H. S. CROMBIE.

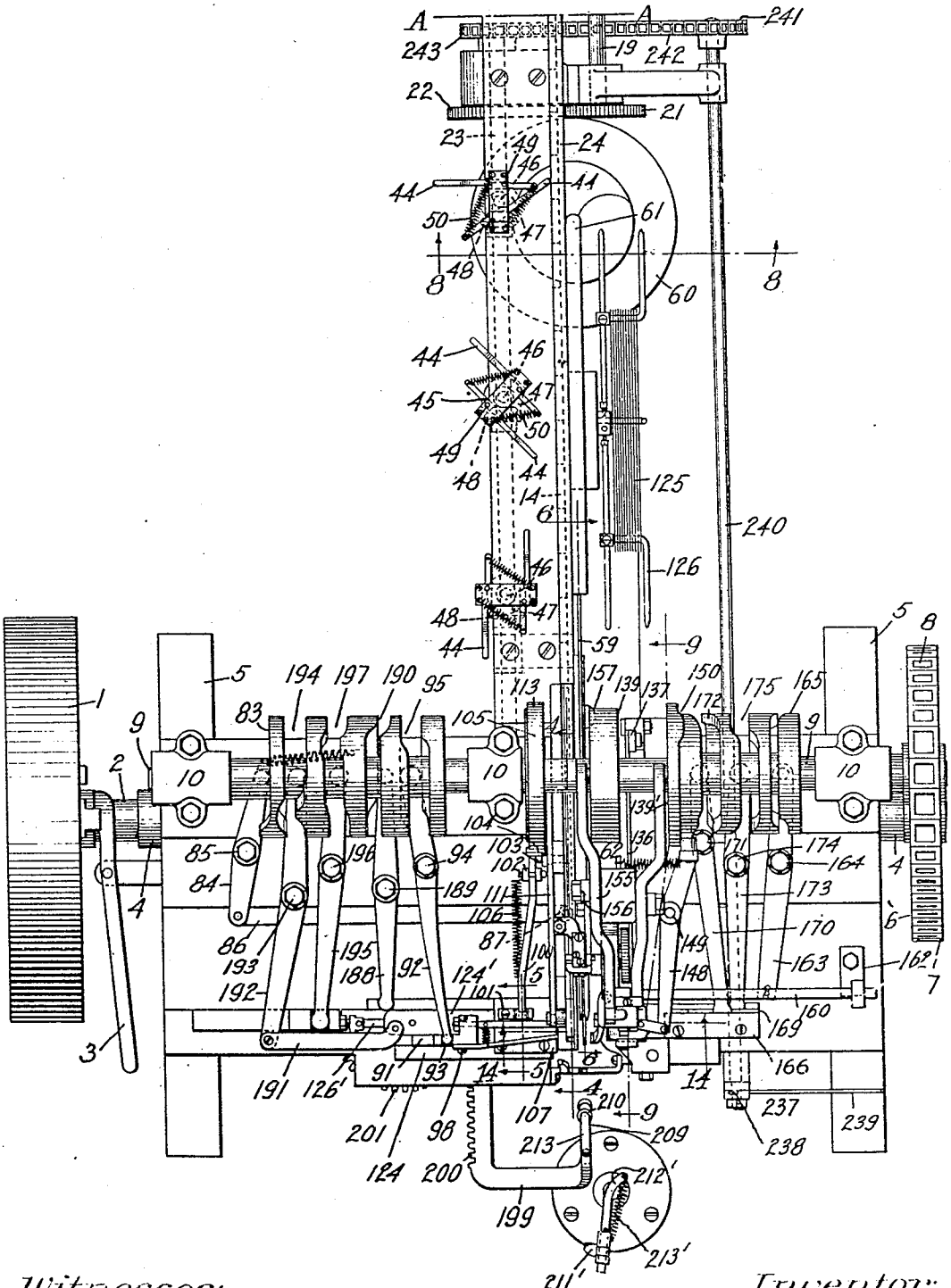
MACHINE FOR MAKING TOGGLES.

APPLICATION FILED FEB. 3, 1911.

1,060,168.

Patented Apr. 29 1913.

11 SHEETS—SHEET 1.



Witnesses:

Sydney E. Taft.

Lenard A. Powell.

Fig. 1.

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Charles S. Goodwin.

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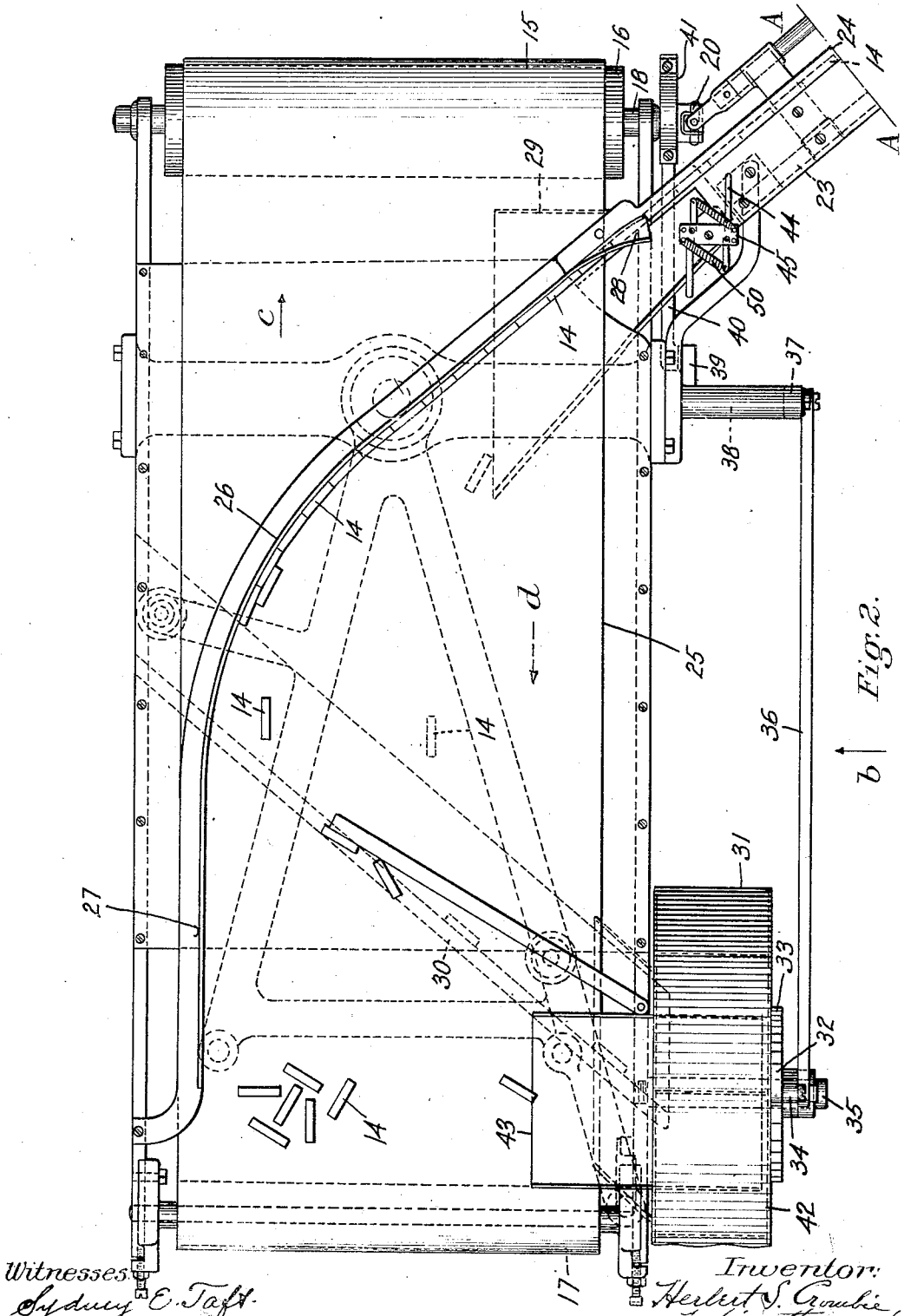

Fig. 2.

Witnesses:
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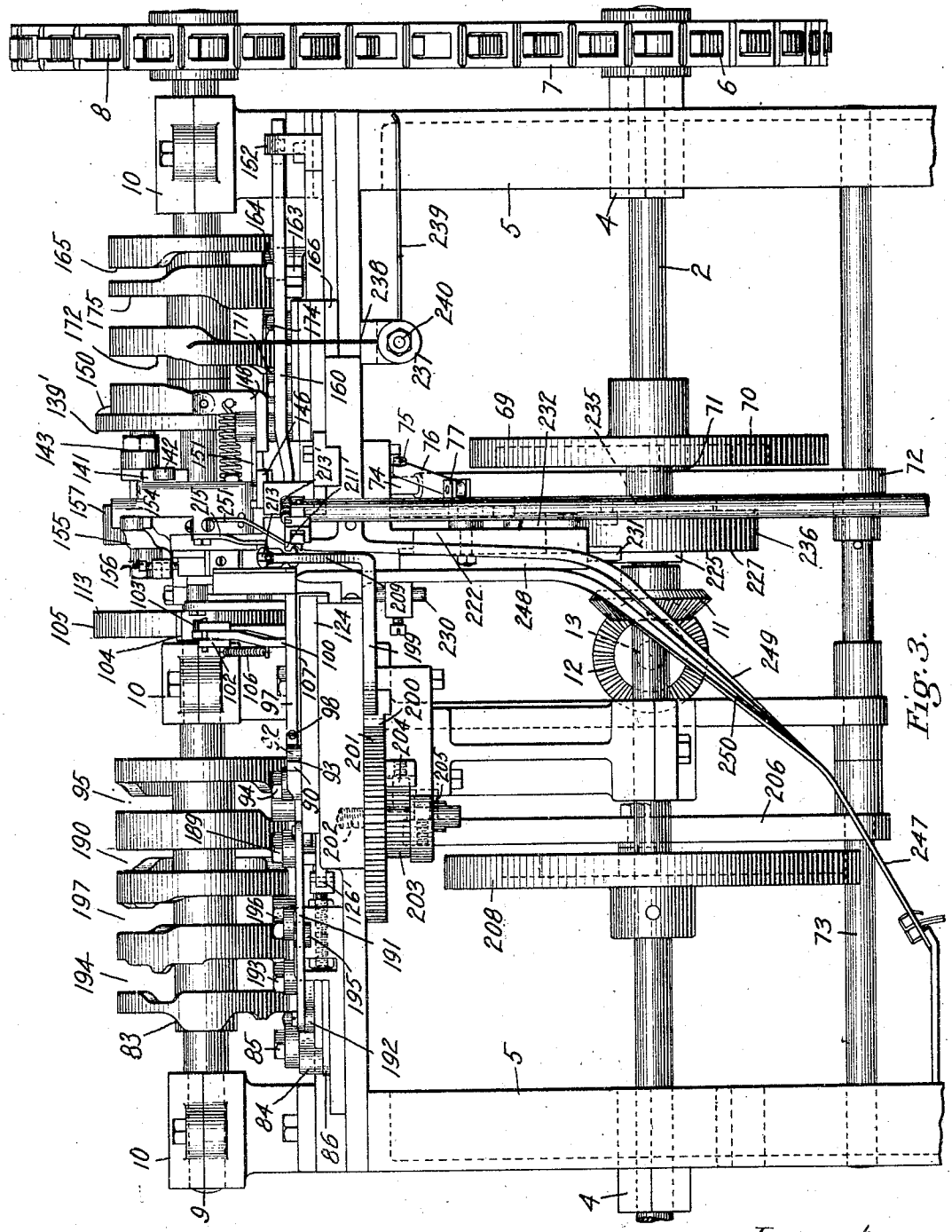

Fig. 3.

Witnesses:

Sydney E. Taft.

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Inventor:

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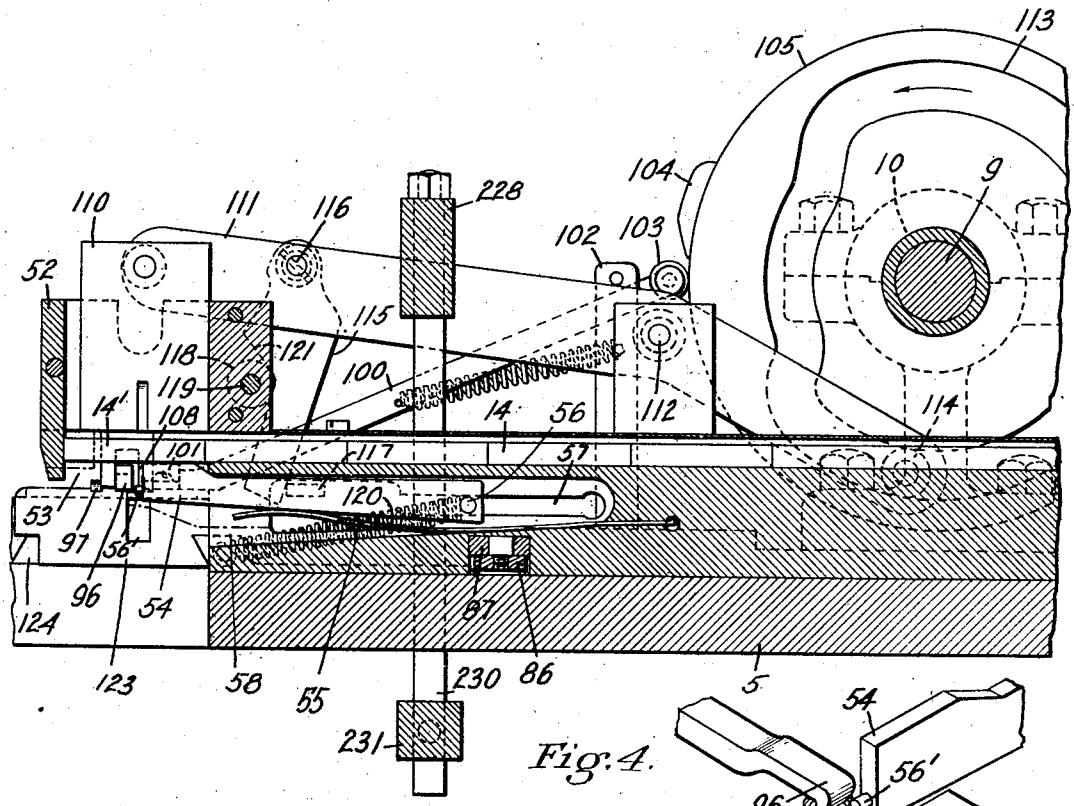

Fig: 4.

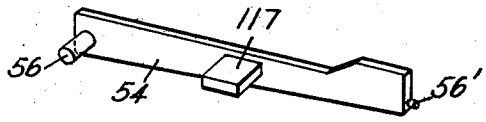

Fig: 4a.

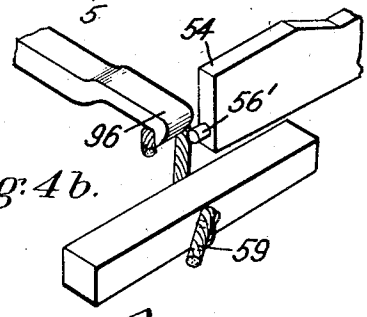

Fig: 4b.

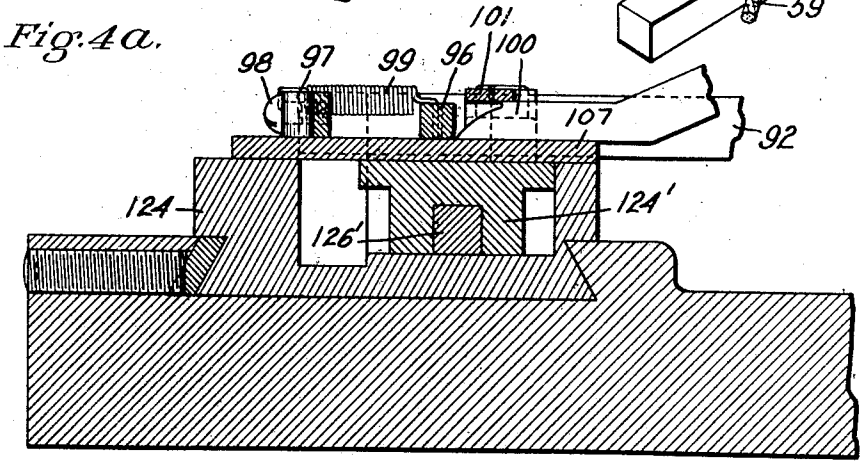

Fig: 5.

Witnesses:

Sydney E. Taft.

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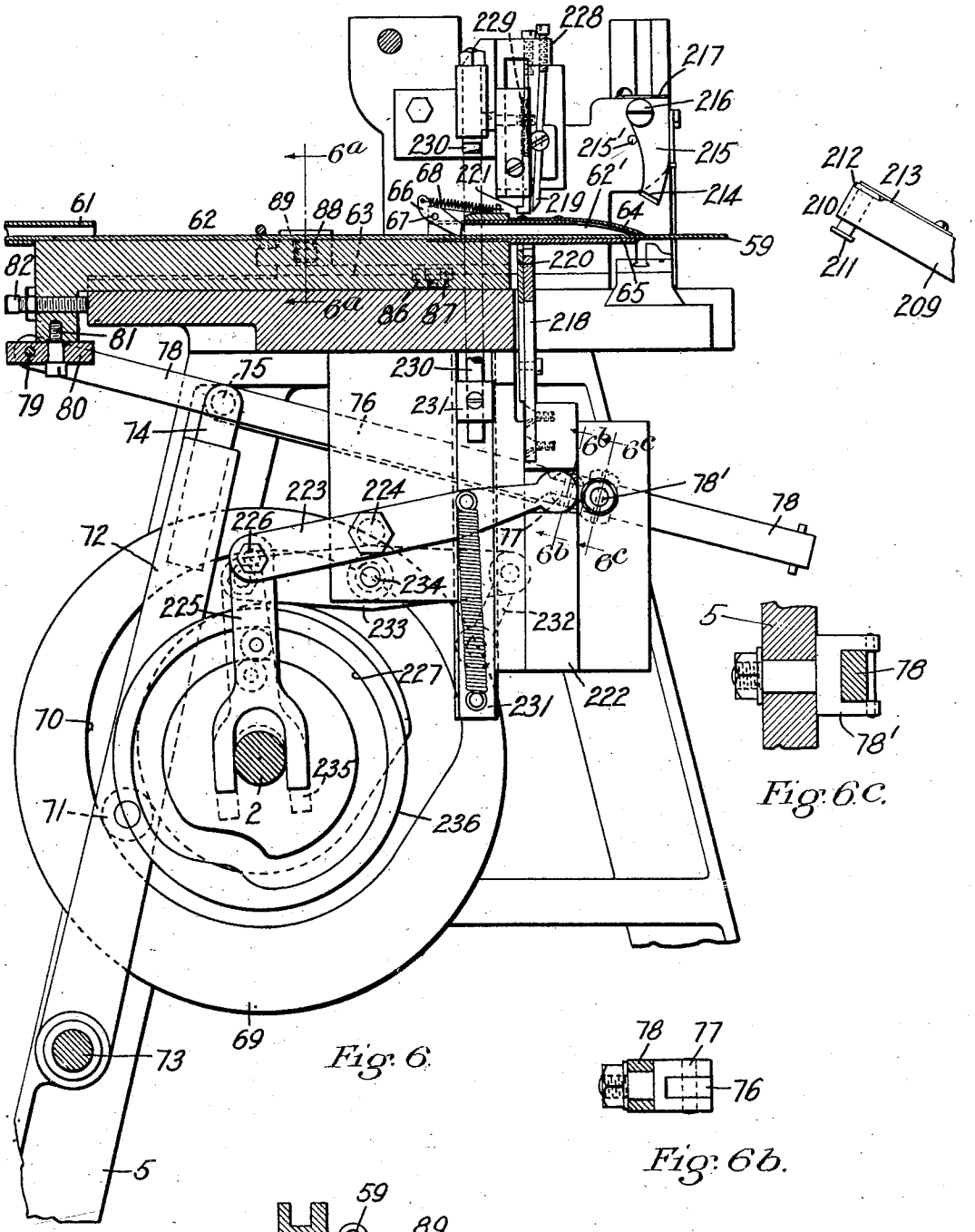

Witnesses:

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Leonard A. Powell.

Inventor:

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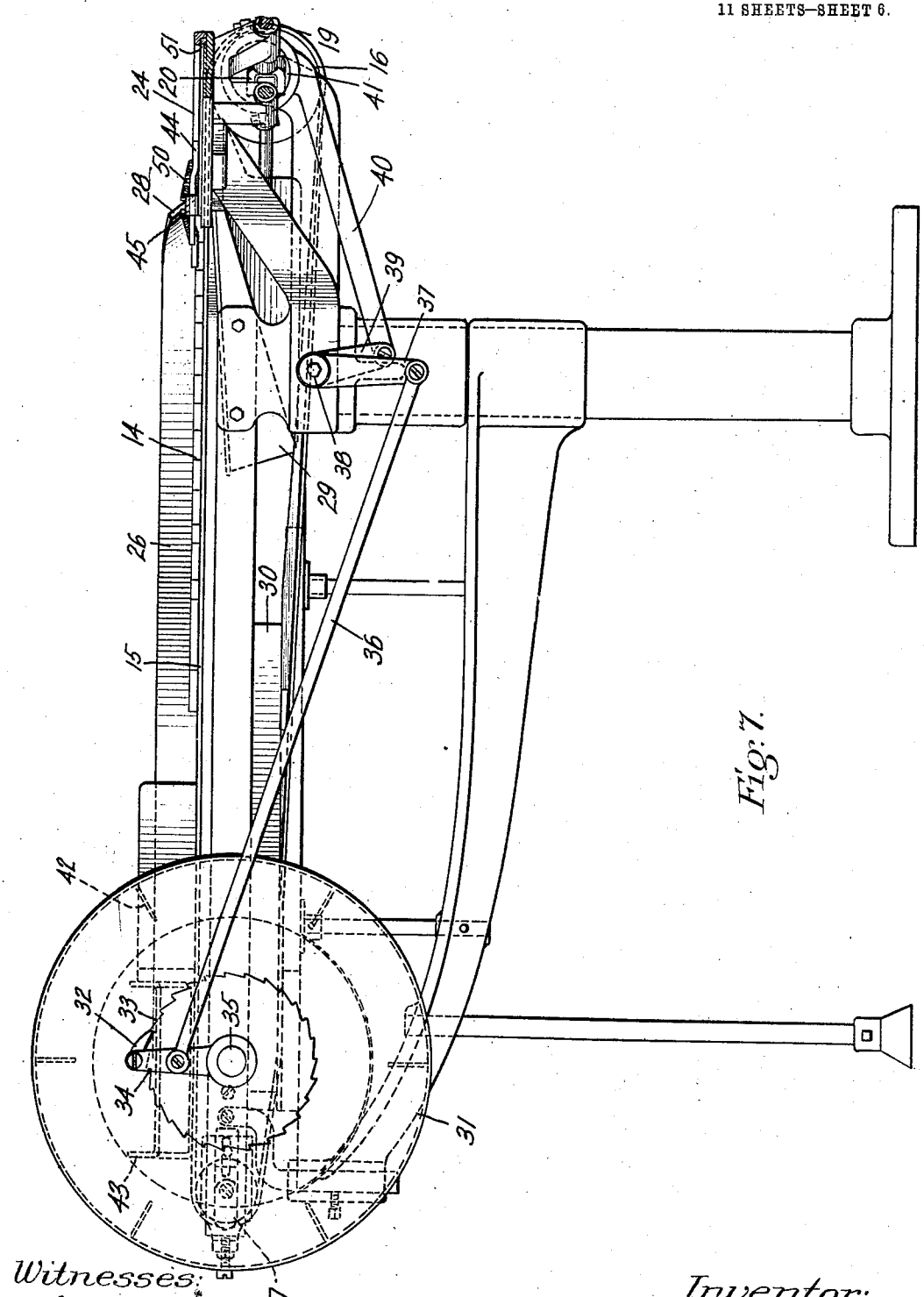

Fig. 7.

Witnesses:
Sydney E. Taft.
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Inventor:
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by his attorney
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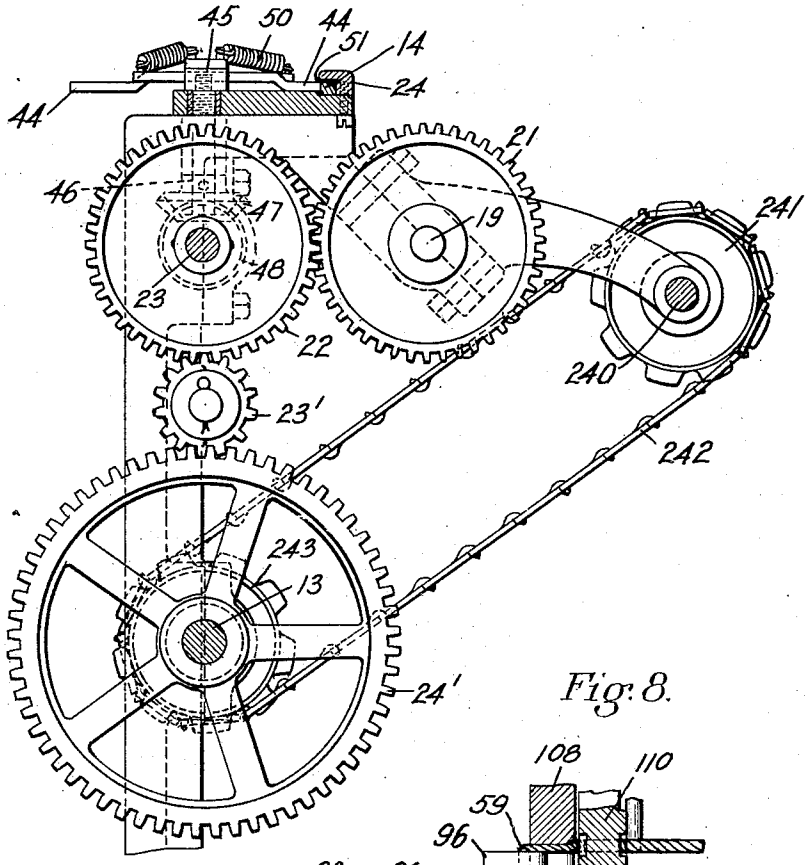
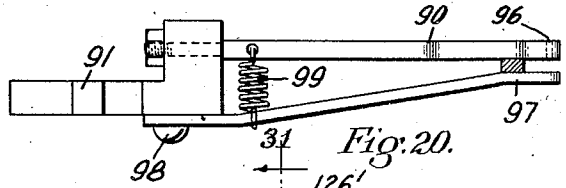


Fig. 8.



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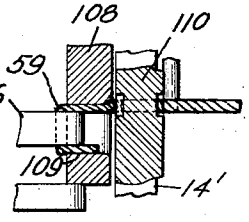

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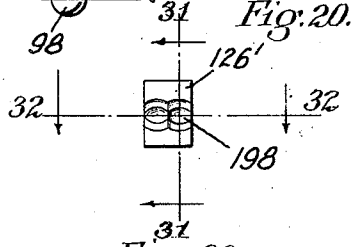

Fig. 30.

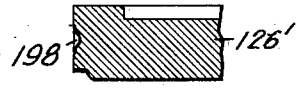

Fig. 31.

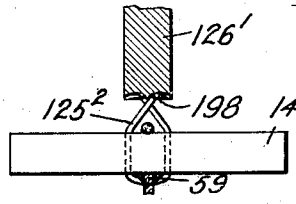

Fig. 32.

Witnesses:

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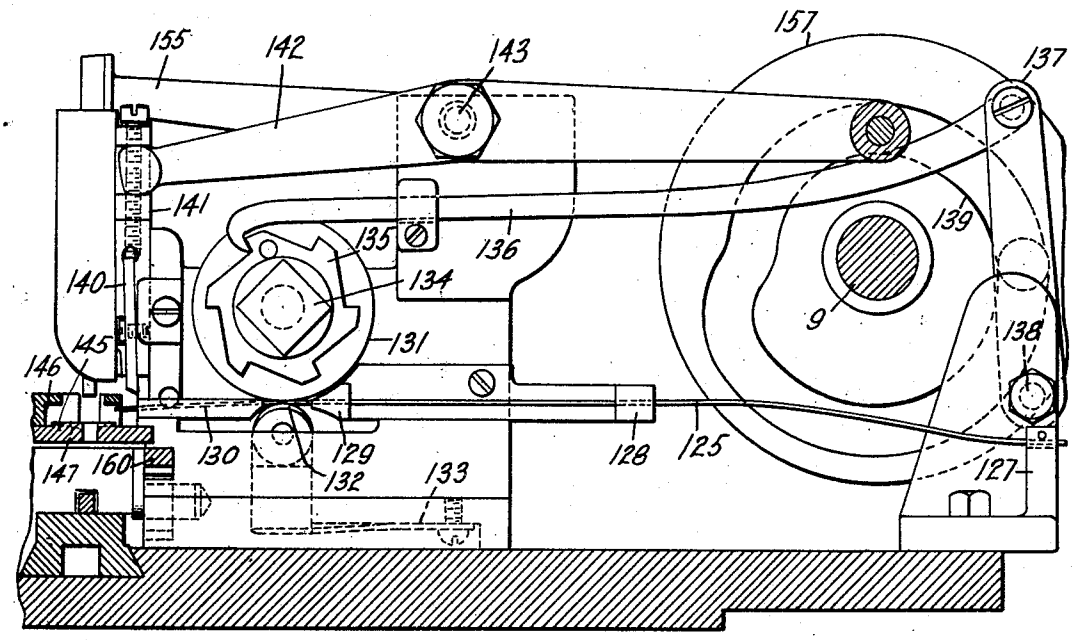


Fig. 9.

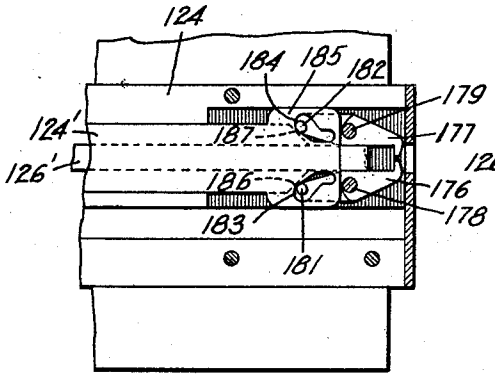


Fig. 10.

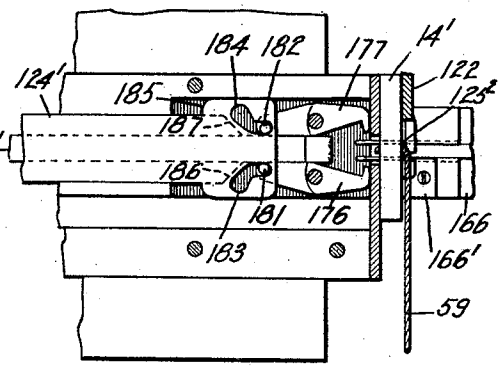
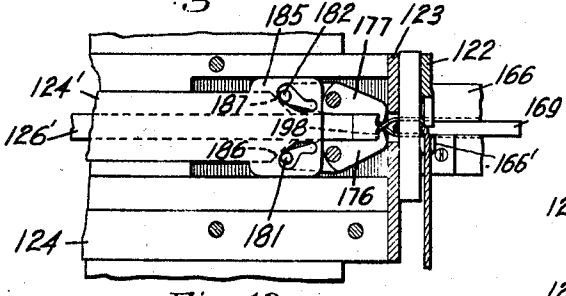


Fig. 11.



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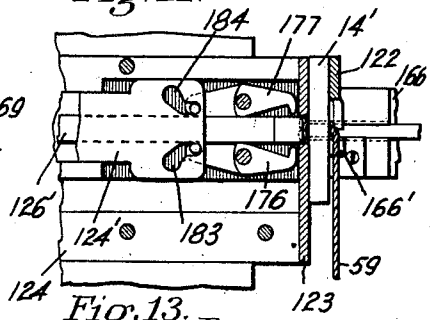

Fig. 13.

Witnesses:
Sydney E. Taft.
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Inventor:
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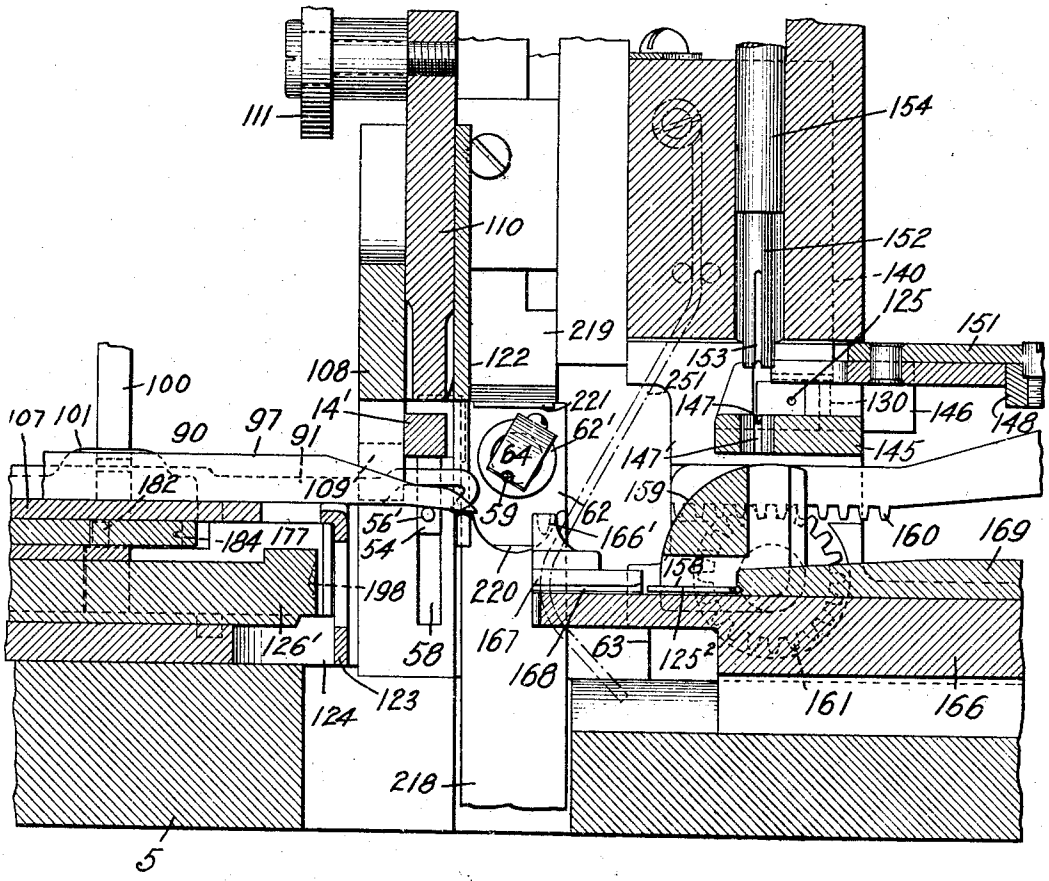
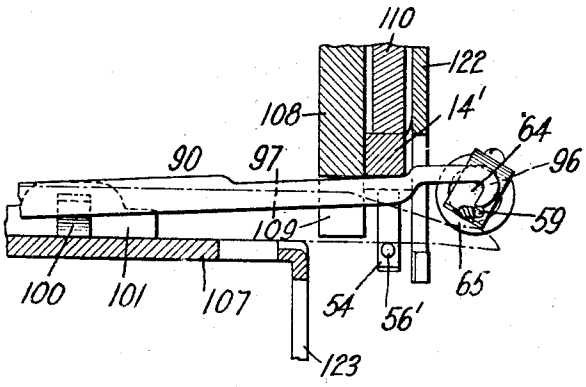


Fig. 14.



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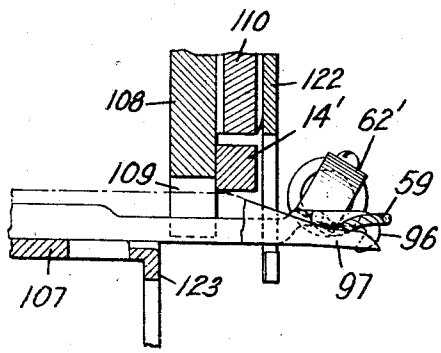

Fig. 16.

Witnesses:
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Leonard A. Powell.

Inventor:
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MACHINE FOR MAKING TOGGLES.

APPLICATION FILED FEB. 3, 1911.

1,060,168.

Patented Apr. 29, 1913.

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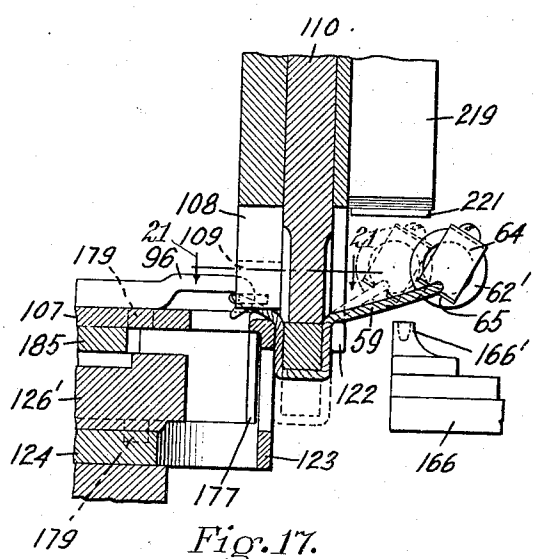

Fig. 17.

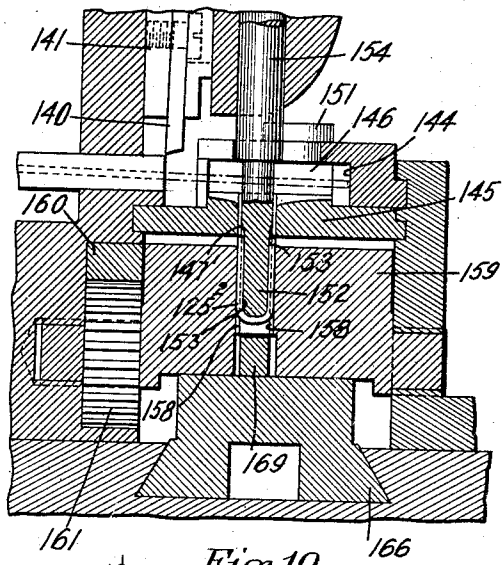

Fig. 19.

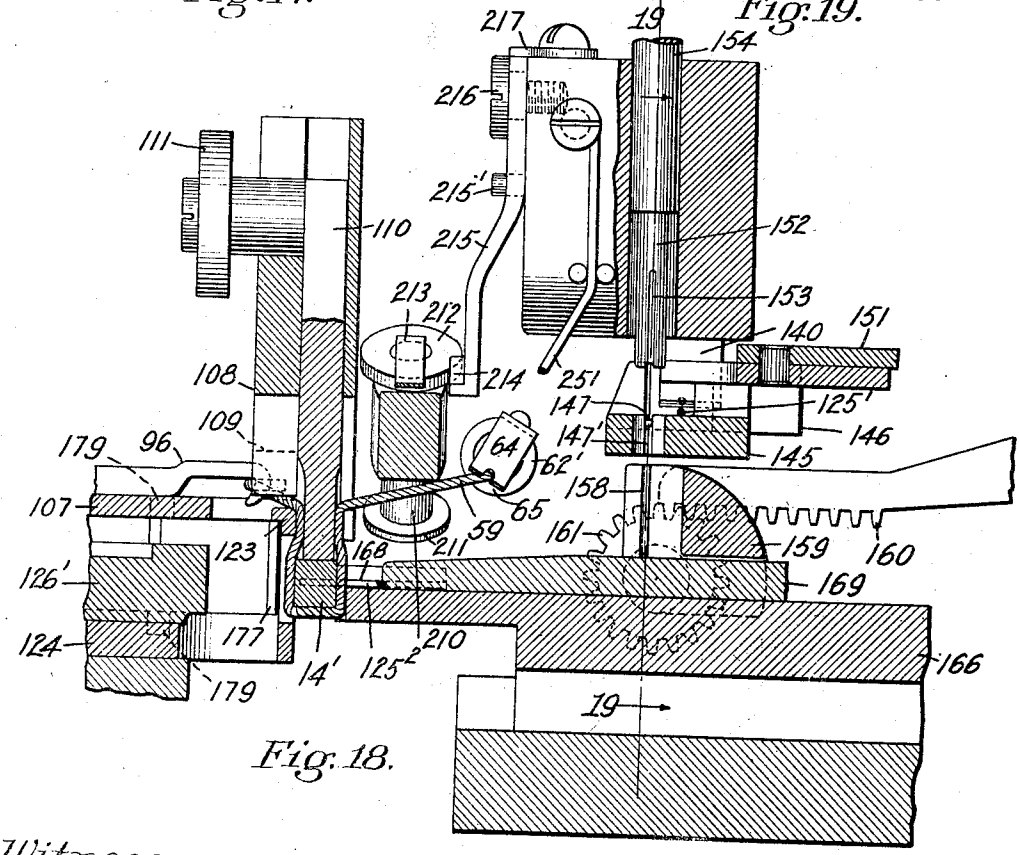

Fig. 18.

Witnesses:

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MACHINE FOR MAKING TOGGLES.

APPLICATION FILED FEB. 3, 1911.

1,060,168. Patented Apr. 29, 1913.

11 SHEETS—SHEET 11.

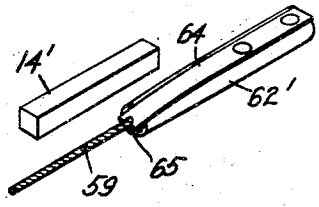

Fig. 22.

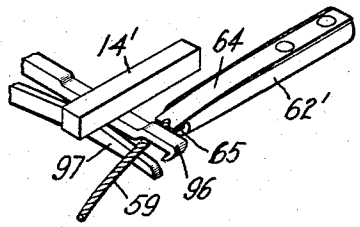

Fig. 23.

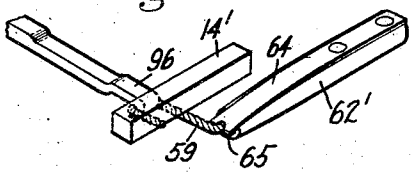

Fig. 24.

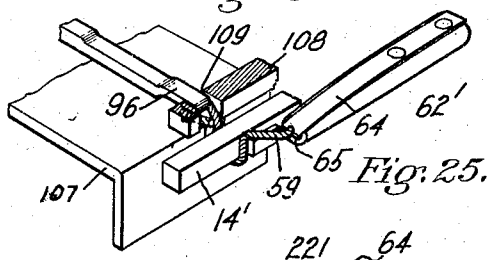

Fig. 25.

Fig. 26.

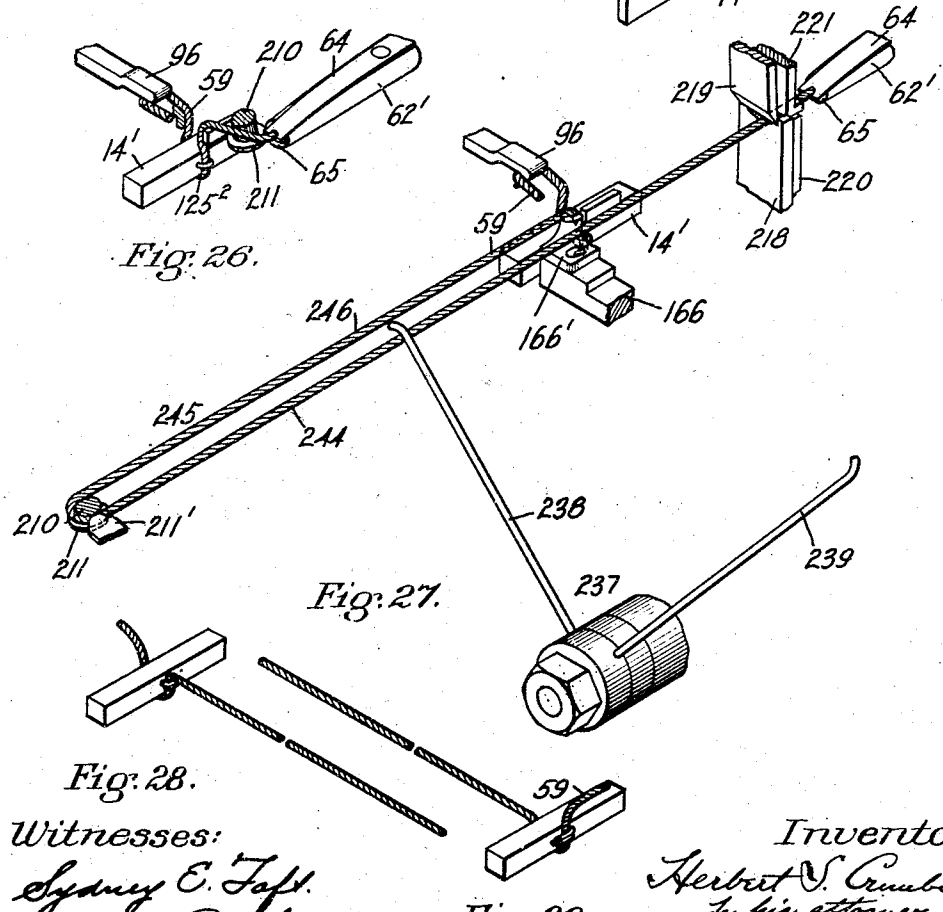

Fig. 27.

Fig. 28.

Fig. 29.

Witnesses:

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Leonard A. Powell.

Inventor:

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Charles N. Fording.

UNITED STATES PATENT OFFICE.

HERBERT S. CROMBIE, OF WOBURN, MASSACHUSETTS, ASSIGNOR TO BOSTON TOGGLE COMPANY, OF BOSTON, MASSACHUSETTS, A CORPORATION OF MAINE.

MACHINE FOR MAKING TOGGLES.

1,060,168. Specification of Letters Patent. Patented Apr. 29, 1913.

Application filed February 3, 1911. Serial No. 606,424.

To all whom it may concern:

Be it known that I, HERBERT S. CROMBIE, a citizen of the United States, residing at Woburn, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Machines for Making Toggles, of which the following is a specification.

This invention relates to a machine for manufacturing "toggles."

A "toggle" as it is known in the leather trade is a device which is used to support hides during the process of manufacture in which the hides are coated with some preparation, such as a patent leather preparation, and are then allowed to remain exposed to the air for a sufficient time to "cure" or dry them. To suspend the hides in a horizontal position while they are being coated with the patent leather preparation and while they are afterward drying, a frame is used from which the hides are suspended by means of said toggles. The toggle itself consists of a cord fastened to a short bar of wood, usually rectangular in cross section, and the cord is passed through the hide near the edge thereof and the small bar of wood is pulled up against the under side of the hide, which, it will be understood, has to be suspended in a horizontal position and the cord then passes from the hide to the horizontal surrounding framework. This framework has large headed tacks driven therein and the cord is passed around one of these tacks and then the tack is driven down against the cord to bind it or lock it to the frame. A series of these toggles is used on each side of the hide or skin which it is desired to treat as hereinbefore set forth. A very large number of these toggles is used daily and they can only be used once or twice, as the patent leather preparation has a deleterious effect upon a cord. Hitherto, these toggles have been made by hand—that is, the cord has been usually tied to the bar of wood by hand. This makes the toggles expensive and the item of toggles to a manufacturer is quite a large one on account of the enormous number which is used and, therefore, it is the object of this invention to manufacture said toggles by automatic machinery which will very much reduce the cost of the same.

A toggle such as the machine of this invention is particularly adapted to manufacture has been patented by me in U. S. Letters Patent No. 936,522, dated October 12, 1909.

The invention consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims thereof.

Referring to the drawings: Figure 1 is a plan view of a portion of my machine for making toggles. Fig. 2 is a plan view of the remainder of said machine. By placing the line A—A, Fig. 1, upon the line A—A, Fig. 2, the complete plan of the machine will be obtained as shown in Figs. 1 and 2 combined in the manner indicated. Fig. 3 is a front elevation of said machine viewed in the direction of the arrow *a* (Fig. 1), the clutch mechanism being removed. Fig. 4 is a sectional elevation taken on line 4—4 of Fig. 1 illustrating the bar holding and vertical feeding mechanism. Fig. 4^a is a perspective view of the movable support for the toggle bar. Fig. 4^b is a perspective view of the hook and a portion of the movable support for the bar, with the clearing pin in position to free the hook of the cord. Fig. 5 is a sectional elevation taken on line 5—5, Fig. 1, of the cord carrier and the slides which operate the staple clenching mechanism. Fig. 6 is a sectional elevation taken on line 6—6 of Fig. 1 illustrating the mechanism for operating the cord holder and the cord cutting mechanism. Fig. 6^a is a section taken on line 6^a—6^a, Fig. 6. Fig. 6^b is a detail section taken on line 6^b—6^b, Fig. 6. Fig. 6^c is a detail section taken on line 6^c—6^c, Fig. 6. Fig. 7 is a side elevation of the toggle bar feeding mechanism, as viewed in the direction of the arrow *b*, Fig. 2. Fig. 8 is a section taken on line 8—8 of Fig. 1 illustrating the bar feeding mechanism. Fig. 9 is a section taken on line 9—9, Fig. 1, illustrating the wire feeding and cutting mechanism. Figs. 10, 11, 12 and 13 are detail plan views, partly in section, of the mechanism for bending the ends of the legs of the staples after they have been driven through the toggle bar, and clenching the same. Fig. 14 is a sectional elevation taken on line 14—14, Fig. 1, looking in the direction of the arrow *a*, illustrating the cord manipulating instrumentalities, the staple forming and driving mechanisms and the mechanism for bending and clenching the legs of the staple after they have been

driven through the bar. Figs. 15 and 16 are sectional elevations of the mechanism which manipulates the cord to pass the same beneath the toggle bar preparatory to the downward movement of said bar. Fig. 17 is a sectional elevation similar to Fig. 14 illustrating the cord manipulating devices in a different position relatively to the toggle bar. Fig. 18 is a sectional elevation showing the cord manipulating devices in other positions and also illustrating the staple forming and driving mechanisms in different positions. Fig. 19 is a sectional elevation taken on line 19—19, Fig. 18, looking toward the right in said figure and illustrating the staple forming and driving mechanisms. Fig. 20 is an enlarged plan view of the cord carrier. Fig. 21 is a sectional plan of the cord clamping plate, and a portion of the hook with the cord clamped therebetween, taken on line 21—21, Fig. 17. Figs. 22 to 27 inclusive are diagrammatic perspective views illustrating different successive steps in the manufacture of the "toggle" by the machine of this invention. Figs. 28 and 29 are perspective views of the completed toggle. Fig. 30 is an end elevation of the driver slide 126′. Fig. 31 is a sectional plan taken on line 31—31 of Fig. 30, viewed in the direction of the arrows on said line. Fig. 32 is a sectional plan taken on line 32—32 of Fig. 30 illustrating the toggle bar, cord and staple in connection therewith.

In the drawings which I shall now proceed to describe specifically, it will be understood, in general, that the bars of the toggles are placed in mass in the machine and are arranged by suitable mechanism so that they can be taken one by one and presented to the cord which is to be subsequently attached to them. The cord is manipulated by suitable machinery so that the same extends around three sides of the bar and while being held in this position the staple is driven through the bar until the closed end engages the cord on one side, and on the opposite side of the bar the legs of the staple project through and are then folded over toward each other in engagement with the cord, passing said cord firmly against the bar. The cord is drawn out from its holder at one side while it is being held and fastened to the bar to form a long loop, then the side of this loop farthest removed from the bar is cut off, freeing the cord which is attached to the bar from the main portion of the cord in the machine, and the toggle is then removed from the machine. There is an automatic wire feeding and staple forming mechanism which manufactures the staple which is subsequently driven into the bar of wood to fasten the cord thereto. This, in general, is the mechanism and course of procedure by which the toggle is manufactured in the machine of this invention. The different mechanisms of the machine, as a whole, therefore, include 1st, a bar feeding mechanism; 2d, a cord manipulating mechanism; 3d, a staple forming mechanism; 4th, a staple feeding and driving mechanism; 5th, a cord measuring mechanism; 6th, a cord cutting mechanism; 7th, a toggle ejecting mechanism.

The different mechanisms hereinbefore referred to are operated by a clutch pulley 1 which is thrown into and out of engagement with the main driving shaft 2 by a clutch lever 3 (Fig. 1). The main driving shaft 2 is journaled in suitable bearings 4, 4 in the frame 5 of the machine (Fig. 3). Said main driving shaft has a number of cams directly fastened thereto and has a gear 6 fast thereto which is connected by the sprocket chain 7 to a sprocket gear 8 fast to the cam shaft 9. Said cam shaft 9 is journaled to rotate in bearings 10, 10 on the frame of the machine. A bevel gear 11 is fast to the main driving shaft 2 and meshes into another bevel gear 12 fast to a shaft 13 which extends rearwardly from the shaft 2 and operates the bar feeding mechanism.

Bar feeding mechanism, (Figs. 1, 2, 7 and 8.)—Referring, now, to Figs. 2 and 7, the bars 14 to which the cords are to be fastened to form the completed toggle are placed in mass upon an endless belt or apron 15. Said apron extends around drums or pulleys 16, 17 which are connected by the endless belt 15. The pulley 16 is fast to a shaft 18 which is rotated by the shaft 19 to which it is connected by a universal joint 20. The shaft 19 is rotated by mechanism illustrated in Fig. 8, consisting of a gear 21 fast to said shaft 19 and meshing into a gear 22 fast to a shaft 23. The gear 22 is driven by an intermediate gear 23′ which, in turn, is driven by a gear 24′ fast to the shaft 13. The carrier belt or apron 15 is moved by the mechanism hereinbefore described in the direction of the arrow *c* on the advancing side thereof and the raceway 24, into which the toggles are fed from the carrier belt 15, which raceway is clearly shown in cross section in Figs. 7 and 8 and in plan view in Figs. 1 and 2, extends at an angle to the endless carrier belt 15, the entrance of the raceway beginning at the edge 25 of the belt 15 (see Fig. 2), the upper surface of the advancing side of the carrier belt 15 being in alinement with the bottom of said raceway on the inside thereof. A guide plate 26 extends from the entrance of said raceway across the top of the carrier belt on its advancing side at an angle to said belt, as will be clearly seen in Fig. 2, said guide terminating in a portion 27 extending parallel to the edge of the carrier belt 15. The bars 14 are carried by the motion of the advancing upper side of the belt 15 against the

guide 26 and said guide, together with the belt 15, causes said bars to move diagonally across the belt 15 and into the raceway 24 end to end. Any of the bars which do not enter the raceway are forced off of the belt 15, partly by the belt 15 and partly by the auxiliary guide plate 28, and fall onto a suitably arranged chute 29 which extends downwardly between the advancing and retreating sides of the carrier belt 15, so that the bars which fall onto said chute are directed back onto the endless belt 15 upon the upper face of the retreating side. The bars which are returned to the belt are carried in the direction of the arrow *d* against a guide 30 which extends at an angle to the apron 15 and terminates within a hopper 31, so that all of the bars which are carried back onto the lower side of the belt are guided by said guide 30 into the hopper 31. The hopper 31 has an intermittent rotary motion imparted thereto by a pawl 32 and ratchet 33 (Fig. 7). The pawl 32 is pivoted to an arm 34 which is pivoted to a shaft 35 and has a rocking motion imparted thereto by a link 36 which is actuated by a rocker arm 37 pivoted at 38 to the frame of the machine and which, in turn, is rocked by an arm 39 which receives its rocking movement from an eccentric rod 40 mounted upon and operated by an eccentric 41 which is fast to the shaft 18. Thus a step by step rotary motion is imparted to the hopper 31. Said hopper is provided with buckets 42 which, as the hopper is rotated, pick up the bars from the bottom of the hopper and spill them onto a chute 43 which extends downwardly from the upper portion of the hopper toward the upper side of the conveyer belt 15, so that bars which have been carried into the hopper in the manner hereinbefore described are returned by said hopper from the lower side of the belt to the upper and advancing side of the belt. If desired, the bars 14 may be placed upon the carrier belt itself, or they may be placed in the hopper 31 as may be most convenient. After the bars 14 have been started into the raceway, as hereinbefore described, they are pushed along said raceway, end to end, to the front of the machine by a series of rotary feed fingers 44, 44 (see Figs. 1, 2, 7 and 8). These rotary feed fingers 44, 44 are arranged in pairs and each of said pairs of rotary feed fingers are pivotally and yieldingly mounted, respectively, upon rotary supports 45, 45. The rotary supports 45 (see Fig. 8) are each fastened to the upper end of a vertical shaft 46 which has at its lower end a bevel gear 47 meshing into a bevel gear 48 fast to the shaft 23. Thus a rotary motion is imparted to each of the supports 45 and upon each of these supports 45 is pivotally mounted a pair of feed fingers 44. Each of the fingers 44 is pivoted at 49 to its respective holder and is held against a stop by a spring 50, so that as the supports 45 rotate the fingers 44 come into contact with the bars which are located in the raceway 24, said fingers projecting through a slot 51 extending longitudinally of said raceway, and bearing against the side of the bar. As the support is rotated it will be seen that the springs 50 will yield and thus allow the fingers 44 to move along with a sort of dragging movement to feed the bars longitudinally of the raceway 24 end to end. It will be noted that the rotary supports 45, 45 are set at different angles so that a finger of at least one pair of feed fingers will be in contact with the bars in the raceway at all times during the operation of the machine. The toggle bars, then, it will be understood are now moved along end to end in the raceway 24 until the first toggle bar 14′ in the raceway arrives at the position illustrated in Fig. 4—that is, with the front end of the bar 14′ bearing against a stop 52. It will be understood that at this time the feed fingers are pushing on this series of end to end arranged toggle bars, so that the toggle bar 14′ is held against the stop 52 in the position illustrated in Fig. 4 by this end pressure. In the bottom of the raceway, beneath the toggle bar 14′, is an opening 53 of substantially the length of one of the toggle bars and beneath this opening projects the front end of the movable support 54. This movable support is adapted to slide toward the right (Fig. 4) and is held in its normal position as in Fig. 4 by means of a spring 55 which is fastened at the front end thereof to the frame 5 and at the rear end thereof to a pin 56 which is fast to the movable support 54 and is adapted to slide in a slot 57 in the frame 5. This movable support performs the function of supporting the foremost toggle bar 14′ in the raceway as it is being fed across the space or opening 53. It also performs the function of removing the end of the cord from the cord carrier after the toggle has been completed, as will be hereinafter more fully described. The movable support 54 is guided in its longitudinal sliding movement in a slot or guideway 58 formed in the frame 5 (see Fig. 14).

Cord manipulating mechanism, (see Figs. 1, 3, 4, 5, 6, 14, 15, 16, 17, 18 and diagrammatic views 22 to 29).—The toggle bar 14′ now being held in the position illustrated in Fig. 4, the next step is to pass the cord 59 beneath said toggle bar. The supply of cord 59 is contained in a spool 60 (Fig. 1) and passes from said spool through a tube 61 (Figs. 1 and 6) and over a slide 62 loosely mounted to slide longitudinally thereof in ways 63 in the frame of the machine. The cord 59 is held at the front end of the slide 62 between two fingers 64 and 65 both fast to the slide 62. These fingers

64 and 65, together with the slide 62, form a cord holder 62'. (See Fig. 6 and the end view of said cord holder where it appears in Figs. 14, 15, 16, 17 and 18.) A stop pawl or finger 66 is pivoted at 67 to the slide 62 and is held in engagement with the cord 59 by a spring 68, thus preventing the cord from being drawn toward the left (Fig. 6) relatively to the slide 62, but permitting the withdrawal of the cord toward the right in said figure or toward the front of said cord holder.

The slide 62, together with the parts attached thereto, is movable longitudinally of said slide and is also movable laterally thereof at its forward end. The longitudinal movement of the slide 62 is obtained by means of a cam 69 fast to the main driving shaft 2. This cam is provided with a cam groove 70 into which projects a cam roll 71 mounted upon a cam lever 72 pivoted at 73 to the frame of the machine. At the upper end of the lever 72 is a pin 74 swiveled in the arm 72 and this pin is connected by a pin 75 to a link 76 which, in turn, is connected by a pivotal joint 77 to another link 78 (Fig. 6[b]). The link 78 is pivoted at its rear end by a pin 79 to a block 80 which, in turn, is rotatably mounted upon a stud 81 fast to the slide 62. Said link 78 slides in a swivel stud 78' (see Fig. 6[c]) said stud 78' being mounted to rock in the frame of the machine. A stop-screw 82 in the slide 62 is arranged to abut against the frame 5 when said slide 62 is in its forward position as in Fig. 6, this screw limiting the distance to which the slide can be moved forward by the mechanism hereinbefore described.

In addition to the longitudinal movement of the cord holder, said cord holder has a lateral movement, and this lateral movement is obtained by means of a cam 83 (Figs. 1 and 3), said cam actuating a cam lever 84 pivoted at 85 to the frame of the machine and having pivotally connected thereto a slide 86 which has journaled thereon, at its forward end, a roll 87, this roll bearing against one side of the slide 62 (see Fig. 6[a]). The slide 62 is held against the roll 87 by a spring follower 88 provided with a roll 89 which bears against the slide 62. Thus said slide 62 moves between the rolls 87 and 89 and is capable of longitudinal movement and of lateral movement for the purpose hereinafter described.

Assuming the parts to be in the relative positions illustrated in Fig. 6, it will be seen that the cord 59 is projecting for a considerable distance beyond the front ends of the fingers 64 and 65 by which it is held, said fingers 64, 65 and the slide 62 forming, as a whole, the cord holder 62'. Said projecting end of the cord 59 is now to be carried transversely of the slide 62 beneath the bar 14' preparatory to passing said cord around the bottom and two opposite sides of said bar by moving said bar downwardly against the cord as it is held therebeneath. This operation of carrying the end of the cord beneath the bar and holding the same, preparatory to having the bar pushed down will now be described.

Referring to Figs. 1, 4, 6, 14, 15, 16, 17 and 18, the cord 59 is taken from the end of the cord holder 62' by a carrier 90 which is shown in detail in Fig. 20, in plan and in its position in the machine in Fig. 1. This cord carrier consists of a slide 91 arranged to slide in ways in the frame of the machine and to which a longitudinal movement is imparted by means of a lever 92 (Fig. 1) connected to said slide at 93. The cam lever 92 is pivoted at 94 to the frame of the machine and has a rocking motion imparted thereto by a cam 95 fast to the cam shaft 9. The slide 91 has a hook 96 fast thereto and said slide 91 also has a finger 97 loosely pivoted at 98 to the slide 91. A spring 99 is fastened at one end to the hook 96 and at the other end to the finger 97 and tends at all times to draw the finger 97 toward the hook 96. Assuming, now, that the cord is projecting from the end of the cord holder 62', as in Fig. 6, the cord carrier 90 is moved toward the right from the position illustrated in Fig. 14 to that illustrated in Fig. 15 and subsequently to that illustrated in Fig. 16. This is accomplished by the lever 92 which moves the slide 91 toward the right (Figs. 1 and 14), thus moving the hook 96 and the finger 97 also toward the right with said slide. As the hook is moving toward the right, as hereinbefore set forth, it is raised just before it reaches the projecting cord 59, as shown in Fig. 15, and the bent outer end of the hook is then dropped to the other side of the cord, as in Fig. 16. This lifting of the hook is obtained by means of the slide finger 100 (Figs. 1, 4 and 5). The front end of this slide finger passes beneath a guide plate 101 adjacent the rear side of the hook 96 and said slide finger extends at an angle upwardly through a guide 102 and has on its rearward end a cam roll 103 adapted to be engaged by a cam projection 104 on the cam 105. A spring 106 is connected to the slide finger 100 and keeps the roll 103 in engagement with the cam 105. Now, as the cord carrier moves forward to engage the cord, as hereinbefore set forth, this slide finger 100 is moved toward the left (Fig. 4) by the cam projection 104 and pushed beneath the hook, thus raising the hook 96 and also the slide 91 at its forward end slightly, in its ways, while the finger 97 remains stationary as to vertical movement and rests upon a cover plate 107. This lifting of the hook 96 is clearly shown in Fig. 15. When the hook is released by the slide

finger 100 moving backwardly, the hook drops down to the position illustrated in Fig. 16 and the free end of the cord 59 is prevented from moving downwardly away from the hook by the finger 97, so that the free end of the cord 59 is now held, as illustrated in Fig. 16, between the hook 96 and the finger 97. The cord carrier is now moved backwardly or toward the left from the position illustrated in Fig. 16 to the position illustrated in Figs. 1 and 17, and at the latter part of its backward movement, or movement toward the left (Fig. 17), the free end of the cord 59 is carried by the hook against a clamp-plate 108, said hook retreating into the slot 109 in said clamp plate and pinching the free end of the cord between itself and said clamp plate, (see Fig. 21.) The cord has now been carried from the position illustrated in diagram, Fig. 22, by means of the cord carrier beneath the bar 14′ and clamped against the clamp plate 108, substantially as illustrated in Fig. 24. Now, while the cord is held by the hook firmly at its free end, the cord holder 62′ moves toward the right, from the position illustrated in Fig. 14 to the position illustrated in Fig. 17 in full lines, thus paying out from the cord holder a certain amount of cord. The bar 14′ is moved downwardly from the position illustrated in Figs. 4 and 14 to the position illustrated in Fig. 17 and then to the position illustrated in Fig. 18. This downward movement of the bar 14′ is performed by a slide 110 (Figs. 4, 14, 17 and 18). Referring to Fig. 4, it will be seen that the slide 110 is guided in ways in the frame of the machine and is actuated by a lever 111 pivoted at 112 to the frame of the machine and having a rocking motion imparted thereto by a cam 113 which engages a roll 114 journaled on said lever 111. The lever 111 has an arm 115 pivoted on a stud 116 fast to said lever 111. This arm engages at its lower end a projection 117 on the movable support 54. Said arm 115 engages, on the side opposite to that upon which the projection 117 is located, a roll 118 journaled to rotate upon a pin 119 fast to the frame of the machine. The movable support 54 is pivotally mounted upon the pin 56, as well as slidably mounted upon the frame and is supported at its forward end by a spring 120, so that as the lever 111 is rocked the arm 115 will be thrown toward the right (Fig. 4) during this downward motion by the roll 118 which engages an incline 121 upon said arm 115, thus forcing the arm 115 to the right and by its engagement with the projection 117 on the movable support 54 moving said support 54 toward the right. The bar 14′ is being, meanwhile, pushed down by the slide 110 and as it engages the support 54 during the first part of its downward motion, said support 54 will swing upon its pivot 56 and be returned to its normal upward position after being moved toward the right (Fig. 4) to clear the bar 14′, by the spring 120. The bar 14′ is guided laterally during the downward motion thereof by a stationary plate 122 on one side thereof and by the end plate 123 on the opposite side thereof, said plate 123 being fastened to and forming, in effect, a portion of, a slide 124 which forms a part of the clenching mechanism and will be hereinafter more fully described. Said plates 122 and 123 form supports for the cord when the bar 14′ is being moved downwardly between them. As the cord 59 is drawn downwardly by the bar 14′ it will be seen that it will be drawn over the upper edges of the plates 122 and 123, and at this time the cord holder 62′ is moved at its forward end toward the left from the position illustrated in full lines (Fig. 17) to that illustrated in dotted lines therein, and thus the cord is fed by said cord holder to the bar as the bar is being pushed downwardly, which prevents, to a large extent, any unnecessary strain or fraying of the cord which would be caused by pulling the same around the corners of the bar 14′ and at the same time pulling the cord out of the cord holder. This cord holder, therefore, acts as a feeding element at this particular part of the operation to feed the cord to the bar while the same is being wrapped around the three sides of the bar. The bar having now arrived at the position illustrated in Fig. 18, with the cord held around the bottom and two opposite sides thereof, the next step is to drive the staple through the bar until the closed end of the staple engages the cord at one side of the bar and subsequently to bend the legs of the staple, where they project beyond the bar, toward each other and then clench them against the cord on that side of the bar, thus firmly uniting the cord and the bar by means of the staple on opposite sides of said bar. I will, therefore, now proceed to describe the wire feeding and staple forming mechanism.

Wire feeding and staple forming mechanism, (Figs. 1, 9, 14, 18 and 19.)—The wire 125 is wound on a reel 126 (Fig. 1) and is fed toward the front of the machine by the feeding mechanism illustrated in Fig. 9, in which the wire 125 passes through guides 127, 128, 129 and 130 between the feed roll 131 and the idler roll 132 which is held against the wire with a yielding pressure by the spring 133. The feed roll 131 is mounted upon a stud 134 and has a ratchet 135 fast thereto which is operated by a pawl 136 pivoted to a lever 137 which is pivoted at 138 to the frame of the machine and is rocked by a cam 139. The wire is thus fed forward between two cutters, viz., the stationary cutter 130, which also acts as a wire guide, and the vertical movable cut-

ter 140 which is adjustably fastened to a slide 141 adapted to slide in suitable ways in the frame of the machine and operated by a lever 142 pivoted at 143 to the frame of the machine, said lever being rocked by the cam 139′. See Figs. 1 and 3. The wire is fed between the cutters 140 and 130 by the feeding mechanism hereinbefore described and is fed against a stationary stop 144. It is then cut off by the cutters 140 and 130 coacting together and the piece thus cut off, which is to be bent to form a staple, drops upon a forming die 145, (Figs. 14 and 18.) Then this piece of wire 125′ which has been cut from the main portion of the wire 125, as hereinbefore described, is pushed forward on said forming die by a slide 146 until it falls into a groove 147 in the upper surface of said forming die. The slide 146 is given a reciprocatory motion for the purpose of "landing" the piece of wire 125′ in the groove 147 by a lever 148 (Fig. 1) which is pivoted at 149 to the frame of the machine and is rocked by a cam 150. The lever 148 is connected by a link 151 to the slide 146. The wire 125′ is bent to form a staple by the male former 152 which is grooved on its opposite sides 153, 153 and receives a vertical reciprocatory motion from a slide 154 to which it is fastened, said slide being guided in suitable ways in the frame of the machine and moved by a lever 155 pivoted at 156 to the frame of the machine (Fig. 1) and rocked by a cam 157. The wire is forced down through the female former or die 145 by the male former 152 and is bent to form a U-shaped staple 125^2 in the grooves 147′ which extend vertically down through the female former 145 (see Figs. 14 and 19). After the male former has pushed the wire down and formed the staple in the female former 145, it still further pushes it out of said female former and into grooves 158, 158 in a segmental carrier 159, (Fig. 19.)

Staple feeding and driving mechanism.—Assuming this segmental carrier at this time to be standing in the position illustrated in Fig. 18, it is rocked through an angle of about ninety degrees into the position illustrated in Fig. 14 by a rack 160 which meshes into a gear 161 fast to said segmental carrier. The rack 160 is guided in ways formed in a bracket 162 (Fig. 1) and has a reciprocatory motion imparted thereto by a lever 163 pivoted at 164 to the frame of the machine and having a rocking motion imparted thereto by the cam 165. The staples are carried by the segmental carrier from a vertical position, as in Fig. 18, to a horizontal position, as in Fig. 14, and above a slide 166. This slide has on its upper surface a holder 167 which is grooved on opposite sides at 168 to receive the staple, and the staple is pushed into said grooves 168, 168 by a slide 169, said slide 169 constituting a driver which drives the staple into the bar 14′. A reciprocatory motion is imparted to the slide 169 to push the staple into the grooves 168, 168 by a lever 170 (Fig. 1) pivoted at 171 to the frame of the machine and rocked by a cam 172. The slide 166 has a reciprocatory motion imparted thereto by a lever 173 pivoted at 174 to the frame of the machine and actuated by a cam 175. It will be understood that when the bar 14′ has descended to the position illustrated in Fig. 18, the slide 166 is then brought forward to clamp the bar against the end plate 123 of the slide 124, and on the top of this slide, at the front end thereof, is a cord guide 166′ which moves up with said slide 166, with its front face against the bar 14′ and adjacent to the plate 122. The slide 166 now having clamped the bar 14′ firmly against the plate 123, the slide 169 advances and drives the staple out of the grooves 168, 168 and through the bar, with its closed end engaging the cord on one side of the bar and the free ends of the legs of the staple projecting through the bar on the opposite side thereof, as illustrated in Fig. 11. The next step is to clench the legs of the staple over the cord and against the bar 14′ and this is done by the clenching mechanism illustrated in Figs. 1, 5, 10, 11, 12, 13 and 14. The slide 124 has mounted therein two other slides 124′ and 126′. The ends of the legs of the staple are first pinched toward each other by a pair of levers 176 and 177 which are pivoted upon pins 178 and 179, respectively, said pins 178 and 179 being fastened to the cover 107 of the slide 124 and at their lower ends extending into said slide 124. The levers 176 and 177 are provided with pins 181 and 182, respectively, and these pins project upwardly into cam-shaped slots 183 and 184, respectively, formed in a plate 185 which is rigidly fastened to the slide 124′. The slide 124′ is also provided with inclines 186 and 187, which, as hereinafter described, are adapted to abut at certain times, against the ends of the levers 176 and 177, respectively, during the clenching operation. A reciprocatory motion is imparted to the slide 124 by a lever 188 pivoted at 189 to the frame of the machine and rocked by a cam 190. The slide 124′ has a reciprocatory motion imparted thereto by a link 191 and lever 192 pivoted at 193 to the frame of the machine and actuated by a cam 194. The slide or driver 126′ is actuated by a lever 195 pivoted at 196 to the frame of the machine and rocked by a cam 197.

The clenching operation of the staple is as follows: Assuming the parts to be in the position illustrated in Fig. 11, with the legs of the staple projecting through the bar, the

slide 124′ is brought forward or to the right (Fig. 11) rocking the levers 176 and 177 upon their pivots until the ends of said levers engage the legs of the staple and bend them toward each other. Said levers are still further rocked upon their pivots during the latter part of the bending operation by the inclines 186 and 187, which abut against the ends of the levers themselves and thus take the strain off the pins 181 and 182. The levers then having been brought into the position illustrated in Fig. 12, the slide 126′ moves forward and the ends of the staple enter depressions 198 in the end of the driver slide 126′, and thus holds the ends of the staple legs in their bent position, when said ends are released by the moving apart of the levers 176 and 177. This moving apart of the levers 176 and 177 is obtained by moving the slide 124′ toward the left from the position illustrated in Fig. 12 to that illustrated in Fig. 13; the pins 181 and 182 projecting into the grooves 183 and 184 are rocked by this latter motion of the slide 124′ to the position illustrated in Fig. 13. The driver slide 126′ is then advanced to the position illustrated in Fig. 13 from that illustrated in Fig. 12 and the ends of the legs of the staple are firmly clenched and driven against the bar and against the cord 59, on that side of the bar. During this driving and clenching of the staple, the slide 110 moves upwardly from the position illustrated in Fig. 18 to that illustrated in Fig. 4, and in so moving allows the support 54 to resume the position illustrated in Figs. 4 and 4ᵇ. The pin 56′ projects from the front end of the movable support 54, the function of this pin being to free the hook 96 of the cord when the completed toggle is being taken out of the machine.

Cord measuring mechanism, (Figs. 1, 3, 6 and 18.)—While the staple is being driven the cord is measured off in the form of a loop and subsequently one side of said loop, viz., the side extending to the cord spool, is cut off. This measuring of the loop is for the long end of the toggle string and is accomplished by means of a cord measuring device consisting of a slide 199 (Fig. 1) which has a rack 200 thereon. This rack is guided in suitable ways in the frame of the machine and has a reciprocatory motion imparted thereto by a gear 201 (Fig. 3) which is rotatably mounted upon a stud 202 fast to the frame of the machine and projecting downwardly underneath said frame. The gear 201 has a pinion 203 fast thereto which meshes into a rack 204 adapted to slide in suitable ways in the frame of the machine and connected by a link 205 to the upper end of a cam lever 206. The cam lever 206 is pivoted to the stationary shaft 73 and has a rocking motion imparted thereto by the cam 208. The slide 199 has an arm 209 and this arm has rotatably mounted thereon a spool 210 (Figs. 6 and 18). Said spool has a flange 211 at its lower end and another flange 212 at its upper end and is free to slide in the end of the arm 209, but is kept normally in the position illustrated in Fig. 6 by a spring 213 which bears against the upper end of said spool. As the slide 199 is moved in the direction of the arrow *a* (Fig. 1) the flange 212 on the upper end of the spool 210 engages an inclined flange 214 on an arm 215 pivoted at 216 to the frame of the machine and held in the position illustrated in Fig. 6 by a flat spring 217 against a pin 215′. The flange 212 of the spool 210 rides up on the flange 214 and moves the spool longitudinally thereof in the arm 209, lifting the spool and the flange 211 on the bottom thereof over the cord 59, and when the spool has been moved to a sufficient extent in the direction of the arrow *a* (Fig. 1) the flange 212 drops off of the flange 214 behind said cord, as illustrated in Fig. 18, and said flange 212 engages the flange 214 upon its underside, the arm 215 tipping toward the right (Fig. 6) upon its pivot 216 to allow the spool in its motion toward the front of the machine to pass by the arm 215 without being raised longitudinally thereof. Then, upon a reversal of the motion of the slide 199, the spool 210 draws the cord 59 forward in the form of a loop, one end of the cord being fastened to the bar 14′, which is held firmly gripped at this time between the slide 166 and the plate 123 on the slide 124, the other end of the cord being drawn out from the cord holder 62′ and off of the spool 60. As the spool 210 moves to draw out this loop of cord, the cord passes from the bar around the guide 166′, as illustrated in Figs. 11 and 12, and thus the cord is prevented from being cut on the staple. While the cord is thus being measured, the cord holder 62′ moves rearwardly or toward the left (Fig. 6) and when the slide 199 has moved to the distance necessary to measure off the required length of cord in the form of a loop, as hereinbefore described, the spool 210 engages the clamp 211′ (Fig. 1). The cord which extends around the lower part of said spool is clamped between this clamp 211′ and the spool. The clamp 211′ slides on a support 212′ and is held in yielding engagement with the cord by means of a spring 213′. The cord is now firmly held at one end by the bar 14′ to which it is secured. At the other end it is held in the cord holder 62′ and intermediate these two ends, in the form of a loop, it is held between the clamp 211′ and the spool 210. The length of cord which forms the toggle is now cut from the main part of the cord in the machine by the following described mechanism.

Cord cutting mechanism, (Figs. 1, 3, 6, and 14.)—This cord cutting mechanism con-

sists of a lower cutter 218, an upper cutter 219, a lower clamp 220 and an upper clamp 221, (see Fig. 6). The lower cutter 218 and the clamp 220 are moved upwardly by a slide 222 which is guided in suitable ways in the frame of the machine and has a vertical reciprocatory motion imparted thereto by a lever 223 pivoted at 224 to the frame of the machine and actuated by a cam slide 225, one end of which is pivotally connected at 226 to said lever 223, the other end of which is bifurcated so as to slide upon the shaft 2. A reciprocatory motion is imparted to the cam slide 225 by a cam 227. A vertical reciprocatory motion is imparted to the upper cutter 219 and clamp 221 by a slide 228 to which the cutter 219 is adjustably fastened and upon which the clamp 221 is yieldingly mounted—that is, said clamp 221 is adapted to slide in the slide 228 against the action of a spring 229. The slide 228 is mounted in suitable ways in the frame of the machine and is fastened to a rod 230 which extends downwardly through the frame of the machine and is fastened at its lower end to another slide 231 adapted to slide in suitable ways in the frame of the machine and actuated by a link 232 which is pivotally connected to a lever 233. The lever 233 is pivoted at 234 to the frame of the machine and has pivotally connected thereto, at its rearward end, a cam slide 235 which is bifurcated to straddle the shaft 2 and which has a reciprocatory motion imparted thereto by the cam 236. The operation of this cutting mechanism is as follows: The cord holder having withdrawn from between the cutters 218 and 219, said cutters, with the clamp plates 220 and 221, are advanced toward each other, the clamp plates 220 and 221 engaging the cord 59 and holding it firmly clamped between them. At this time the slide 222 stops its upward movement and the cutter 218 and clamp plate 220 remain stationary. The upper slide 228 continues its downward movement, but the clamp 221 remains stationary, the spring 229 yielding to allow it so to do, while the cutter 219 continues its downward movement, and coacting with the lower cutter 218, cuts the cord necessary to form the toggle cord from the main portion of the cord 59.

Toggle ejecting mechanism, (Figs. 1, 3 and 27.)—As soon as the cord 59 has been cut, as hereinbefore described, that side of the loop of the cord which is measured out, as hereinbefore described, and which is adjacent to the cord cutters, is knocked down out of the way by an ejector. This cord ejecting mechanism consists of a rotary ejector 237 which has two arms 238 and 239 fast thereto, the arm 238 being shorter than the arm 239. The ejector 237 is fastened to a shaft 240 which extends rearwardly from the front of the machine and has a rotary motion imparted thereto by a sprocket 241 fast to said shaft and driven by a chain 242 (Fig. 8) which, in turn, is driven by a sprocket 243 fast to the shaft 13. As soon as the arm 238 (Fig. 27) of the rotary ejector has knocked the side 244 of the loop 245 downwardly out of the way, subsequent to the cutting operation hereinbefore described, the other arm 239 of said rotary ejector moving downwardly and being longer than the arm 238 engages the side 246 of said loop 245 and at this time the bar is free from the slide 166. The vertical slide 110 is moved up out of the way so that when the arm 239 strikes the side 246 of the loop it will knock that side of the loop downwardly, together with the bar 14′ and the cord which surrounds it, it being understood that at this time the hook 96 has moved forward, releasing the other end of the cord from the clamp plate 108, and that other end of the cord has been pushed out of the hook by the pin 56′ on the end of the movable support 54, so that the toggle bar and the end of the cord attached thereto being free, said toggle bar is thrown downwardly by the arm 239 and subsequently the slide 199 moves forward releasing the other end of the cord from the clamp 211′ and the toggle bar and its attached cord, completed, fall into the raceway 247 (Fig. 3), said toggles descending said raceway, which may be of any suitable form, and hanging, with the bars of the toggles on the upper side of the raceway and the cord hanging downwardly through a space 248 between the two side plates 249 and 250 forming said raceway. From this position they may be easily removed from the machine.

To prevent the end of the cord 59 from being thrown laterally toward the right out of the path of the hook 96, and also to assist in properly guiding the end of the cord after it has been cut and the same thrown downwardly by the toggle ejector, a wire stop or guard 251 is provided (Figs. 3, 6, 14 and 18).

The general operation of the mechanism hereinbefore specifically and to some extent, in general described, is as follows: Referring to Figs. 22 to 29 inclusive, the toggle bars are fed along the raceway 24 by the series of rotary feed fingers 44, as hereinbefore described, until the row of toggle bars, end to end, fills the raceway, as illustrated in Fig. 4, the toggle bar 14′ at the front of the machine being held, as hereinbefore described, against the stop 52 and resting upon the movable slide support 54. At this time a certain amount of cord projects beyond the end of the cord holder 62′, as seen in Figs. 6 and 22. The hook 96 is now carried forward beneath the bar 14′ and is lifted to pass over the cord, as seen in Fig. 15, this lifting of the hook being

performed by the slide finger 100 (see Figs. 4 and 5). The hook drops over the projecting portion of the cord 59 (see Fig. 3), when the slide finger 100 retreats. The cord is then held in the hook 96 and over the finger 97, as illustrated in Fig. 16. The hook 96 and finger 97 now retreat and carry the cord 59 beneath the bar 14′ (see Fig. 24), the free end of the cord being clamped by the plate 108 against the hook 96 (see Fig. 21) and held firmly in position. The cord holder 62′ then moves away from the hook and from the bar 14′, paying out a certain amount of the cord 59, leaving the parts in the position illustrated in Fig. 24, the cord holder 62′ being in the position shown in full lines (Fig. 17). The bar 14′ passes between the plates 122 and 123 (Fig. 17), carrying the cord down with it and wrapping said cord around the bottom and two opposite sides of said bar 14′. The bar is pushed farther down from the position illustrated in Fig. 17 to that illustrated in Fig. 18, and during this downward movement of the bar, the cord holder moves from the position illustrated in full lines (Fig. 17) to that illustrated in dotted lines therein, thus paying out cord to the bar as it is being pushed down between the plates 122 and 123 and preventing the rending of the cord around the edges of the bar 14′. The cord holder then moves back to the position illustrated in Fig. 18, drawing some cord from the cord holder and placing it in position for the measurer to come forward and measure off the loop of cord. When the parts are in the position illustrated in Fig. 18, the staple which has been formed as hereinbefore described and positioned by the segmental carrier in the position shown in Fig. 14 is driven through the bar 14′, said bar being held clamped at this time between the slide 166 and the front plate 123 of the slide 124. The staple having been driven through the bar, as shown in Fig. 11, the fingers 176 and 177 are moved toward each other at their front ends by the movement of the slide 124′ and the ends of the legs of the staples are bent, as illustrated in Fig. 12, whereupon the slide 126′ advances and engages said ends of the staple and holds them and then the slide 124′ retreats, causing the fingers 176 and 177 to spread apart and the driver slide 126′ is then advanced, driving and clenching the projecting ends of the legs of the staple against the cord and against the bar 14′. During this operation the vertical slide 110 has moved up, away from the bar 14′, the movable support 54 has returned to the position illustrated in Fig. 4, and the pin 56′ on the end of said support is in position to clear the cord out of the hook when the hook shall be advanced slightly preparatory to the removal of the completed toggle from the machine. During the movement hereinbefore described, the loop is drawn out, as illustrated in Fig. 27, by the measuring spool 210 by reason of the slide 199 moving toward the front of the machine in a direction opposite to the arrow *a* and the cord is gripped by the said measuring spool against the clamp 211′. Now the cord cutters 218 and 219 and the clamps 220 and 221 approach each other, the cord holder 62′ having retreated from between said cutters and clamps to a position considerably in the rear thereof, so that when the cutters approach each other and the cord is clamped between the clamps 220 and 221, said cord will be cut off by said cutters at a considerable distance in advance of the extreme end of the cord holder or of the spring fingers 64 and 65 of said cord holder and will, therefore, after having been cut off, project beyond the ends of said fingers, as illustrated in Fig. 6, preparatory to another forward movement of the hook to secure the same and draw the cord out for another toggle. Almost simultaneously with the cutting off of the cord, the short arm 238 of the ejector 237 strikes the side 244 of the loop 245 (see Fig. 27) and knocks this side of the loop downwardly out of the way of the mechanism, and this is followed by the arm 239 striking the side 246 of the loop 245, which occurs just after the bar has been released from between the slide 166 and the front plate 123. The hook 96 also having moved slightly forward has released the other end of the cord from between itself and the clamp plate 108, so that the toggle bar and its cord are free to be thrown downwardly out of the machine, which is done by the arm 239 striking the side 246 of the loop 245, as hereinbefore set forth, and almost simultaneously with the striking of this side 246 by the arm 239, the cord is entirely released from the machine by the measuring spool 210 being moved forward to release the cord from between itself and the clamp 211′. The completed toggle then falls into the raceway 247 and down said raceway to the position illustrated in Fig. 3.

The general operation of the feeding, cutting and forming of the wire staple has been hereinbefore fully set forth and, therefore, it is not thought necessary to repeat the same.

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

1. A machine for making a toggle having, in combination, mechanism adapted to feed a plurality of toggle bars in line, longitudinally thereof and contacting end to end with each other, means adapted to hold a cord across one of said toggle bars, mechanism adapted to move one of said toggle bars out of said line of toggle bars, laterally thereof,

means adapted to subsequently clamp said last named toggle bar, and mechanism adapted to connect a fastener to said bar in engagement with said cord, whereby said cord and bar are fastened together.

2. A machine for making a toggle having, in combination, mechanism adapted to feed a plurality of toggle bars in line, longitudinally thereof and contacting end to end with each other, means adapted to hold a cord across one of said toggle bars, mechanism adapted to move one of said toggle bars out of said line of toggle bars, laterally thereof, means adapted to subsequently clamp said last named toggle bar, and mechanism adapted to drive a fastener into said bar in engagement with said cord.

3. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to hold a cord across opposite sides of said bar, mechanism adapted to drive a fastener through said bar into engagement with said cord on one side of said bar, and means to clench said fastener against said cord on the opposite side of said bar.

4. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, mechanism adapted to bend the free ends of the legs of said staple toward each other on the opposite side of said bar, and a driver mechanism adapted to drive said bent ends into engagement with said cord on said opposite side of said bar.

5. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, and means for securing said cord to said bar.

6. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, mechanism adapted to subsequently move said bar into engagement with and transversely of said cord while it is held by said cord holder and carrier on opposite sides, respectively, thereof, whereby said cord is carried across the opposite sides of said bar, and means for securing said cord to said bar.

7. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, means adapted to move said cord holder away from and toward said bar alternately, mechanism adapted to move said bar into engagement with and transversely of said cord while it is held by said cord holder and carrier on opposite sides, respectively, thereof, whereby said cord is carried across opposite sides of said bar, and means for securing said cord to said bar.

8. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, means adapted to clamp said bar in a stationary position, and mechanism adapted to drive a staple into said bar with its closed end in engagement with said cord, whereby said cord is fastened to said bar.

9. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, mechanism adapted to move said bar into engagement with and transversely of said cord, means adapted to clamp said bar in a stationary position, and mechanism adapted to drive a staple through said bar, with its closed end in engagement with said cord on one side of said bar, and mechanism adapted to clench the free ends of the legs of said staple over said cord on the opposite side of said bar.

10. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, and means adapted to subsequently measure off a loop of said cord between said holder and bar.

11. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a

cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, and means to clamp said loop to said measurer.

12. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, means to clamp said loop to said measurer, and means to cut off said cord between said measurer and holder.

13. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, means to clamp said loop to said measurer, means to move said holder away from said measurer, and means to cut off said cord between said measurer and holder.

14. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, means to clamp said loop to said measurer, means to cut off said cord between said measurer and holder, and means to move the cut end of said loop transversely thereof.

15. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, means to clamp said loop to said measurer, means to cut off said cord between said measurer and holder, means to move the cut end of said loop transversely thereof, and means adapted to throw the completed toggle out of engagement with said carrier and measurer.

16. A machine for making a toggle having, in combination, means to hold the bar of said toggle, a holder adapted to hold a cord, a carrier adapted to carry the free end of said cord from said holder across said bar, mechanism adapted to drive a fastener into said bar in engagement with said cord, whereby said cord and bar are fastened together, means adapted to subsequently measure off a loop of said cord between said holder and bar, means to clamp said loop to said measurer, means to cut off said cord between said measurer and holder, means to move the cut end of said loop transversely thereof, a raceway, and means to throw the completed toggle out of engagement with said carrier and measurer and into said raceway.

17. A machine for making a toggle having, in combination, a raceway adapted to guide a plurality of toggle bars end to end, means adapted to move said toggle bars along said raceway, and an endless carrier belt extending at an angle to said raceway at the entrance thereof, the upper surface of the advancing side of said carrier belt being in alinement with the bottom of said raceway on the inside thereof, and a guide plate extending from the entrance of said raceway across the top of said carrier belt on its advancing side, at an angle to said belt.

18. A machine for making toggles having, in combination, a raceway adapted to guide a plurality of toggle bars end to end, an endless carrier belt extending at an angle to said raceway at the entrance thereof, the upper surface of the advancing side of said carrier belt being in alinement with the bottom of said raceway on the inside thereof, and a guide plate extending from the entrance of said raceway across the top of said carrier belt on its advancing side, at an angle to said belt.

19. A machine for making toggles having, in combination, a raceway adapted to guide a plurality of toggle bars end to end, an endless carrier belt extending at an angle to said raceway at the entrance thereof, the upper surface of the advancing side of said carrier belt being in alinement with the bottom of said raceway on the inside thereof, a guide plate extending from the entrance of said raceway across the top of said carrier belt on its advancing side, at an angle to said belt, a chute leading onto the upper advancing side of said belt, and a hopper adapted to feed toggle bars onto said chute.

20. A machine for making toggles having, in combination, a raceway adapted to guide

a plurality of toggle bars end to end, an endless carrier belt extending at an angle to said raceway at the entrance thereof, the upper surface of the advancing side of said carrier belt being in alinement with the bottom of said raceway on the inside thereof, a guide plate extending from the entrance of said raceway across the top of said carrier belt on its advancing side, at an angle to said belt, a chute leading onto the upper advancing side of said belt, a hopper adapted to feed toggle bars onto said chute, a second chute adjacent to the entrance of said raceway and leading thence onto the upper retreating side of said belt, and a guide extending along the top of the retreating side of said belt and terminating within said hopper.

21. A machine for making toggles having, in combination, a raceway adapted to guide a plurality of toggle bars end to end, a stop extending across the outer end of said raceway in alinement with said toggle bars, there being an opening through the bottom of said raceway adjacent said stop, through which one of said bars may pass laterally thereof, a movable support projecting beneath said opening, means adapted to hold a cord across said opening and means for securing said cord to said bar.

22. A machine for making toggles having, in combination, a raceway adapted to guide a plurality of toggle bars end to end, a stop extending across the outer end of said raceway in alinement with said toggle bars, there being an opening through the bottom of said raceway adjacent said stop, through which one of said bars may pass laterally thereof, a movable support projecting beneath said opening, means adapted to hold a cord across said opening, mechanism adapted to push one of said bars through said opening against said cord, and means for securing said cord to said bar.

23. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a hook and supporting finger, mechanism adapted to move said hook and finger transversely of said bar and of said cord, with said hook on one side of said cord and said finger on the opposite side of said cord, a clamp plate located on the opposite side of said bar from that upon which said holder is located and adapted to clamp the free end of said cord against said hook, and means for securing said cord to said bar.

24. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to hold a cord transversely of said bar, a support for said cord on opposite sides, respectively, of said bar, means adapted to push said bar against said cord and between said supports, whereby said cord may be passed across opposite sides of said bar, and means for securing said cord to said bar.

25. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to hold a cord transversely of said bar, a support for said cord on opposite sides, respectively, of said bar, and means adapted to push said bar against said cord and between said supports, whereby said cord may be passed across opposite sides of said bar, and mechanism adapted to drive a fastener into said bar with its closed end in engagement with said cord.

26. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to hold a cord transversely of said bar, a support for said cord on opposite sides, respectively, of said bar, means adapted to push said bar against said cord and between said supports, whereby said cord may be passed across opposite sides of said bar, mechanism adapted to drive a fastener through said bar with its closed end in engagement with said cord on one side of said bar, and mechanism adapted to clench the free ends of the legs of said fastener on the opposite side of said bar, whereby said cord and bar may be fastened together.

27. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, a pair of levers adapted to engage the free ends of the legs of said staple on the other side of said bar, and mechanism adapted to rock said levers, whereby said free ends are bent toward each other.

28. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, a pair of levers adapted to engage the free ends of the legs of said staple on the other side of said bar, mechanism adapted to rock said levers, whereby said free ends are bent toward each other, and a driver adapted to engage said bent ends and clench them against said cord and bar.

29. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, a cord holder located at one side of said bar, a carrier adapted to take the free end of said cord from said cord holder and carry it transversely of said

bar to the side of said bar opposite to that upon which said holder is located, means to clamp the free end of said cord to said carrier, mechanism adapted to subsequently move said bar into engagement with and transversely of said cord while it is held by said cord holder and carrier on opposite sides, respectively, thereof, whereby said cord is carried across opposite sides of said bar, mechanism adapted to move said cord holder away from said carrier after said free end has been clamped thereto, said last-named mechanism adapted to move said cord holder toward said carrier while said bar is being moved transversely of said cord, and means for securing said cord to said bar.

30. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to hold the free end of a cord at one side of said bar, a cord holder adapted to hold said cord on the opposite side of said bar, a support for said cord on opposite sides of said bar, respectively, means adapted to move said bar into engagement with and transversely of said cord and between said cord supports, mechanism adapted to move said cord holder toward said bar while the latter is being moved transversely of said cord, and means for securing said cord to said bar.

31. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, a pair of levers adapted to engage the free ends of the legs of said staple on the other side of said bar, mechanism adapted to rock said levers, whereby said free ends are bent toward each other, and means adapted to engage said bent ends and hold them while said levers are moved out of engagement with said legs.

32. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, a pair of levers adapted to engage the free ends of the legs of said staple on the other side of said bar, mechanism adapted to rock said levers, whereby said free ends are bent toward each other, and a driver having a depression in the end thereof adapted to receive and hold said bent ends while said levers are moved out of engagement with said legs.

33. A machine for making a toggle having, in combination, means adapted to hold the bar of said toggle, means adapted to pass a cord across opposite sides of said bar, mechanism adapted to drive a staple through said bar until the closed end of said staple engages said cord on one side of said bar, a pair of levers adapted to engage the free ends of the legs of said staple on the other side of said bar, mechanism adapted to rock said levers, whereby said free ends are bent toward each other, and a driver adapted to engage and hold said bent ends while said levers are moved out of engagement with the ends of said legs, and mechanism adapted to move said driver toward said bar, whereby said ends of the legs of said staple may be clenched against said cord and bar.

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

HERBERT S. CROMBIE.

Witnesses:
LOUIS A. JONES,
CHARLES S. GOODING.