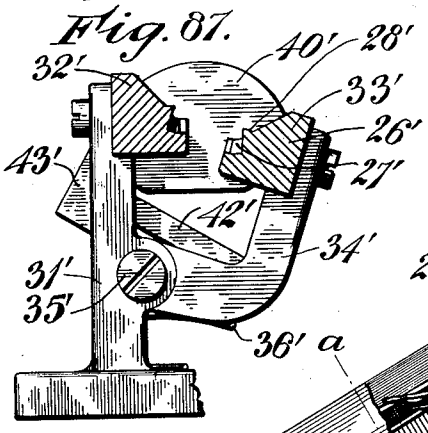



Fig. 84.




Fig. 88.




Fig. 85.




Fig. 89.

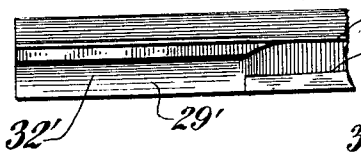
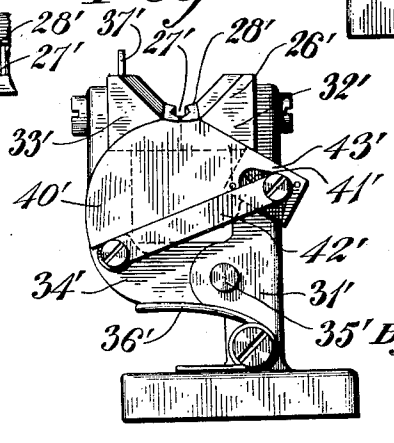



Fig. 86.




Witnesses:

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S. Grotta.

Inventor:

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MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 22.

Fig. 91.

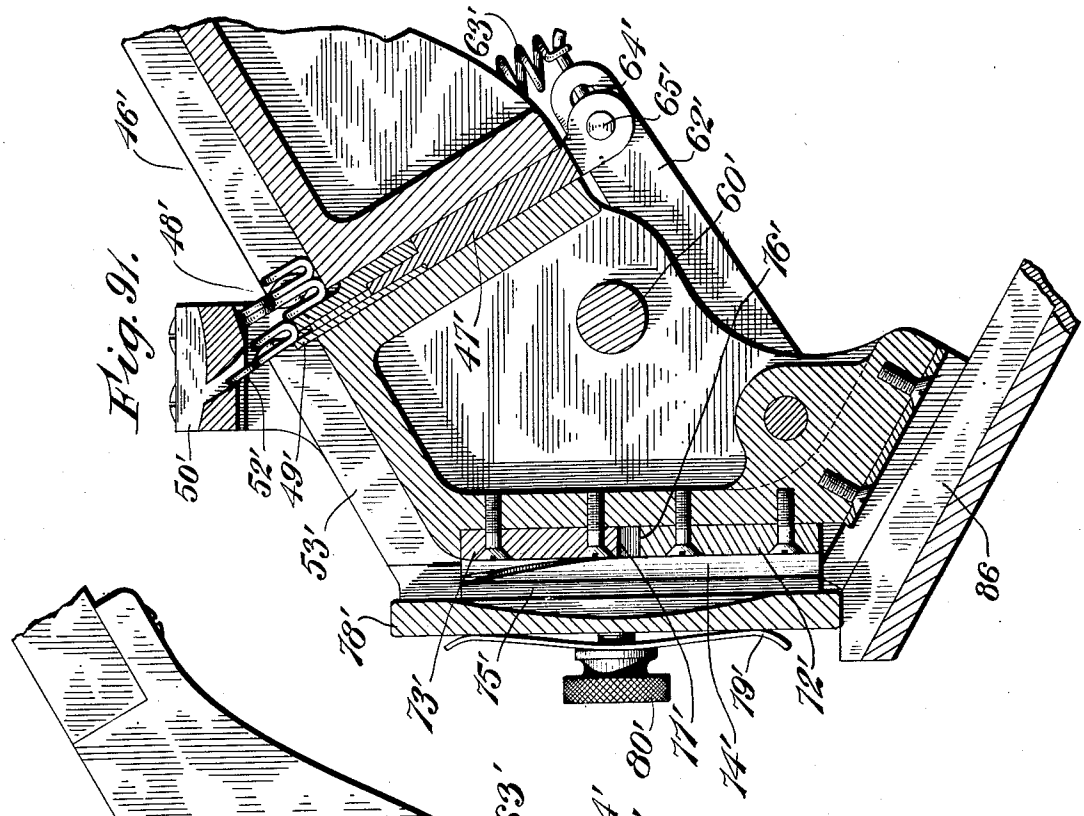
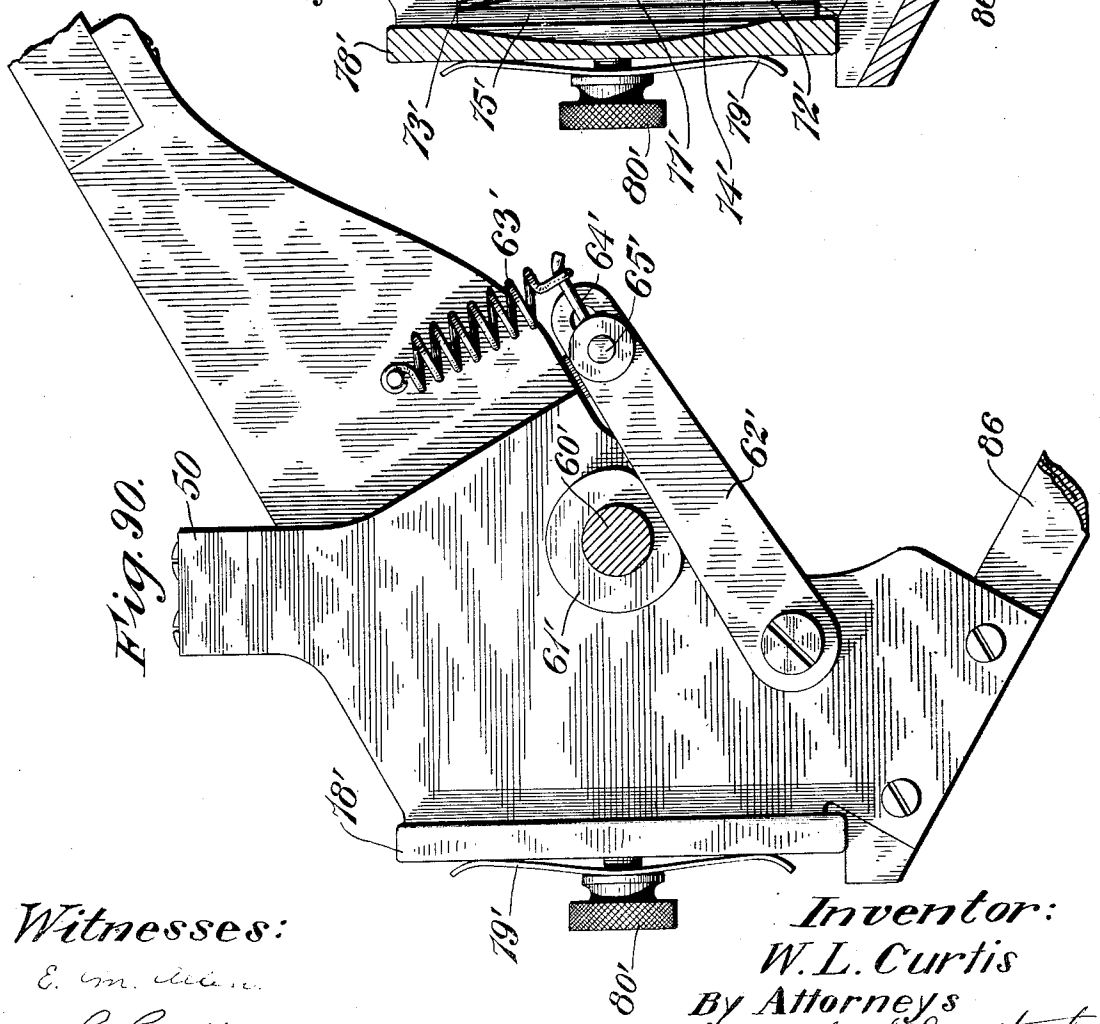



Fig. 90.




Witnesses:

E. M. Allen.

S. Grotta.

Inventor:

W. L. Curtis

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Southgate & Southgate

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MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

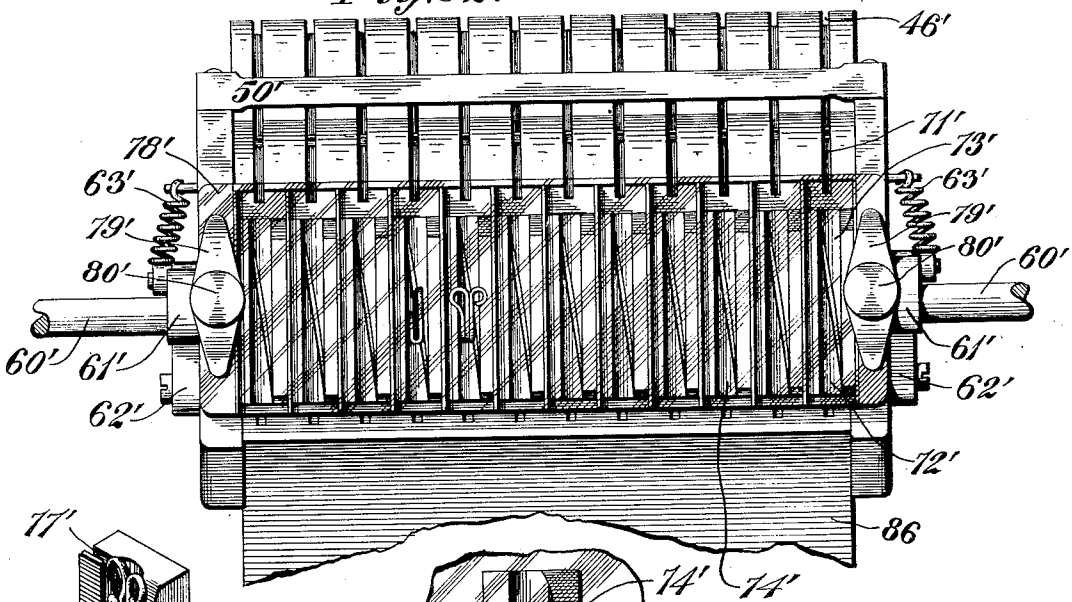
APPLICATION FILED MAR. 16, 1908.

1,095,457.

Patented May 5, 1914.

23 SHEETS—SHEET 23.

Fig. 92.



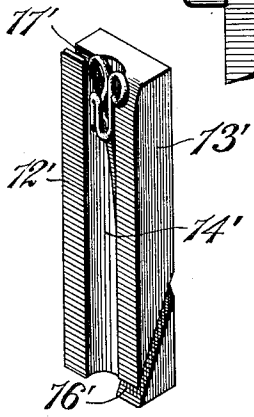




Fig. 94.

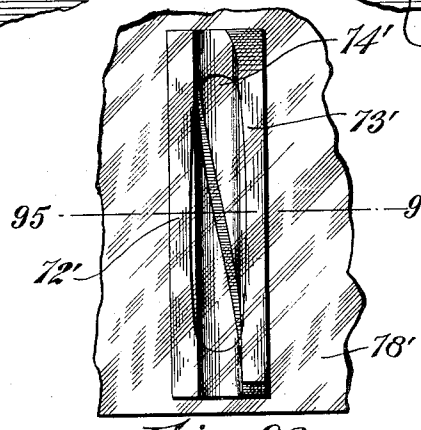
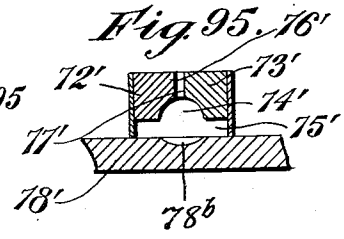



Fig. 93.

Fig. 95.



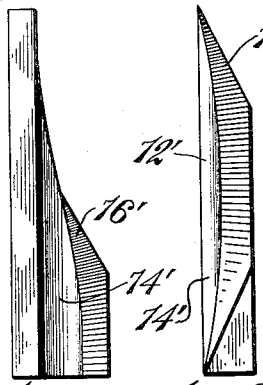




Fig. 96. Fig. 97.

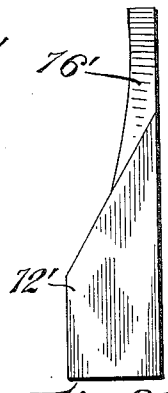



Fig. 98

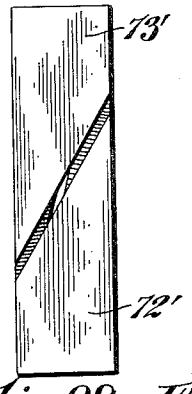



Fig. 99.

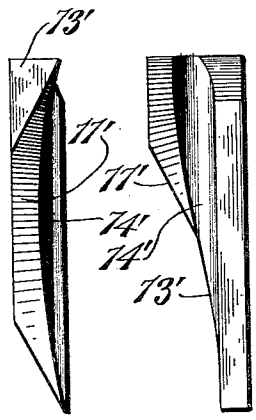



Fig. 100. Fig. 101.

Witnesses:

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S. Grotta.

Inventor:

W. L. Curtis

By Attorneys

Southgate & Southgate

# UNITED STATES PATENT OFFICE.

WALTER L. CURTIS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO DE LONG HOOK AND EYE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

## MACHINE FOR ASSEMBLING HOOKS AND EYES AND ATTACHING THEM TO CARDS.

1,095,457. Specification of Letters Patent. Patented May 5, 1914.

Application filed March 16, 1908. Serial No. 421,347.

*To all whom it may concern:*

Be it known that I, WALTER L. CURTIS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Machine for Assembling Hooks and Eyes and Attaching Them to Cards, of which the following is a specification.

My invention relates to a machine for assembling hooks and eyes in a natural position with respect to each other, feeding them in rows into a position to be applied to cards which are automatically fed by the machine into place, and for sewing the hooks and eyes on the cards, preferably in two or more rows.

My invention comprises means for feeding a plurality of eyes simultaneously on a support, moving this support to apply the eyes to a carrier, feeding an equal number of hooks into a position to be taken up by said eyes on the carrier and deposited thereby on a transfer device, alternately operating two transfer devices to feed sets of the assembled hooks and eyes into a position to be mounted on cards, feeding cards singly from a pack into a position to receive the hooks and eyes, sewing the hooks and eyes on the cards in a proper manner to secure the right length of stitches at all points along the card, feeding the hooks and the eyes separately to the machine and several other features for the general improvement of machines of this character.

While I have illustrated and described the invention as especially applicable to the sewing of hooks and eyes on cards and while this is the principal object for which it has been made, yet it will be understood that articles of other characters can be assembled, fed, delivered and attached to cards or the like by the employment of the same principles, as set forth in the claims, and, therefore, I do not wish to be strictly limited to the employment of the invention for hooks and eyes.

Reference is to be had to the accompanying drawings which illustrate a preferred embodiment of the invention designed for the sewing of hooks and eyes on cards and in which—

Figure 1 is a plan of a machine constructed in accordance with the principles of the invention, without the hook and eye hoppers. Fig. 1ª is a side view with parts removed showing the hook and eye hoppers. Fig. 2 is a plan on an enlarged scale of a portion of the machine with certain parts removed. Fig. 3 is a side elevation of a part of the structure shown in Fig. 2. Fig. 4 is a fragmentary plan of the upper part of Fig. 3. Fig. 4ª is a sectional view on an enlarged scale of a part shown in Fig. 4 taken on a plane parallel to Fig. 3. Fig. 5 is a sectional view of a part of an element shown in Fig. 3 on a plane parallel to that figure. Fig. 6 is a plan of parts shown in Fig. 5 with the top plate, guide, and rods removed, parts being broken away and shown in section. Fig. 7 is a side elevation of one of the rods shown in Fig. 5 and of parts at the right of said rod in that figure. Fig. 8 is a perspective view of the guide appearing in Fig. 5. Fig. 9 is a fragmentary plan of parts shown at the upper end of Fig. 5. Fig. 10 is a plan of mechanism shown in Fig. 1 for connection with the movable parts of Fig. 5 and showing how these parts are operated. Fig. 11 is an end elevation of parts shown in Fig. 10. Fig. 12 is a sectional view of the rotary carrier shown in Fig. 3 parts being broken away and shown in section. Fig. 13 is a plan of one of the jaws of said carrier parts being broken away and shown in section. Fig. 14 is a side elevation of a shaft for operating one of the jaws shown in Fig. 13. Fig. 15 is an end elevation of mechanism for operating the jaws of the carrier shown in Fig. 12. Fig. 16 is a sectional view taken on a plane at the rear of and parallel with Fig. 15. Fig. 17 is an end elevation of a friction device connected with the parts shown in Fig. 16. Fig. 18 is a plan of parts shown in Fig. 15 and including the operating mechanism therefor. Fig. 19 is a side elevation of parts shown in Fig. 18. Fig. 20 is a sectional view similar to a portion of Fig. 12 showing the manner in which the hooks are fed down an incline. Fig. 21 is a side elevation of the same. Fig. 22 is an inside elevation taken in the opposite direction from Fig. 21 of a guard for the runway through which the hooks pass. Fig. 23 is a sectional view similar to part of Fig. 20 showing the parts in a different position.

Fig. 24 is a plan of the same. Fig. 25 is a perspective view of a sliding stop. Fig. 26 is an end elevation of parts shown in Fig. 20. Fig. 27 is an elevation of means for operating a shaft. Fig. 28 is a plan of a transfer device. Fig. 29 is a plan of a portion of the transfer device on an enlarged scale. Fig. 30 is a side elevation of the same. Fig. 31 is an end elevation. Fig. 32 is an enlarged fragmentary plan showing how the hooks and eyes are held in position. Fig. 33 is a perspective view of parts shown in Fig. 30. Fig. 34 is a perspective view of a guide rod and a friction device therefor. Fig. 35 is a plan of a rack holder. Fig. 36 is an elevation of the same partly broken away. Fig. 37 is a central sectional view of the same. Fig. 38 is a fragmentary plan of the same. Fig. 39 is a plan of a part of the rack employed in the rack holder. Fig. 40 is a side elevation of the same. Fig. 41 is a bottom plan view showing how the hooks and eyes are held. Fig. 42 is a side elevation of the operating mechanism for the rack holder. Fig. 43 is a plan of a card holder for the machine. Fig. 44 is a side elevation of the same. Fig. 45 is a sectional view on the line 45—45 of Fig. 43. Fig. 46 is a fragmentary plan of parts shown in Fig. 43 with certain parts removed. Fig. 47 is a fragmentary end elevation of parts shown in Fig. 44. Fig. 48 is a fragmentary sectional view on an enlarged scale on a central horizontal line of Fig. 43. Fig. 49 is a sectional view taken through the center of Fig. 47. Fig. 50 is a side elevation of the operating parts for the card holder. Fig. 51 is a plan of a rack and card starting device. Fig. 52 is a view of the left end of the same with parts in section. Fig. 53 is the opposite end elevation of parts shown in Fig. 52. Fig. 54 is a fragmentary plan showing how the racks are pushed into position over the cards. Fig. 55 is a side elevation of Fig. 52, showing the table in section. Fig. 56 is a side elevation of the operating mechanism for the same. Fig. 57 is a plan of the sewing mechanism and card feed therefor. Fig. 58 is an end elevation of the same. Fig. 59 is an elevation partly in section showing the rack and card feed. Fig. 60 is a fragmentary view similar to Fig. 58 with parts removed and parts in section. Fig. 61 is a plan of a pair of springs shown in Fig. 58. Fig. 62 is a plan of a regulating wheel shown in Fig. 60. Fig. 63 is an elevation showing how the sewing needles operate in conjunction with the hook holding devices. Fig. 64 is a plan of a card with the hooks and eyes sewed thereon, a rack appearing on one side. Fig. 65 is a fragmentary plan showing means for operating a certain part of the device. Fig. 66 is a side elevation of an eye receiving hopper and eye arranging and feeding device on an enlarged scale. Fig. 67 is an end view of the same with the hopper removed. Fig. 68 is a sectional view of the same parallel to Fig. 67. Fig. 69 is an enlarged sectional view of parts shown in Fig. 68. Fig. 70 is a bottom view of parts shown in Fig. 69. Fig. 71 is an elevation of the same with parts in section. Fig. 72 is a frgamentary sectional view. Fig. 73 is a plan of a portion of the hook receiving and arranging mechanism. Fig. 74 is a longitudinal sectional view of the same. Fig. 75 is a plan of the same. Fig. 76 is an end view of certain mechanism shown in Fig. 74. Fig. 77 is a plan of a chute for arranging the hooks with their axes in parallel lines. Fig. 78 is an end view of the same. Fig. 79 is a longitudinal sectional view of the same. Figs. 80, 81 and 82 are transverse sectional views on the lines 80, 81 and 82 respectively of Fig. 79. Fig. 83 is a plan of one of a series of chutes for bringing the hooks into vertical position. Fig. 84 is a side elevation of the same partly broken away to show interior construction. Figs. 85 and 86 are views of the opposite ends of the same. Fig. 87 is a sectional view of the line *a*—*a* of Fig. 84. Fig. 88 is a sectional view of the line *b*—*b* of Fig. 84. Fig. 89 is a fragmentary side view of portion of the same device. Fig. 90 is an enlarged side elevation of the lower end of the hook arranging mechanism. Fig. 91 is a longitudinal sectional view taken on the line at the rear of the side shown in Fig. 90. Fig. 92 is an end elevation of the same. Fig. 93 is a fragmentary enlarged end elevation of one of the chutes for turning the hooks around. Fig. 94 is a perspective of the principal part of one of said chutes. Fig. 95 is a sectional view of the same on the line 95 of Fig. 93. Figs. 96, 97 and 98 are views of three sides of one of the parts of the hook turning chute. Figs. 99, 100 and 101 are similar views of the other part thereof.

The machine is intended to receive two series of complementary articles or of the complementary halves of articles, feed them toward each other, deliver one into contact with the other, connect them, deposit them on a transfer device, and transfer the assembled articles away from the feeding and carrying devices through which they pass. It is to be noted that the articles are preferably fed in series containing, in the case illustrated, a dozen articles each, and that one of these series is fed by a transfer device into position for further operation while another is being received by another part of the transfer device to be subsequently fed forward, the machine therefore operating to assemble and feed two series. While this part of the machine is in operation, a pack of cards or other articles to which the first mentioned articles are to be attached, in a receiver, are taken in succession from the

bottom of the pack and moved in proper position for receiving the articles from the transfer device.

The transfer device operates a series of racks for receiving the assembled articles and feeding them on the cards. These racks move with the articles throughout the rest of their travel in the machine and are taken up at the delivery end of the machine and fed by hand back into the machine to be used over. The racks are fed along in pairs and each holds a series of hooks and eyes or other articles on the card, being fed along with it. The racks, the cards carrying the racks, and the articles which the racks hold are fed to a sewing device of any desired character and the feed of the cards and racks is then taken up by another feeding device which regulates their motion in such a manner as to provide the necessary long and short stitches which occur alternately when hooks and eyes are operated upon. Means is also provided for making the short stitch at each end of the card, where only one wire has to be held by the stitch. With this general statement of the nature of the machine, the details of construction which are illustrated will be more readily understood.

The drawings illustrate the invention as embodied in a machine which is provided with a table 10 having brackets 11 provided with bearings for a longitudinal shaft 12. This shaft is provided with a worm-wheel 13 operated by a worm 14 on a shaft 15 which is the main driving shaft of the machine. This shaft is provided with a driving pulley 16 and with a hand-wheel 17 for obvious purposes.

The invention will be described as operating to assemble hooks and eyes and apply them to cards. Brackets $10^a$ on the table 10 support end pieces $11^a$ of a device for receiving arranging and feeding forward the eyes with which the machine is to be supplied. See Figs. $1^a$ and 66 to 72. One of the end pieces carries a guide $12^a$ into which the eyes are shoveled or otherwise placed in an indiscriminate manner. This guide is shown as having a flange $13^a$ at the lower end thereof by which it is secured to a face $14^a$ on one of the end pieces $11^a$. These end pieces are connected by a series of cross bars $15^a$ so as to constitute a substantial frame for supporting the parts. Mounted to turn within this frame on suitable bearings is a rotary hopper $16^a$ driven by a pulley $17^a$ in any desired way. This hopper comprises a pair of ends $18^a$, one of which has a central opening $19^a$ through which the eyes are discharged into the interior of the hopper from the guide $12^a$. The ends of the hopper are connected by means of a series of plates $20^a$ which are fixed with respect to the ends. These plates are supplemented by an equal number of swinging members $21^a$ pivotally mounted on studs $22^b$ screwed through the ends $18^a$. It will be observed that each plate $20^a$ with its complementary member $21^a$ forms a comparatively flat wall inside the hopper, each of these walls being at an angle to those on the two sides thereof, so that as the hopper turns, the eyes will be caused to collect in a trough formed between the adjacent walls. These walls, however, are not entirely flat, as the inner surfaces of the plates $20^a$ and $21^a$ are reversely curved to form a trough which will terminate in a series of passages $22^a$ separated by partitions $23^a$, the passages being of such size as ordinarily to admit one eye at a time in each of them. The number of passages may be varied at will, but the invention is illustrated in a form in which there are twelve.

As the hopper rotates in the direction of the arrow in Fig. 68 the eyes will gather in the trough at the bottom and a certain number of them will descend into the passages $22^a$. Obviously, the eyes will enter these passages in all positions. Now at the bottom of these passages and under the rotating hopper are a series of curved feed or guide rods $24^a$ each guide bi-secting one of the passages $22^a$. These rods are curved entirely around the hopper and are supported by the cross bars $15^a$, being secured to them by means of screws $330^a$ or in any other desired way. It will be obvious, therefore, that all the eyes which enter the passages $22^a$ in such position that they can straddle the rods $24^a$ will drop down into the position indicated at the bottom of Fig. 68, so that their upper or looped part will rest on top of the rod while all other eyes will remain in the passages $22^a$, above the rods $24^a$ and on the further rotation of the hopper will be carried up in these passages until they pass beyond the top of the hopper, when they will drop back into the interior thereof.

The purpose of pivoting the members $21^a$ will now be seen. When they are in the position shown at the bottom of this figure, gravity will hold them down in such position as to leave the space in the passage $22^a$ at the maximum, just sufficient for the reception of one eye. On the upward passage, as indicated at the right of these figures, the force of gravity tends to hold their pointed ends on such eyes as may be in the passages $22^a$, so that they will not be discharged, but before they reach the position shown at the left in Fig. 68 they will again drop back so as to free the eyes and allow them to drop down the inclined wall of the hopper on the eyes which have slid down into the trough of the hopper. These eyes therefore are continually brought back into such position that they can be fed again into the passages

22ª without discharging them from the hopper and replacing them therein.

The eyes which fall astraddle of the several rods 24ª are pushed along by the continued rotation of the hopper upwardly along said rods. It will be noticed that these rods gradually bear away from the hopper so as to get the eyes entirely out of the hopper during the early part of its rotation. After the eyes are disengaged from the hopper, the eyes are carried along by a series of followers 25ª which are fixed to bars 26ª mounted in the edge of each of the plates 20ª. These carry the eyes along the rods 24ª, thread them on beads 27ª thereon, and leave them in a position at the opposite side of the hopper from which the eyes may descend by gravity along the rods which are continued down below the hopper. It will be noticed that the bead 27ª is discontinued for a short distance at the point 28ª. This is to provide a convenient place for removing any eyes that may become stuck together or lodged in any way. A rod 30ª continues on below this space and serves to guide the eyes in proper position astraddle the several rods.

Referring now to Figs. 3, 4 and 4ª it will be seen that the table is provided with upright standards 18 at the top of which is mounted a bar 19 the sides of which are inclined. This bar is provided with slots 20 for receiving projections 21 from the series of inclined feed or guide rods 30ª. The projections 21 are shown as held in the slots 20 by means of screws 23 projecting therefrom, nuts 24 entering the rear of the bar 19 to engage the screws and hold them. The bar is provided with bearing studs 25 and is held in position on the bearings therefor in the uprights 18 by draw-screws 26 or the like. These rods 30ª are intended for the purpose of feeding the eyes or the like from a convenient point to guides 27ᵇ Fig. 5 which are mounted on a bracket 27 on the table. They are shown as partaking of the shape of the bows of the eyes and as curved near their lower ends to enter the guides. In order to hold the feed rods in position on the bracket, each rod is provided with a supporting fin 28 on its under curved side. These fins enter slots 29 in a cross-bar 30. The cross-bar is shown as provided with nuts 31 for engaging tightening screws 32 projecting from the fins in a manner similar to the construction shown in Figs. 4 and 4ª for the tops of the feed rods.

The guides 27ᵇ are so shaped as to hold the eyes in proper position and deliver them in a uniform manner to the top surface of a support 33. They may extend from any point along the feed rods 30ª to the lower ends thereof. Above this support is a pusher 34 having notches 35 in its front surface for receiving the eyes (Fig. 6). This pusher is mounted on a slide 36. The support 33 is also connected with the slide 36, springs 37 and plungers 38 being employed to normally force the support outwardly and to permit it to yield when it strikes an obstruction. The body carrying the support 33 is provided with a slot 39 through which projects a pin 40 carried by the slide 36 to limit the relative motion between the support and the slide. The slide is reciprocated from the counter-shaft 12 by means of a cam 41 on the shaft, this cam operating a roller 42 mounted on an oscillatable collar 43 (Fig. 11). This collar is connected by an arm 44 to a slide moving in a guideway 46 on the table and the slide carries a link 47 connected with the slide 36.

It will be noted that the cam 41 is shown as provided with two internally projecting surfaces 48 and between them are surfaces which permit the roller to move forward a certain distance. It will be seen that the projecting surfaces 48 are arranged in pairs and that the two forward motions of the slide 36, therefore, take place in a somewhat irregular manner. During a single revolution of the shaft 12 the slide is forced forward twice, equal distances each time. It will be seen, also, that on the forward motion of the slide 36, the support 35 will be forced along with the slide and at the same speed until this support meets an obstruction and then it will stop allowing the pusher 34 to push the eye which lies on the surface of the support in front of it beyond the end of the support. When the eye reaches this point, it is taken up by a carrier and then moved along in a manner which will now be described.

Rotating with a shaft 49 is a carrier comprising an even number of projections 50 see Figs. 12 and 13. These projections are shown as being spaced in pairs, the jaws of each pair being oppositely located. Each projection makes an obtuse angle with the next jaw on one side and an acute angle with that on the other. This provides for conveniently feeding two sets of eyes into two different positions on the table. On each of the projections is mounted a jaw 51 which may be removably fixed in place. Behind this jaw is a cavity 52 shown as semicircular, in which is mounted an oscillatable hook shaped element 53. Secured to the surface of a projection in front of the element 53 is a stationary block 54 having a projection 55 fitting in a depression 56 in the side of the hook-shaped element. This construction provides a pivotal support for this oscillatable element as will appear from the several positions of the different parts 53 in Fig. 12, and allows a swinging or oscillating motion. Springs 57 in the block 54 normally force this element 53 to the rear so that a series of flat springs 58 which it

carries are forced away from the corresponding jaws 51. These springs 58 carry a plurality of jaws 59 adapted to move against and rest upon the jaws 51 to grip a plurality of eyes and hold them in position. When the support 33 comes in contact with the jaw 51, the shaft 49 being stationary at this time, as will be explained hereinafter, the pusher 34 moves the eyes in front of it on the upper surface of this jaw and the jaw 59 is closed at this time by mechanism which will be described presently. This grips and holds the eyes as shown at the top of Fig. 12. The shaft 49 then rotates with the carrier 50 and carries the eyes around into such position that they may engage hooks which are fed up to this point. The hooks and eyes then move along together. The operation of the means for moving the jaws 59 will now be described. This means consists in each instance of a shaft 60 which is provided with a flattened surface 61. It will be seen that when the shaft is in such position that the circular part thereof bears on the end of the oscillatable element 53, as appears at the top, to the right, and at the bottom of Fig. 12, the oscillatable element will be swung to such position as effectively to hold the jaws 54 closed, but when the flattened portion 61 is against the end of the oscillatable element, there will be no force to close the jaws and the springs 57 will open them as is shown at the left of Fig. 12.

As in the present instance I have shown four jaws spaced in a manner indicated above, I have also shown four of these shafts similarly spaced. Each shaft has its bearings in the carrier 50 and is provided with an arm 62 on which is a roller 63 or the like. (Fig. 14.) Referring to Figs. 1 and 17, it will be seen that the shaft 49 carries a friction collar 64 having an arm 65 which normally rests on a stationary projection 66 on the table. On this shaft is loosely mounted a cam 67 having a groove for receiving the rollers 63 and manipulating them in the proper manner to secure the motions of the shafts 60 which have been described above, as shown most clearly in Fig. 15.

It is to be observed that the rotary carrier is intended to deposit removable hooks and eyes in two different positions, located side by side. In order to accomplish this result, the projections 50 of the carrier are spaced in the manner specified above so that when one jaw is in position to apply the eyes to hooks on one side, as shown in Fig. 12, the opposite one is ready to receive eyes on the other side and the bottom jaw is in position to deposit hooks and eyes at one of the receiving positions. The carrier is of course stopped at this time. When the carrier moves forward the next step, it will be observed that the arm which is now depositing a hook and eye must move a greater distance to reach the receiving position than it moved when it carried a hook and eye from the position in which they were assembled. Consequently, the jaw which has last applied eyes to the hooks will move a greater distance and will deposit hooks and eyes in a second position for receiving them at the left of that which is receiving the hook and eye in this figure.

In order to turn the shaft 49 and its cam in such a manner as to secure the desired results, I have shown the following mechanism (Figs. 18 and 19.) On the shaft 12 is mounted a cam 68 shown as operating an oscillatable element 69 through a roller 70. A link 71 projects from the element 69 and operates a bell-crank 72 or similar device for transmitting motion through a link 73 to a slide 74. This slide carries a rack 75 which is designed to oscillate a gear 76 fixedly attached to the cam 67. This cam and gear are loose on the shaft and the shaft is ordinarily held from turning with them by pawl connections on a notched disk 77 fixed to the shaft. This disk is provided with two kinds of notches 78 and 79. A pawl 80 which is mounted on the cam 67, enters the notches 78 and transmits the oscillating motion of the gear and cam to the disk and shaft as a step by step rotary motion, a spring 81 acting on the pawl.

In order to lock the shaft 49, a spring-pressed locking pawl 82 is provided, normally entering one of the notches 79 and preventing rotation of the disk. The slide 74 has a cam block 83 which, toward the end of the stroke, engages the pawl 82 to release the disk and permit it to rotate, on the return motion of the slide 74. I have shown a spring-pressed pawl 84 on the other side of the disk adapted to engage the notches 78 as they rotate to prevent backward motion. As the jaws on the carrier are unequal distances apart, the notches on the disk 77 are so spaced as to turn the carrier four steps per revolution, two of the steps being long and two short. The cam 67, of course, moves exactly with the shaft 49 on the return of slide 74 after the pawl 82 is disengaged from the disk 77 and the cam is so constructed as to give such motions to the shafts 60 through the rollers 63 that they grip the jaws 59 on the eyes when it is time to receive the latter from the jaw 33 and hold the jaws closed until it is time to release the eyes, as will appear below.

The feeding of the hooks into position to be engaged by the eyes will now be described. Referring first to Figs. 1[a] and 73 to 101 inclusive, it will be seen that the table 10 carries brackets or uprights 10′ and 11′ which support an inclined frame 12′ carrying a hook-receiving, arranging and feeding de-

vice. The hooks are shoveled into or otherwise supplied indiscriminately to a hopper 13′ having an inclined bottom 14′ which has an opening at the lower end thereof into which projects slightly a drum or cylinder 15′. This cylinder is provided with small pointed projections 16′ on its surface, which during its rotation, engage the hooks so as to carry them with it out of the hopper under a front wall 17′ in a substantially continuous downward path without materially lifting them in the hopper. This front wall preferably comprises a series of resilient metallic strips which are adapted to yield slightly to permit the hooks to be forced out, but which extend near enough to the cylinder to prevent the hooks being discharged except when carried thereby. This wall is fixed to a cross bar 18′ in any desired way as for example, by means of screws. The hooks discharged from the cylinder drop into the top of a chute 20′ located below it. This chute is provided with an inclined bottom 21′ having a series of corrugations or wavy irregularities 22′ beginning at the upper end in slight curves and gradually increasing toward the center of the chute for the purpose of turning the hooks as they descend along the same by gravity to turn most of them on their backs in such position that their bills are on top. The lower one of these corrugations curves gradually into the lower straight part, of the inclined bottom 21′. From the upper end of this straight part, inclined sides 23′ extend upwardly and gradually converge so as to provide a narrowing passage 24′. On account of the nature of the manner in which the hooks pass over the irregular part 22′ of the bottom of the chute, they will generally be arranged with their bills up when they enter the narrowing passage 24′ between the inclined walls 23′ which will bring them mostly into longitudinal alinement and consequently they will drop from the lower end of this chute on the top of an inclined chute 26′ in alinement but some of them will have their bills forward and some will be located in the opposite position. This chute is provided with a depressed passage way 27′ having a ledge 28′ rising gradually on either side thereof. Most of the hooks are fed into this chute in such position that the shoulders will ride along down the ledges 28′ and the bills will swing down into the depressed passage way. As the angle between the bottom of the passage-way and the top of the ledge 28′ increases during the descent of the hooks, it will be seen that the hooks are gradually brought to an inclined position, supported as they are by their shoulders, with their bills hanging down, some of them extending forward and some backward. At the lower end of this chute the bottom is cut away at the point 29′ so as to permit the bills to project down through and hang vertically. It will be noticed that the passage-way 27′ and the distance between the ledges 28′ gradually narrows from the upper end of the chute to the lower end so as to bring the hooks in alinement at the lower end. If any of the hooks enter this chute in such position that the two shoulders will not engage the ledges 28′ they will descend through the passage 29′ and drop out into the frame 12′ below, which has an inclined bottom so as to receive any hooks dropped from any part of the device above, and deliver them into a receptacle from which they may be returned to the hopper. This chute 26′ is supported on brackets 31′ mounted on the frame 12′. In order to provide for discharging the hooks from this chute in case of any clogging of the same by a too rapid feed of the hooks or for any other reason, each of these chutes is constructed in the form of a pair of jaws 32′ and 33′.

The jaw 32′ is fixed on the brackets but the jaw 33′ is mounted on swinging arms 34′ pivoted on studs 35′. Springs 36′ are provided for normally holding the arms up in such position as to close the chute and permit it to work in a normal manner. When it is desired to open any one of the chutes, however, it is merely necessary to touch a plate 37′ with which each of the movable jaws is provided to swing the jaw back, as indicated in Fig. 87 and permit the hooks to drop out into the bottom of the frame 12′. When this is done, it is desirable to provide means for preventing hooks descending into this chute from the chute above and for this purpose each of the chutes is provided with a gate 40′ at the head end thereof. This gate is mounted to swing on a stud 41′ and is operated by the movement of the swinging jaw. For this purpose a link 42′ is pivotally connected with the upper arm 34′ and with an arm 43′ projecting from the gate. When the jaw 33′ is swung outwardly, the link 42′ is pulled by the arm 34′ so as to swing the gate upwardly, as indicated in Fig. 87. The hooks being now in vertical position as indicated above, descend through the end of the chute 26 into a raceway 45′ which comprises a series of channels 46′ which converge throughout part of their length and at the end of each of which the hooks bring up against the end of a sliding stop 47′. This stop is provided with a series of projections 48′ each adapted to engage the front hook in one channel and each adapted to support the lower end of a hook on its upper surface. In front of these projections and spaced therefrom are higher projections 49′ adapted to engage the front surfaces of the hooks when the latter are held on the top of the projections 48′ until the sliding stop

is withdrawn to a position a little below that shown in Fig. 91. At this time the top surfaces of the projections 48′ are even with the bottom of the race-way 45′ and consequently the hooks are fed by gravity along the race-way until the first hook rests on the top of the projection 48′, its further progress downward being arrested by the higher projection 49′. A bar 50′, which is preferably stationary, extends across the top of the race-way so that when one of the hooks is in position on the top of the projection 48′ and the sliding stop 47′ is forced upwardly, the top of said hook which is now resting on the sliding stop will be projected into a slot 52′ in the cross bar 50′. Then when the sliding stop is withdrawn to bring the projection 49′ below the lower surface of a guide-way 53′ the lower side of the hook slides downwardly over the projection 49′ and into the guide-way 53′ without being interfered with by the sliding stop or the hooks behind. The sliding stop 47′ is operated by means of a cam shaft 60′ having a cam 61′ on each end thereof. These cams operate a pair of arms 62′ pivoted to the frame and having springs 63′ to oppose the cams. Each of these arms has a slot 64′ connected with the sliding stop 47′ by a pin 65′. It may be stated at this point that the shaft 60′ may be operated in any desired way but is shown as being turned by a belt 66′ upon a pulley on the shaft 67′ on which the drum 15′ is mounted, this shaft having a driving pulley 68′. It may also be stated that the shaft 60′ is shown as having a pulley 69′ driving a belt 70′ which operates the driving pulley 17ª, above described, for the eye feeder.

Although only one of the courses for the passage of the hooks has been described, it will be understood that the machine is preferably constructed with a plurality of such courses, twelve being shown in the drawings. When a hook in each course is discharged from the race-ways 45′, as above described, it is left standing in vertical position in an inclined race-way 53′. This permits the hook to descend into a vertical passage which is made up of two guide-pieces 72′ and 73′ located adjacent to each other to form the back side of the guide-way and having a passage 74′ down which the bill of the hook may fall when the hook enters the top of the guide-way in proper position therefor. In this case, the back of the hook and its shoulders fall straight down through a guide-way 75′. If, however, the hook is presented in the opposite direction with its bill forward, one of these shoulders will engage a curved and slanting surface 76′ on the piece 72′ and be guided between that and a correspondingly-shaped curved surface 77′ on the other guide piece to turn the hook half way around and cause its bill to be presented at the back when it reaches the bottom of the guide-way. This series of vertical guide-ways which constitute devices for turning the hooks around so as to locate their bills all in the same direction, are provided with a front plate 78′ which is preferably of glass as indicated in the drawings so that the attendant may see how the hooks are dropping through it. It has notches 78ᵇ opposite the passages 74′ to permit the hooks to be turned. This glass plate 78′ upon which bears screws 80′ is adapted to be adjusted to regulate the pressure of the springs on the glass plate. If the attendant observes that the guides behind this plate are clogged up, it is a very simple matter to touch the top of the plate and thus release the hooks and clear the guide-ways.

Referring now to Figs. 20 to 25, it will be seen that an inclined race-way 86 is provided for receiving the hooks from these vertical guides. This race-way is preferably divided into a plurality of sections or channels, each one adapted to receive a series of hooks, the number of sections being equal to the number of hook guide-ways described above. The hooks are dropped from the vertical guide into the sections of the race-way with their hook ends down and their bills at the front and are fed down by gravity until they reach a sliding stop 87. This stop is provided with a series of projections 88 each adapted to engage the front of one of the hooks and each adapted to support the lower end of a hook on its upper surface. In front of these projections and spaced therefrom are higher projections 89 adapted to engage the front surfaces of the hooks when the latter are held on the top of the projections 88, as shown in Fig. 20, until the sliding stop is withdrawn, as shown in Fig. 23. At this time the top surfaces of the projections 88 are even with the bottom of the race-way 86 and consequently, the hooks are fed by gravity along the race-way until the first series of hooks rest on the tops of the projections 88, their further progress downward being arrested by the higher projections 89.

A stationary bar 90 extends across the top of the race-way so that when one of the hooks is in the position shown at the lower side of Fig. 23, the sliding stop 87 is forced upwardly which projects the tops of the bottom series of hooks which are now resting on the sliding stop, into a slot 92 in the cross-bar 90, as is shown in Fig. 20. Then when the sliding stop is withdrawn to bring the projections 89 below the lower surface of guide-ways 93, the lower side of each hook slides downwardly over the projection 89 and into the guide-ways 93 without being interfered with by the sliding stop or the hooks behind. At the bottom of the guide-ways 93 they enter vertical portions 94 thereof. This vertical portion is provided

with a plate 95 which has slots 96 to permit the hook ends of the hooks to project to the front and retain the eye ends in the vertical portion of the guide-way. The hooks then rest on projecting pins 97 at the bottom of the guide-ways. These pins are provided with slanting surfaces 98 for receiving the hooks and on account of the plate 95, hold the hooks in position with their hook ends projecting beyond the surface of the plate 95.

The sliding stop 87 is manipulated by a roller 99 on the slide 74. This roller, as is shown in Fig. 27, in its reciprocating motion, engages cam surfaces 100 on a block 101 mounted on a shaft 102 and as the cam surfaces are separated some distance from each other, the shaft 102 is kept in one position during a considerable portion of the stroke of the slide 74 and at each end of the stroke the shaft is turned. This turning of the shaft is transmitted through a lever 103 to the slide 87. The shaft 102 is also provided with a gear segment 104 (Fig. 26) which meshes with a similar oscillatable gear segment 105 carrying an arm 106. This arm engages notches 107 in the pins 97 and operates the latter. When a projection 50, carrying the eyes, moves into the position shown at the right in Fig. 12, the eyes engage the hooks and are held thereon by the humps on the hooks or by other equivalent means with which the hooks may be provided. At this time the pins 97 are withdrawn allowing the hooks to descend along the incline 108 with the eyes. When the hooks and eyes reach the bottom of this incline, they are in position to be deposited on movable pins 109 constituting a part of a transfer device and at this time the shaft 60 associated with this jaw turns to such a point that the surface 61 allows the jaw 59 to recede and the hooks and eyes are deposited on the transfer device.

It is to be noted that the table is provided with two sets of openings 110 through which pins for receiving the hooks and eyes may project. This is provided in order that a pair of alternately operating transfer devices may be used so that two sets of hooks and eyes may be delivered to one card for attachment thereto. It is for the same reason that the jaws are mounted on the carrier 50 in the manner described above. Referring to Figs. 28 to 33, it will be seen that each portion of the transfer device comprises a vertically sliding member 111 on which are mounted the pins 109. This member carries rolls 112 engaged by pivoted bell-cranks 113. These bell-cranks have slots 114 for receiving the rolls and projections 115 entering slots or cavities 116 in a sliding bar 117. During the first part of the motion of this bar the sliding member 111, carrying with it the pins 109, will be raised and when the bar strikes an adjustable stop 118, the whole transfer device on which these members are mounted will be moved forward. This transfer device comprises a frame 119 with which is connected a friction rod 120. This rod passes through a bearing in plate 121 on the table in which bearing is a friction device 122 shown in Fig. 34. The transfer device carries a pusher 123, and the sliding member 111 carries a pusher $123^a$. The former is fixed to the transfer device and has a projection of sufficient height above the table to move over the pins of the other transfer device. It is designed to push the other rack while the pusher $123^a$ pushes the rack directly in front of it. The pusher $123^a$ moves up and down with the pins 109, being mounted fixedly with respect to them.

The transfer devices are operated in the following manner: The shaft 12 is provided near its outer end with a cam 124 operating an oscillating arm 125 connected with a slide 126 which, through a link 127, operates a double ended lever 128. Each end of this lever is connected with an adjustable link 129. The links 129 are pivotally connected with levers 130 pivoted at their outer ends to the table and their inner ends connected with studs 131 on the transfer devices. The parts may be guided in any desired way as by dove-tails 132 sliding in guides 133 on the table. The transfer devices with their pins projecting and carrying the hooks and eyes are moved forward alternately to a rack-holder shown in Figs. 35, 36 and 37. This rack-holder consists of a vertically sliding plunger 134 movable in guides $134^a$ and having a vertical passage 135 provided with a mouth 136 into which a series of racks 137 may be introduced. These racks, as shown in Figs. 39, 40 and 41, are provided with lower surfaces having cavities 138 therein for receiving the hooks and eyes and holding them in position.

On one side of each rack are slots 139 and on top a series of teeth 140. On account of the slots 139 and corresponding projections $139^a$ on the holder, these racks are necessarily fed into the opening 136 in proper position with their teeth on top, and descend through the passage 135 until they rest on a sliding carrier 141. After the hooks and eyes are transferred to a position under the rack holder, a rack is dropped on them and the pins of the transfer device are dropped down in the manner specified above, leaving the hooks and eyes in the cavities 138 of the lower surface of the bottom rack. The manner in which the racks are dropped on the hooks and eyes will now be described. The sliding carrier 141 is reciprocated by means of a cam 142 on the shaft 12, an oscillating arm 143, a lever 144, and a link 145. In order to drop a rack first on one series of pins and then on the other, the top surface of the sliding carrier

141 forms ledges in the passage 135, for supporting the racks, each being provided with slots 141ª through which the racks may fall. At the bottom of the passage 135, is a ledge 135ª for supporting a rack when it passes through the slots 141ª and until the slide moves to the edge of the ledge 135ª. When a rack is in position upon this ledge, the holder 134 is raised in its guide-ways 134ª by means of a lever 147 operated by a cam 148 on the shaft 12. This permits the carrier 141 to move to the right or left and carry the bottom rack off the ledge 135ª so as to drop it through a passage 146ª on the hooks and eyes. This operation is then repeated, the member 141 moving the other away, so that two racks are deposited in position. The plunger on its downward motion forces both racks on the hooks and eyes and holds them while the pins 109 are dropped and the racks are being started. The pusher 123 or 123ª making its next stroke forward, moves forward the racks into a position on a card which has previously been placed in front of the transfer device in a manner that will now be described, reference being had to Figs. 43 to 50. On the shaft 12 is a cam 149 operating an oscillating arm 150 which in turn operates a bell-crank 151, a link 152 and a slide 153. This slide carries a pair of pivoted pawls 154 pressed upwardly to the rear by springs 155 and it also carries a pair of separating knives 156. Mounted in a stationary position above the path of the slide 153 is a receptacle 157 at the end of which is a rest 158. A pack of cards 159 rests in this receptacle supported by the rest 158 on one side and by the forward ends of the pawls 154 on the other. At the rear of the receptacle 157 are a pair of lugs 160 for engaging the rear ends of the pawls 154 and holding them up in a certain position on the slide. As the slide moves forward from its rearmost position, the ends of the pawls 154 come out from under the lugs 160 and the springs 155 push the rear ends of the pawls upwardly allowing the forward ends thereof, on which rests the bottom card, to drop. Previous to this, however, the knives 156 have separated the bottom card from those above and the main pack is supported by these knives, and by lugs 156ª. The bottom card, therefore, drops down at the rear on the slide 153 while the remainder of the pack rests on the knives 156. It is then pushed forward against a stop 161 by the continuing forward motion of the sliding member 153. On the reverse motion of the sliding member 153, the card drops to the table. It will be noticed that the card is pushed over the top of the rest 158, as is indicated in Fig. 49. Located above the rest 158 is an adjustable piece 163 which regulates the height of the space through which the card is carried from the card receiver. The card is received in a depressed section 162 of the table and is pushed forward by the next forward movement of the sliding member 153. The card then being in proper position with its edge under a projecting plate 162ª for receiving the hooks and eyes is held firmly in the depression 162 in the table while the two racks carrying two sets of hooks and eyes on their under surfaces are moved on top of the card. The card is held in this position by a pin 165 which bears upon its upper surface. (See Figs. 51 to 56.) This pin is normally pressed up by a spring 166 and is forced down by a pivoted lever 167 which in turn is borne upon and forced down by an arm 168 on a shaft 169. This shaft carries another arm 170 which rides upon a cam 171 on a shaft 172. This cam is adjustably mounted on the shaft and is therefore provided with a slot 173 and screw 174.

The racks are moved forward in a manner described above, along guides 175 pressed down by the spring 166. In this motion of the racks their teeth on the back are brought into engagement with gears 176 which are mounted on a shaft 177 and operated through a gear 178 thereon and a gear 179 on the shaft 172. The shaft 172 is operated by a cam 180 on the shaft 12. This cam operates a roll 181 on a lever 182. This lever carries a rack 183 meshing with a pinion 184 on the shaft 172. Through slots in the table project feeding rollers 185 which are mounted on the shaft 172. These rollers engage the under side of the card and help feed it forward with the racks. These rolls are adjustable about the shaft 172 and each is provided with a flat surface 186 to permit the cards to be pushed over the rolls. The rolls are so adjusted that the advancing edge at the rear of the flat surface will engage the card when the racks start. When the cards are placed in position, the gears 176 and feed rollers 185 feed them forward with the racks and hooks and eyes. The racks during this motion engage the rear ends of the racks on the next forward card and push the same forward ahead of them. The rear card then comes into the position in which the first stitch is taken under gears 187 which, at this time have no part in feeding them forward, because the gears 176 rotate a little faster than the gears 187 and have full control of the racks as long as they are in engagement with them.

The conventionally illustrated sewing device 188 as shown in Fig. 63 is provided with four needles 189 adapted to sew on the two sides of each rack so as to produce a card such as that indicated in Fig. 64. The feeding of the cards and racks through this part of the machine after the racks pass out of control of the gears 176 is facilitated by

rollers 190 underneath the table and projecting through it to engage the under sides of the cards. After passing through the sewing device, the racks engage gears 191 and are fed forward out of the machine. As the hooks and eyes are now secured to the cards, these gears, do not need rollers underneath the table similar to the rollers 190.

In the sewing of hooks and eyes on certain kinds of cards, three different lengths of stitches are required. At each end of the card a short stitch is needed to span a single wire, while between these short stitches two different length stitches are required; first a short one to cover two wires which are close together, being situated in the same hook and eye, and next a long one to cover two wires on two different hooks and eyes, these wires being separated a greater distance from each other. In order to provide for sewing the cards in this manner, they are fed forward varying distances in accordance with the lengths of the stitches required. The first short stitch and the long one between the cards is secured by the action of the gear 176. The long and short stitches intermediate the ends of the cards are formed by the use of a feed mechanism which I will now describe.

The main driving shaft 15 extends across the machine and on the right end thereof is an eccentric 192 operating an adjusting link 193 and sliding rod 194. Pivoted on this rod is a bell-crank 195 or similar oscillating member, connected at one end with a ratchet-wheel 196 which is provided with an even number of teeth. For sewing twelve hooks and eyes at a time, for example, it is provided with ten teeth. As shown in Figs. 58 and 62, this ratchet-wheel is rigidly connected with a rotatable cam 197 having an odd number of flat surfaces 198 and the same number of alternate rounded surfaces 199, the rounded surfaces connecting the flat surfaces and being farther from the center of the cam. The total number of flat and round surfaces is equal to the number of teeth on the ratchet-wheel 196. As there are five flat and five rounded surfaces in the present instance so there will be an odd number of each in any case. It will be seen therefore, that if a pair of rollers 200 located on the member 195 be employed and these two rollers be located opposite each other with respect to the center of the cam 197, one engaging a rounded surface and the other a flat surface, the turning of this cam will result in first moving the two rollers 200 in one direction and then in the other direction. This results in an adjustment of the member 195, it being understood that the ratchet-wheel 196 and its attached ten-sided cam are mounted on a stud 221 on the sliding rod 194. In order to rotate the cam 197 one step for each reciprocation of the rod 194 so as to adjust the bell-crank 195 up and down alternately, the rod is provided with a spring-pressed pawl 201 to prevent the ratchet-wheel from rotating in the wrong direction. The operating pawl 202 is mounted on a stationary stud 222 to engage the teeth of the ratchet-wheel so as to rotate the same one step for each reciprocation of the rod.

The bell-crank 195 is provided with means for turning the gears 187 and 191 and the corresponding card-feeding wheels so as to feed the cards forward. Mechanism is provided whereby the feeding will vary in accordance with the position of the bell-crank as controlled by the rollers 200 and the ten-sided cam 197. For this purpose two springs $203^a$ press pawls 203 and 204 mounted on the bell-crank 195. These pawls engage respectively ratchet-wheels 205 and 206 which are mounted on shafts $205^a$ and $206^a$ on which are mounted gear wheels 207 and 208. These gear wheels mesh with gears 209 and 210 on shafts 211 and 212 respectively. The gears 187 are located directly on the shaft 211 while the gears 191 are located on the shaft 212. These shafts are provided with friction members 213, comprising bars having jaws adapted to be tightened on the shafts to increase the friction. It will be seen that the reciprocation of the rod 194 will result in the rotation of the gears 187 and 191 simultaneously and the corresponding feeding forward of the cards and racks, and also that the position of the bell-crank 195, as controlled by the member 197 in the manner described above, regulates the initial position, and consequently the total travel of the pawls 203 and 204 and the amount by which the cards are fed forward. Consequently, as this feed is a step by step one and as the amount of rotation of the gears is changed so that long and short steps will be provided alternately, it will be seen that the long and short stitches mentioned above are produced. In order to provide for making the short stitches at the end of the card, these stitches being shorter than either of the other two formed in the manner described above, the following mechanism is provided. On the cam-wheel 180 is a lug 214 which once during each revolution, engages an arm 215 on a rod 216. This rod carries a winged cam 217 which engages projections 218 and 219 on the pawls 204 and 203, respectively. The operation of the arm 215 is merely to turn the rod 216 which turns the winged cam and forces both pawls out of engagement with their respective ratchet-wheels but on the pawl 204 is pivotally mounted a second spring-pressed pawl 220. This is not affected by the position of the pawl 204 and constantly engages the teeth of the ratchet-wheel 206. Consequently, when the mechanism

just described operates, this pawl which is located at a certain distance behind the pawl 204, will engage the teeth of the wheel and ratchet it forward a shorter distance than the pawl 204 would have done, thus providing for a short stitch at the end of the completed card. The card is now completed and the last operation is to feed it from the machine which is done by the gears 191. The sewing is done in a continuous manner so a long stitch is made at the end of the card to bring the needle to the next card. The length of this stitch depends on the length of the rack used, and is made by the rack at the rear pushing the front rack out of the machine. The card with the hooks and eyes sewed upon it and the racks resting upon them is left on the table at the end of the machine to be removed by hand or otherwise. The racks may then be returned to the rack-holder which, as has been seen, is of sufficient height to hold several of them and the operations are proceeded with constantly and automatically.

While I have illustrated and described my invention as applied particularly to the sewing of hooks and eyes on cards and while I have illustrated a particular form in which the invention may conveniently be embodied, it is to be understood that the invention is not limited to its use for sewing these particular articles, and that many modifications in the mechanism may be made by any person skilled in the art without departing from the scope of the invention as expressed in the claims.

Having thus fully described my invention, what I claim and desire to secure by Letters-Patent is:—

1. In a machine for assembling hooks and eyes, the combination of means for feeding hooks in the direction of their longest dimension, a carrier having means for positively gripping eyes and holding them projecting therefrom in a plane transverse to its direction of motion, and means for moving said carrier to move the eyes laterally toward the hooks and bring the eyes into engagement with the hooks.

2. In a machine of the character described, the combination of means for carrying an eye in a direction transverse to its plane, means for carrying a hook into the path of travel of the said eye with the hook portion thereof extending backwardly with respect to the direction of motion of the eyes, movable means for arresting the movement of the said hook and holding it in the path of travel of said eye until it is engaged by the latter and carried forward therewith, and means for withdrawing said movable means.

3. In a machine for assembling hooks and eyes, the combination of means for carrying one of said articles, means for guiding the other of said articles in a plane into a position to project into the path of travel of the first named article, movable means adapted to project into the path of travel of the second article for arresting its movement and holding it in position to be engaged by the first named article, and means for then moving said holding means from said path whereby said second article will be released and carried along in the same direction with the first named article during the remainder of the travel thereof.

4. In a machine for applying hooks and eyes to cards and the like, the combination of a rotary carrier, means for feeding eyes to the carrier, means for feeding hooks into a position adjacent to the carrier with their bills projecting toward it and extending rearwardly with respect to the direction of motion of the carrier, and means for moving the carrier with the eyes projecting radially therefrom to bring the eyes into engagement with the hooks, and to apply the eyes to the hooks.

5. In a machine for assembling hooks and eyes, the combination of a movable carrier, means for receiving and transferring the eyes thereto by gravity, a movable member located in position to receive eyes from said carrier, and a guide for keeping the eyes in a certain position while being transferred to said movable carrier.

6. In a machine for assembling hooks and eyes, the combination of a series of adjacent rods for receiving and transferring eyes, a movable member located adjacent to one end of said rods upon which the eyes are deposited from the rods, a guide for keeping the eyes in a certain position while being conveyed to said member, and means for transferring the eyes from said movable member and engaging them with hooks.

7. In a machine for assembling hooks and eyes, the combination of a series of adjacent inclined rods for receiving and transferring eyes, a movable support located at the bottom of said rods upon which the eyes are deposited from the rods, a guide for keeping the eyes in a certain position while being conveyed to said support, and a movable carrier for transferring the eyes from said movable member and engaging them with hooks.

8. In a machine of the character described, the combination of a rotary hollow hopper for receiving eyes, a series of feed rods extending around said hopper and adapted to receive eyes therefrom, said rods being inclined downwardly from the hopper, and an inclined movable support located at the bottom of said feed rods for receiving the eyes therefrom.

9. In a machine of the class described, the combination of a series of adjacent rods for feeding eyes, and a guide for each rod,

said guides partaking of the shape of the bow of the eye and extending along the rods independent thereof, the rods extending into the guides.

10. In a machine of the class described, the combination of a series of inclined rods for feeding eyes, a guide for said eyes, a movable support located at the bottom of said guiding rods for receiving the eyes, and a pusher adapted to push the eyes from the support after they are deposited thereon.

11. In a device for assembling hooks and eyes, the combination of means for directing an eye to a certain point, a movable support, located in position to receive the eye from said means, and adapted to advance with the eye thereon and means for engaging the eye when located on said support and moving it along the surface thereof.

12. In a device for assembling hooks and eyes, the combination of a guide for directing an eye to a certain point, a movable support located below said guide, and a relatively movable member supported on the said movable support for receiving said eye and moving it relatively to the support.

13. In a device for assembling hooks and eyes, the combination of a guide for directing a series of eyes to certain points, a movable support located below said guide, a receiving member for receiving said eyes, the said receiving member being supported on said support, the said receiving member being movable, and means for occasioning movement of the said receiving member with and independently of the said support.

14. In a device for assembling hooks and eyes, the combination of a guide for directing a series of eyes to a certain point, a slide located below said guide, a support movably mounted with respect to said slide and projecting beyond the end thereof into a position beneath said guide, and resilient means for normally forcing said support along the slide.

15. In a device for assembling hooks and eyes, the combination of a movable slide having a pusher thereon, a support yieldingly mounted on the slide and having a surface for supporting eyes located below said pusher, and means for guiding eyes into position on the support.

16. In a device for assembling hooks and eyes, the combination of a guide for directing a series of eyes to a certain point, a slide located below said guide, a support movably mounted on said slide and projecting beyond the end thereof into a position beneath said guide, resilient means for normally forcing said support forward on the slide, and a pusher mounted on said slide and movable along the surface of said support, whereby when the support meets an obstruction, it will yield and permit the pusher to slide along its surface and force the eyes therefrom.

17. In a device for assembling hooks and eyes, the combination of a slide, a movable support projecting beyond the slide, resilient means for normally forcing said support forward on the slide, a pusher mounted on said slide and movable along the surface of said support, whereby when the support meets an obstruction it will yield and permit the pusher to slide along its surface and force the eyes therefrom, and a carrier having jaws for gripping said eyes, said jaws being movable into a position in the path of said support.

18. In a device for assembling hooks and eyes, the combination of means for directing an eye to a certain point, a support located in position to receive the eye from said means, means for engaging the eye when supported by said support and moving it along the surface thereof, and a carrier having jaws adapted to move into position adjacent to the support and having means for closing its jaws on the eye when in that position.

19. In a device for assembling hooks and eyes, the combination of means for directing an eye to a certain point, a movable support located in position to receive the eye from said means, and means for engaging the eye when supported by said support and advancing it along the surface thereof into position to be removed therefrom.

20. In a machine for assembling hooks and eyes, the combination of movable means for receiving and supporting an eye, movable means adapted to move into the path of the first named means and arrest its movement, means for transferring the eye from the first to the second named means, and means for securing the said eye to the second named means.

21. In a machine for assembling hooks and eyes, the combination of a guide for a plurality of eyes, a movable support on which said eyes are deposited by the guide, means for yieldingly forcing said support forward, a carrier having a jaw adapted to move into the path of the support to arrest the motion thereof, a pusher mounted on the surface of the support, and means for positively forcing said pusher forward when the motion of the support is arrested to advance an eye from the support to the carrier.

22. In a machine for assembling hooks and eyes, the combination of a movable support adapted to receive eyes, a carrier having a jaw adapted to move into the path of the support and arrest the motion thereof, means for forcing the eyes from the support to the jaw when they are in contact, and means for clamping the eyes on the jaw.

23. A machine for assembling hooks and eyes, comprising a movable carrier having a

pair of jaws one fixed thereon and the other movable thereon in the direction in which the carrier moves, an oscillating member mounted on the carrier and supporting said movable jaw, means mounted on the carrier for moving said oscillating member to open the jaw, and positive means for moving it to close the jaw.

24. A machine for assembling hooks and eyes, comprising a rotary carrier having a plurality of jaws, each jaw comprising a movable member, an oscillatable member by which said movable member is supported, means for moving said movable member into an open position, and means for closing it.

25. In a machine for assembling hooks and eyes, and similar articles, the combination of a rotary carrier, and means for delivering eyes thereto, said carrier being provided with an even number of jaws arranged in pairs on the carrier, each pair of jaws being located nearer to the pair of jaws on one side than to the pair of jaws on the other.

26. A machine for assembling hooks and eyes having a rotary carrier provided with four pairs of jaws, each pair making an acute angle with the next pair of jaws on one side and an obtuse angle with the next pair on the other side.

27. A machine for assembling hooks and eyes comprising a rotary carrier having a plurality of jaws, each jaw being provided with a movable member, an oscillatable member by which said movable member is supported, a spring for normally forcing said movable member into an open position, and positive means for closing it.

28. A machine for assembling hooks and eyes comprising a rotary carrier provided with a plurality of jaws each jaw having a movable member, an oscillatable member supporting said movable member, means for pivotally mounting said oscillatable member, and a shaft having a cut away portion and a certain portion for engaging the oscillatable member to swing it and the jaw thereon, the cut away portion of the shaft permitting the jaw to open when in contact with the oscillatable member.

29. In a machine for assembling hooks and eyes, the combination of a carrier having movable jaws thereon, a shaft for operating each jaw, said shafts each having a flattened portion, a shaft on which the carrier is mounted, a cam rotatably mounted on the last named shaft and having connections with the first named shafts to operate them, and means for turning said cam.

30. In a machine for assembling hooks and eyes, the combination of a carrier, a shaft upon which said carrier is mounted means on the carrier for holding one of the members of a hook and eye, means for rotating the shaft and carrier, and means for periodically locking the shaft and carrier against rotation.

31. In a machine for assembling hooks and eyes, the combination of a carrier, a rotatable shaft upon which said carrier is mounted, holding means on the said carrier for holding one of the members of a hook and eye, means for operating the said holding means, means for locking said shaft in stationary position, means for rotating said shaft, and means connecting with the rotating means for unlocking said locking means.

32. In a machine for assembling hooks and eyes, the combination of a rotary carrier, a shaft upon which said carrier is mounted, jaws on said carrier, a cam rotatably mounted on said shaft for operating said jaws, a disk fixedly mounted on said shaft, means for locking said disk in stationary position, means for rotating said shaft, and means connected with the rotating means for unlocking said disk.

33. In a machine for assembling hooks and eyes the combination of a shaft, an eye carrier connected therewith a gear rotatably mounted thereon, a slide having a rack engaging said gear, means for reciprocating said slide, a locking device on said shaft for preventing the rotation thereof, and means on said slide for unlocking said device.

34. In a machine for assembling hooks and eyes, the combination of a shaft, an eye carrier connected therewith a slide, means on the slide for oscillating the shaft, means for reciprocating said slide, a locking device on the shaft for preventing the rotation thereof, and means on the slide for unlocking the locking device.

35. In a machine for assembling hooks and eyes, the combination of a shaft, an eye carrier fixed thereto, a notched disk fixed to said shaft, a locking pawl mounted in position to engage notches in said disk to lock it in certain positions, a slide for rotating said shaft, and means connected with said slide for unlocking said disk and permitting the shaft to be rotated.

36. In a machine for assembling hooks and eyes, the combination of a shaft, an eye carrier thereon having four jaws arranged in pairs, each pair having a movable member, and means for opening the movable member of one pair when in a certain position and for closing said movable member and keeping it closed during the greater portion of the revolution of the carrier.

37. In a machine for assembling hooks and eyes, the combination of a rotary carrier therefor having four movable jaws, a shaft having a flat side for operating each of said jaws, said shafts being mounted on said carrier, each shaft being provided with a

crank, a roll on each crank, a cam rotatably mounted on said shaft, said cam having a groove for receiving all of said rolls, and means for rotating said cam on the shaft.

38. In a machine for assembling hooks and eyes, the combination of a movable carrier provided with a plurality of jaws for gripping eyes with their bow portion projecting, and a guide-way for delivering hooks adjacent to the path of motion of said jaws and holding them with the hook portions toward the jaws said guideway being shaped to receive the bow portion of the eyes, whereby, during the movement of the carrier, the eyes will be threaded on said hooks.

39. In a machine for assembling hooks and eyes, the combination of a rotary carrier having jaws for gripping eyes, means for delivering hooks into a position adjacent to the path of said jaws to engage the eye portions, movable supports for said hooks, and means for withdrawing said supports when the eyes are threaded on the hooks.

40. In a machine for assembling hooks and eyes, the combination of a carrier having jaws for gripping eyes, means for delivering hooks into a position adjacent to the path of said jaws to engage the eyes, movable supports for said hooks, means for withdrawing said supports when the eyes are engaged with the hooks, and a guideway along which the hooks are carried by the eyes gripped by said carrier.

41. In a machine for assembling hooks and eyes, the combination of a carrier having jaws for gripping eyes, means for delivering hooks into position adjacent to the path of said jaws to engage the eyes, movable supports for said hooks, means for withdrawing said supports when the eyes are threaded on the hooks, an inclined guideway along which the hooks are carried by said carrier, and means for releasing the eyes from the carrier when they reach the bottom of said guide-way.

42. In a machine for assembling hooks and eyes, the combination of a rotary carrier for eyes adapted to hold them with the loop projecting, means for feeding hooks in substantially vertical position with the hook portion projecting toward said carrier, means for supporting the hooks in said position until the loops of the eye engage the hooks, means for withdrawing the supporting means, a guide-way along which the hooks are moved by the carrier, means for releasing the eyes from the carrier, and means for receiving the hooks and eyes when the latter are released.

43. In a machine for assembling hooks and eyes, the combination of an inclined frame, a hopper thereon for receiving hooks, a cylinder for assisting in withdrawing said hooks from the hopper, a shaft on which the cylinder is located, means for rotating the shaft, a guide for receiving eyes, a hollow hopper for receiving eyes from the eye receiving guide, means for discharging the eyes from the hollow hopper and feeding them forward, and means connected with said shaft for rotating the hopper.

44. The combination of a carrier, means for assembling a plural number of articles thereon, and a transfer device comprising pins for receiving the articles, the assembling means having means for depositing the articles on the transfer device.

45. The combination of means for assembling two part articles, a reciprocating transfer device comprising pins for receiving the assembled articles, means for feeding the transfer device forward, and means for withdrawing the pins from the articles.

46. In a machine for assembling hooks and eyes, the combination of a device for carrying eyes, means for retaining the hooks in a position to be engaged by the eyes during the travel of said device, means for releasing the eyes from said device thereafter, a transfer device upon which said hooks and eyes are deposited, means for feeding said transfer device away from the device for carrying the eyes and means for thereafter withdrawing the transfer device from the hooks and eyes.

47. In a device for assembling hooks and eyes, the combination of means for supporting hooks in a stationary position, means for carrying eyes into contact with said hooks, means for releasing the hooks whereby the hooks and eyes are transferred by the eye-carrying device and means for causing said eye-carrying device to deliver the eyes in two positions alternately.

48. In a machine of the class described, the combination of means for simultaneously assembling a plurality of hooks and eyes, with means for thereafter actuating said means to deposit them in two positions, alternately, and means for thereafter moving them away from each of said two positions.

49. In a machine of the character described, the combination of means for assembling hooks and eyes, and for thereafter depositing them in two positions alternately, and a pair of transfer devices each adapted to move the assembled hooks and eyes from one of said positions.

50. A machine for assembling hooks and eyes comprising a rotary carrier having jaws mounted in pairs, the jaws of each pair being on opposite sides of the carrier and each jaw being at a different distance from the next jaw on one side than from the next jaw on the other side, and a pair of transfer devices located in position to move under said carrier side by side.

51. In a device for assembling hooks and

eyes, the combination of means for supporting hooks in a stationary position, means for carrying eyes into contact with said hooks, means for releasing the hooks whereby the hooks and eyes are transferred by the eye-carrying device, means for carrying said eye-carrying device to deliver the eyes in two positions alternately, and a pair of transfer devices adapted to feed the hooks and eyes from each of said positions.

52. In a device for assembling and transferring hooks and eyes, the combination of means for carrying hooks and eyes, means for carrying said carrying device to deliver the hooks and eyes in two positions alternately, a pair of transfer devices adapted to feed the hooks and eyes from each of said positions, and means for operating said transfer devices alternately.

53. In a machine for assembling and transferring hooks and eyes, the combination of means for supporting hooks, means for applying eyes thereto, means for depositing the assembled hooks and eyes in two series, a pair of transfer devices for receiving said hooks and eyes, and means for alternately operating said transfer devices to move the hooks and eyes into another position.

54. In a machine for assembling and transferring hooks and eyes, the combination of means for depositing assembled hooks and eyes in two series, a pair of transfer devices for receiving said hooks and eyes, and means for alternately operating said transfer devices to move the hooks and eyes into another position, said means comprising a lever connected with each transfer device, said levers extending from the transfer devices in opposite directions, a lever pivoted in the center, each end being connected with one of the first mentioned levers, and means for operating the last lever to move the first named levers alternately.

55. In a machine for assembling and transferring hooks and eyes, the combination of a table having a slot therein, a transfer device having means projecting through said slot for receiving hooks and eyes, means for feeding hooks and eyes to said receiving means, means for moving said transfer device from receiving position, and means for thereafter withdrawing the receiving means from engagement with the hooks and eyes.

56. In a machine of the character described, the combination of an assembling device, and a transfer device, said transfer device comprising a slide, means for reciprocating the slide, a series of pins movably mounted on the slide, and means connected with the reciprocating means for raising the pins before the slide commences to move.

57. In a machine of the character described, the combination of an assembling device, and a transfer device, said transfer device comprising a slide, means for reciprocating the slide, a series of pins movably mounted on the slide, means connected with the reciprocating means for raising the pins before the slide commences to move in one direction, and means for withdrawing the pins before the slide begins its return motion.

58. In a machine of the class described, the combination of a slide, a bar reciprocably mounted on the slide, means for reciprocating the bar in the direction of motion of the slide, a series of movable pins on the slide, means connected with said reciprocating bar for moving the pins before the slide commences to move, and means on the slide for engaging the bar whereby the motion of the bar is transmitted to the slide.

59. In a machine of the class described, the combination of a slide, a bar reciprocably mounted on the slide, means for reciprocating the bar, a series of movable pins on the slide, and means connected with said bar for moving the pins.

60. In a machine of the character described, the combination of a slide, a reciprocating bar mounted thereon, means for reciprocating said bar, said slide having a device projecting into the path of the bar whereby motion of the bar will be transmitted to the slide, movable pins carried by said slide, and a lever having means for raising said pins, said bar having connection with said lever for operating it.

61. A transfer device for a machine of the character described comprising a movable member, hook and eye holding means, and means for automatically moving the hook and eye holding means transversely to the direction of motion of the transfer device when said member is moved.

62. A machine of the character described comprising a transfer device for transferring assembled articles from one point to another, said device comprising a horizontally movable member, means for holding said assembled articles on said movable member, and means for occasioning vertical movement of said holding means when the member is moved.

63. A machine of the character described, having a transfer device comprising a movable member, a set of movable pins, and means interposed between the said movable member and the said pins, having connection with the said member and with the said pins for occasioning movement of the latter when the said member is moved.

64. A machine of the character described, comprising a transfer device for transferring the assembled articles from one point to another, the said device comprising a movable member, means movable upwardly from below into position to hold said articles, and also into position to release said

articles, and means having connection with said member and the said means, for occasioning movement of the latter.

65. A machine of the class described, having a transfer device comprising a movable bar having a slot, a bell-crank having an arm entering said slot, a set of movable pins, a roller connected with said pins for moving them, and means on the bell-crank for moving said roller when the bar is moved.

66. A machine of the class described having a transfer device comprising a movable bar having a slot, a bell-crank having an arm entering said slot, a set of movable pins, a roller connected with said pins for moving them, means on the bell-crank for moving said roller when the bar is moved, and means for transmitting motion from the bar to the transfer device to reciprocate the latter after the pins have been raised.

67. A transfer device comprising a moving member, means associated with said member for engaging hooks and eyes, and means connected with the member for bodily moving the hook and eye engaging means before the member starts to move.

68. A device for assembling hooks and eyes comprising a transfer device having a reciprocating member, movable pins adapted to engage and hold hooks and eyes mounted on said member, and means on the transfer device for moving the pins before said member starts to move.

69. A transfer device comprising a reciprocating member, a guide therefor, movable pins mounted on said member, means for moving the pins before the member starts to move, and a pusher mounted on the member.

70. A transfer device comprising a reciprocating member, pins, and a pusher mounted on said member, and means for moving the pins and said pusher before the member starts to move.

71. A transfer device comprising a reciprocating member, a vertically slidable member thereon, and hook and eye holding means and a rack pusher mounted on said vertically sliding member.

72. A transfer device having hook and eye holding means a vertically movable rack pusher, and a stationary rack pusher connected therewith.

73. In a machine of the class described, the combination of two transfer devices located side by side and alternately reciprocable, a vertically movable pusher on one of said transfer devices located in line therewith, and a stationary pusher on the same transfer device located in line with the other transfer device.

74. In a machine of the class described, the combination of a transfer device comprising a reciprocating member, means for moving said member, movable pins mounted thereon for holding articles to be transferred, means for projecting the pins into operative position before the member begins to move and for withdrawing them, and means for depositing a rack in a position over the movable member before said pins are withdrawn.

75. In a machine for assembling and transferring hooks and eyes, the combination of a pair of transfer devices having means for engaging hooks and eyes to hold them on their upper surfaces, means for alternately reciprocating said transfer devices, a series of racks, means for depositing said racks on the transfer devices to hold the hooks and eyes in position, and means for thereafter withdrawing the transfer devices leaving the hooks and eyes in engagement with said racks.

76. In a machine for assembling and transferring hooks and eyes, the combination of a transfer device for carrying hooks and eyes, said device having movable means for engaging the hooks and eyes, means for placing a rack over said transfer devices to hold the hooks and eyes, and means for thereafter withdrawing said means and then removing the transfer device.

77. In a machine for assembling and transferring hooks and eyes, the combination of a transfer device having movable pins for engaging the hooks and eyes, means for depositing a rack for holding the hooks and eyes on said transfer device, and means for withdrawing the pins at right angles to the surface of the rack which engages the hooks and eyes and for thereafter withdrawing the transfer device transversely to the direction of motion of said pins.

78. In a machine for assembling and transferring hooks and eyes, the combination with means for supporting hooks and eyes of a holder provided with a passage therethrough, said passage having projections on one side, and a series of racks having means for holding hooks and eyes and slots registering with said projections when the racks are in said passage.

79. In a machine for assembling and transferring hooks and eyes, the combination of a transfer device for receiving and moving a plurality of assembled hooks and eyes, a rack for holding them and means for automatically depositing the rack on said hooks and eyes.

80. In a machine for assembling and transferring hooks and eyes, the combination of a transfer device for receiving and moving the hooks and eyes, means for depositing on the hooks and eyes, a rack for holding them and a pusher on the transfer device for moving the rack.

81. In a machine for assembling and transferring hooks and eyes, the combination with a support for hooks and eyes, and a plurality of racks adapted to be positioned on hooks

and eyes placed on said support, of a movable rack-holder having a slot for receiving a plurality of racks, and a sliding member movable transversely with respect to said rack-holder, said member having means for supporting the racks, said means being provided with a slot through which the racks may descend.

82. In a machine for assembling and transferring hooks and eyes, the combination with a support for hooks and eyes, and a plurality of racks adapted to be positioned on hooks and eyes placed on said support, of a rack-holder having ways and passage through which a series of racks may pass, a reciprocating member mounted in the ways, and means for reciprocating said member, said member being provided with a ledge for supporting the racks, said ledge having a passage for permitting the racks to drop.

83. In a machine for assembling and transferring hooks and eyes, the combination with a support for hooks and eyes, and a plurality of racks adapted to be positioned on hooks and eyes placed on said support, of a rack-holder having a passage for racks, a ledge located across said passage at the bottom thereof to prevent the passage of racks below it, and a sliding member located above said ledge and having means for supporting said racks, said sliding member having a passage for permitting the racks to drop when moved to either side of said ledge in the rack-holder passage.

84. In a machine for assembling and transferring hooks and eyes, the combination with a support for hooks and eyes, and a plurality of racks adapted to be positioned on hooks and eyes placed on said support, of a rack-holder for receiving a plurality of hook and eye holding racks, with means for supporting said racks in the rack-holder and for withdrawing them therefrom and depositing them alternately in two different positions.

85. In a machine for assembling and transferring hooks and eyes, the combination of means for supporting hooks and eyes, with a rack holder, and means for supporting racks in said holder, for withdrawing them therefrom, and for depositing them on a plurality of hooks and eyes.

86. In a machine for assembling and transferring articles consisting of complementary members, the combination of means for supporting said members, a holder for receiving a plurality of devices for holding the said articles, means for supporting the said devices in the said holder, for withdrawing them therefrom and depositing them in the positions desired, and means for raising the said holder to permit the said devices to be deposited.

87. In a machine for assembling and transferring articles consisting of complementary members, the combination with means for supporting the articles, of racks for holding the articles, and means for supporting said racks, for withdrawing them, and depositing them on the said articles.

88. In a machine for assembling and transferring hooks and eyes, the combination with a support for hooks and eyes, and a plurality of racks adapted to be positioned on hooks and eyes placed on said support, of a rack-holder for receiving a plurality of hook and eye holding racks, means for supporting said racks in the rack-holder and for withdrawing them therefrom and depositing them alternately in two different positions, and means for raising the rack-holder to permit the racks to be deposited.

89. In a machine for assembling and transferring hooks and eyes, the combination with transfer devices, of a table having two sets of passages for receiving the transfer devices, racks for holding hooks and eyes on the table, a rack-holder, a frame movable horizontally in the rack holder, means for vertically moving the rack holder, and means for horizontally moving the frame for taking racks from said rack-holder and depositing them above the transfer devices.

90. In a machine for assembling hooks and eyes, the combination with means for supporting hooks and eyes, of a plurality of racks, a movable rack-holder therefor, and means for withdrawing the racks from the rack-holder and depositing them, each of said racks being provided with rack teeth on the top surface thereof, and with means on the bottom surface for engaging and holding a series of assembled hooks and eyes.

91. In a machine for assembling and transferring hooks and eyes, the combination with means for supporting hooks and eyes, of a rack-holder, and a slidable member movable through the rack-holder, said member comprising a frame having a ledge thereon for supporting racks, said ledge having an opening therethrough to permit the racks to drop.

92. In a machine for applying articles to cards and the like, the combination of means for feeding a purality of rows of articles in parallel paths transversely to the rows, means for feeding in transverse parallel paths a purality of rows of other articles, means for simultaneously moving one article of each of the first series into engagement with one of each of the others and for attaching them thereto, and means for moving the attached articles away in longitudinal rows.

93. In a machine for applying articles to cards and the like, the combination of means for feeding a plurality of series of articles of one kind, means for feeding a plurality of series of articles of another kind, a carrier for simultaneously moving one article

of each series of one kind into engagement with one of each series of the other kind, means for feeding cards to a certain position, and means for simultaneously transferring a plurality of assembled articles on the cards equal to said number of series.

94. In a machine for applying articles consisting of complementary members to a card or the like, the combination of a device for simultaneously carrying a plurality of one of the said members in alinement and attaching them to a corresponding number of the other of said members, a device for simultaneously transferring a plurality of the assembled members along parallel paths to the card, and means for sewing the said members to the said cards.

95. In a machine for applying hooks and eyes to cards, the combination of means for feeding a plurality of adjacent series of eyes toward a plurality of adjacent series of hooks in tranverse alinement, means for feeding the hooks, means for attaching the eyes to the hooks, means for feeding cards, means for transferring the assembled rows of hooks and eyes on said cards longitudinally with respect to the rows, and means for attaching the hooks and eyes to the cards.

96. In a machine for applying hooks and eyes to cards, the combination of a device for simultaneously attaching a plurality of eyes to a corresponding number of hooks, a device for transferring the assembled hooks and eyes to cards, and means for sewing the hooks and eyes on the cards.

97. The combination of means for separating the bottom card from the pack of cards, and feeding it forward, a rack having means for holding hooks and eyes, means for feeding the rack on the surface of the card which has been separated, and means for holding the card in a stationary position for a predetermined period while the rack is applied to it.

98. The combination of a card receptacle, means for feeding the cards therefrom, a card feeding device operating transversely to said means, a pin above the path of the cards while moving transversely, means for forcing said pin down on a card and holding it in stationary position, racks for holding articles on the cards, and means for moving racks on the card while stationary.

99. In a machine for applying hooks and eyes to cards, the combination of a card feeding device, and means for holding a card, said means comprising a reciprocable pin adapted to bear on the card, a spring for normally holding the pin up, a lever bearing on the pin, a bell-crank bearing on the lever between its ends for forcing the pin down, and a cam for operating said bell-crank.

100. In a machine for applying hooks and eyes to cards, the combination of means for feeding cards in one direction, with means for feeding racks carrying hooks and eyes in a transverse direction onto the cards to deposit the hooks and eyes thereon.

101. In a device for applying hooks and eyes to cards, the combination of two sets of feeding wheels for feeding cards with assembled hooks and eyes, a sewing device, and means for varying the amount of feed of the cards between alternate stitches to regulate the length of the stitches.

102. In a machine for applying hooks and eyes to cards, the combination of means for sewing the hooks and eyes to the cards, means for first feeding the cards forward a short distance to provide a short stitch at the end, means for thereafter alternately feeding the cards forward a short and a long space to provide alternate short and long stitches.

103. In a machine for applying hooks and eyes to cards, the combination of means for sewing the hooks and eyes to cards, means for first feeding the cards forward a short distance to provide a short stitch at the end, means for thereafter alternately feeding the cards forward a short space and a long space to provide alternate short and long stitches, and means for feeding the cards forward a short space on the last stroke to provide a short stitch at the rear end of the card.

104. In a machine for applying hooks and eyes to cards, the combination of means for first sewing the outer wire of the hooks and eyes to the card with a short stitch, means for then making a longer stitch to sew the two interior wires of the first hook and eye to the card, means for thereafter making a still longer stitch to attach the outside wires of two adjacent hooks and eyes to the card, means for repeating the last two stitches throughout the length of the card, and means for finally applying a short stitch at the opposite end of the card.

105. In a machine for applying hooks and eyes or the like to cards, the combination of a bar, means for reciprocating the bar, and means connected with the bar and operatable thereby for feeding cards alternately relatively long and short distances.

106. In a machine for applying hooks and eyes or the like to cards, the combination of a bar, means for giving the bar uniform reciprocating motion, and means operatable by the bar for feeding cards alternately relatively long and short distances at each reciprocation of the bar.

107. In a machine for applying hooks and eyes to cards, the combination of a sewing device, a shaft having connections for feeding cards, a ratchet-wheel operably connected with said shaft, a pawl for operating said ratchet-wheel, an oscillatable member supporting said pawl, a reciprocable bar sup-

porting said oscillatable member, and means for varying the position of said pawl and changing the amount of its motion to alter the feed.

108. In a machine for applying hooks and eyes to cards, the combination of a reciprocable member, and an oscillatable member supported and carried thereby, means for changing the position of said oscillatable member relatively to the reciprocable member after each complete reciprocation of the reciprocable member, and a feeding device operated by the oscillatable member different distances on alternate reciprocations of the reciprocable member.

109. In a machine for applying hooks and eyes to cards, the combination of a movable member, an oscillatable member mounted thereon, a ratchet-wheel journaled on the movable member and provided with a cam having alternate rounded and flat surfaces, a pair of rolls mounted on the oscillatable member and engaging said surfaces, means for turning the ratchet-wheel and said surfaces during each motion of the movable member, and means connected with said oscillatable member for feeding cards to which the hooks and eyes are to be applied.

110. In a device for applying hooks and eyes to cards, the combination of a movable member, a ratchet-wheel journaled thereon and carried thereby, said ratchet-wheel having a cam provided with an odd number of curved surfaces, and an odd number of flat surfaces alternating with the curved surfaces, an oscillatable member mounted on the movable member, a pair of rolls on the oscillatable member located opposite each other with respect to said ratchet-wheel, the rolls alternately engaging the flat and curved surfaces, means for turning the ratchet-wheel and thereby shifting the oscillatable member through the instrumentality of the flat and curved surfaces, and means connected with the oscillatable member for feeding cards onto which the hooks and eyes are applied.

111. In a machine for applying hooks and eyes to cards, the combination of a movable member, an oscillatable member mounted thereon, means for automatically adjusting the position of the oscillatable member back and forth, a pair of pawls on the oscillatable member, a pair of ratchet-wheels operated by said pawls, a feed device operated by each ratchet-wheel, a projection on each pawl, and means for automatically throwing said pawls out of engagement with said ratchet-wheels, one of said pawls being provided with means for moving its ratchet-wheel a shorter distance than it would be moved by the pawl itself.

112. In a machine for applying hooks and eyes to cards, the combination of a movable member, means for adjusting said member after each motion thereof, a pair of pawls mounted on said member, a pair of ratchet-wheels operated by said pawls, a feeding device connected with each ratchet-wheel, said feeding device being operated by the pawls different distances according to the position of the first member, means for disengaging both pawls from the ratchet-wheels and means for operating one of the ratchet-wheels a short distance.

113. In a machine for applying hooks and eyes to cards, the combination of a movable member, means for adjusting said member after each motion thereof, a pair of pawls mounted on said member, a pair of ratchet-wheels operated by said pawls, a feeding device connected with each ratchet-wheel, said feeding device being operated by the pawls different distances according to the position of the first named member, means for disengaging both pawls from the ratchet-wheels and means for operating one of the ratchet-wheels a shorter distance, said disengaging means comprising an oscillatable shaft, means for turning said shaft and means connected with the shaft for engaging said pawls.

114. In a machine for applying hooks and eyes to cards, the combination of a movable member, means for adjusting said member after each motion thereof, a pair of pawls mounted on said member, a pair of ratchet-wheels operated by said pawls, a feeding device connected with each ratchet-wheel, said feeding device being operated by the pawls different distances according to the position of the first named member, means for disengaging both pawls from the ratchet-wheels and means for operating one of the ratchet-wheels a shorter distance, said disengaging means comprising a main shaft, a lug rotated thereby once during each revolution of the main shaft, a second shaft, an arm on the second shaft extending into the path of the lug, and a winged cam mounted on the shaft for engaging the pawls.

115. In a machine for applying articles to cards and the like, the combination with a sewing device, of means for advancing the cards thereto, and means whereby said advancing means has control of each card until the first stitch is taken, and then loses all further control of the card, whereby the length of the first stitch is controlled by said advancing means.

116. In a machine for sewing articles to cards and the like, the combination with a sewing device, of an oscillatory means for advancing the cards to the sewing device, and means for moving said oscillatory means in one direction until the first stitch is taken in the card and then returning the oscillatory means to its initial position.

117. In a machine for sewing articles to

cards and the like, the combination with a sewing device and a feeding device, of means independent of said feeding device for advancing the cards to the sewing device and in position to be fed forward by the feeding device, said advancing means having control of the cards until after the first stitch is taken.

118. In a machine for securing hooks and eyes to cards, the combination with a card feeding device and a securing means, of means independent of said feeding device for advancing the cards to the securing means and controlling the motion of the cards during the first operation of the securing means on each card.

119. In a machine for sewing hooks and eyes on cards, the combination with a card feeding device and a sewing device, of means independent of said feeding device for advancing the cards to the sewing device and in position to be taken up by the feeding device and controlling the motion of the cards while the first stitch is taken on each one, whereby the length of the stitches between the cards is entirely out of the control of the feeding device.

120. In a machine for sewing hooks and eyes on cards and the like, the combination with a sewing device, of means for advancing the cards thereto, said means having control of each card until the first stitch is taken, and means for then removing the cards from the control of said advancing means and feeding them forward.

121. In a machine for sewing hooks and eyes on cards and the like, the combination with a sewing device, of feed rolls for advancing the cards thereto, an additional set of feed-rolls for advancing the cards through the sewing device, and means for rotating the first named feed-rolls faster than the additional set, whereby the first named rolls will have control of each card until the first stitch is taken.

122. In a machine of the character described, the combination of a rotary hopper, slotted peripherally, the slot having dimensions only to permit the passage of a single article, and a rail adjacent to, and following substantially the entire contour of the hopper and bridging the slotted portion of the hopper.

In testimony whereof I have hereunto set my hand, in the presence of two subscribing witnesses.

WALTER L. CURTIS.

Witnesses:

ALBERT E. FAY,

C. FORREST WESSON.