

No. 883,379

PATENTED MAR. 31, 1908.

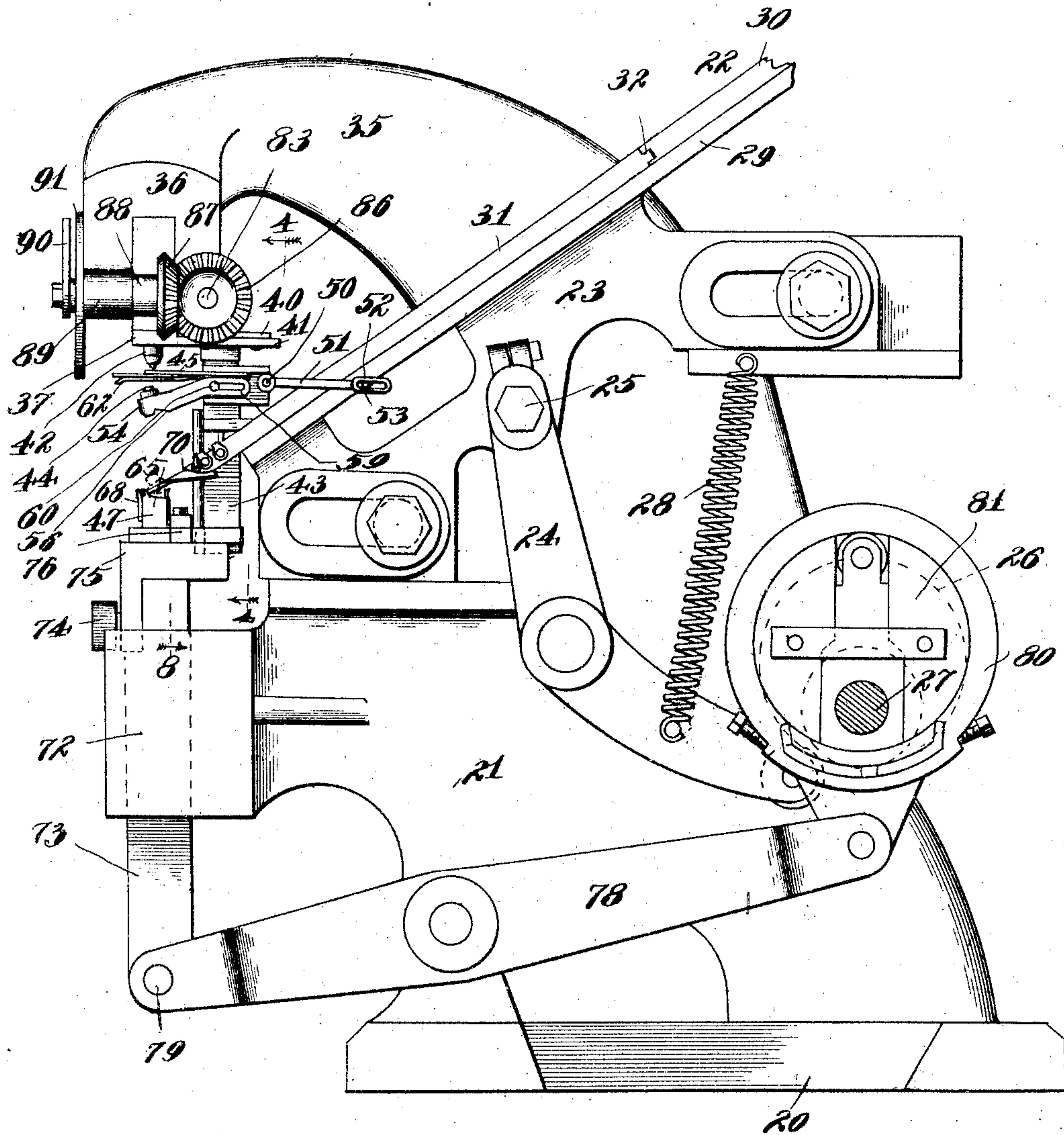
J. W. BARNA & V. HOFFMAN.

HOOK SETTING MACHINE.

APPLICATION FILED APR. 23, 1906.

3 SHEETS—SHEET 1.

*Fig 1*



*Witnesses*

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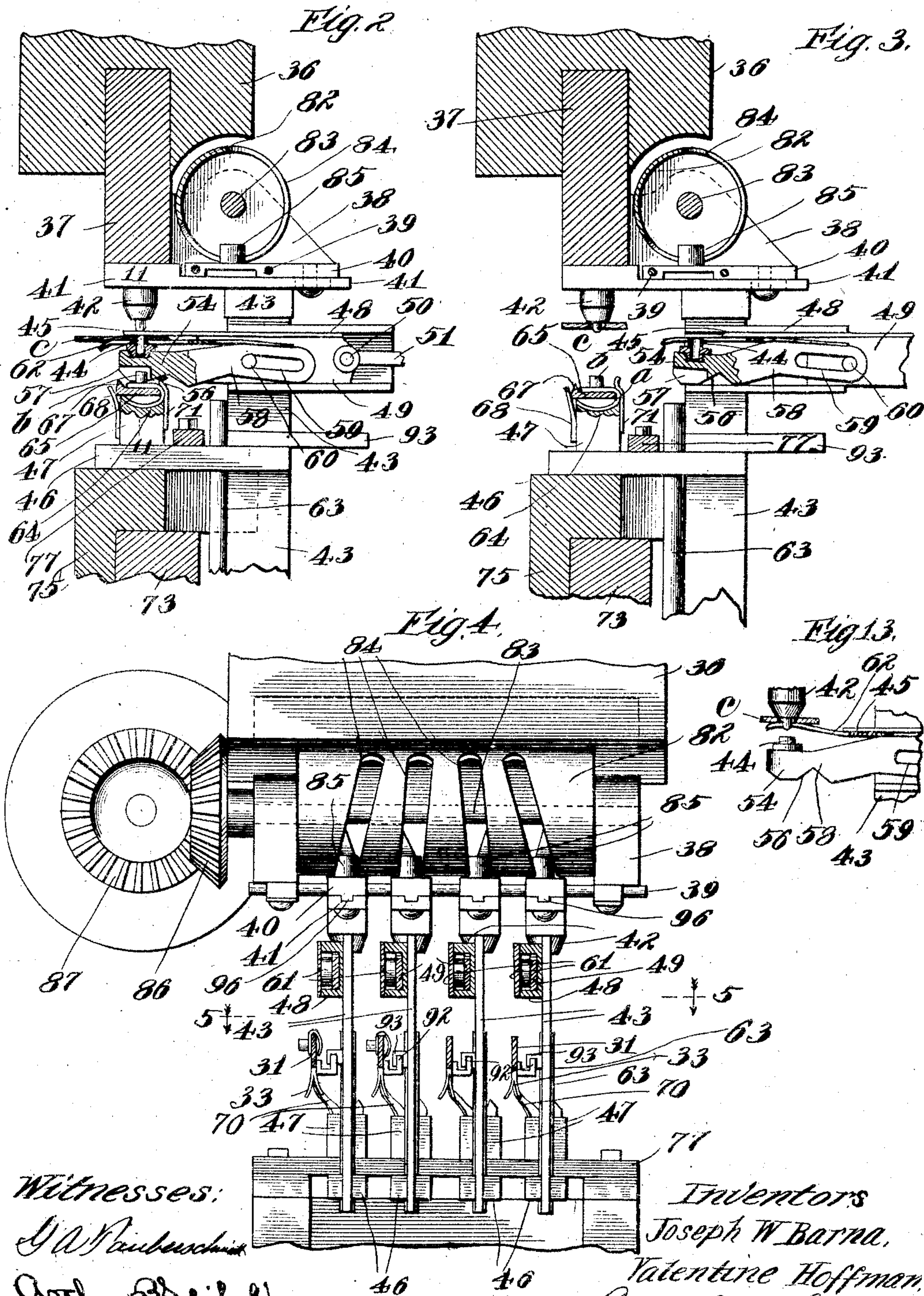
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HOOKE SETTING MACHINE.

APPLICATION FILED APR. 23, 1906.

3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 5.

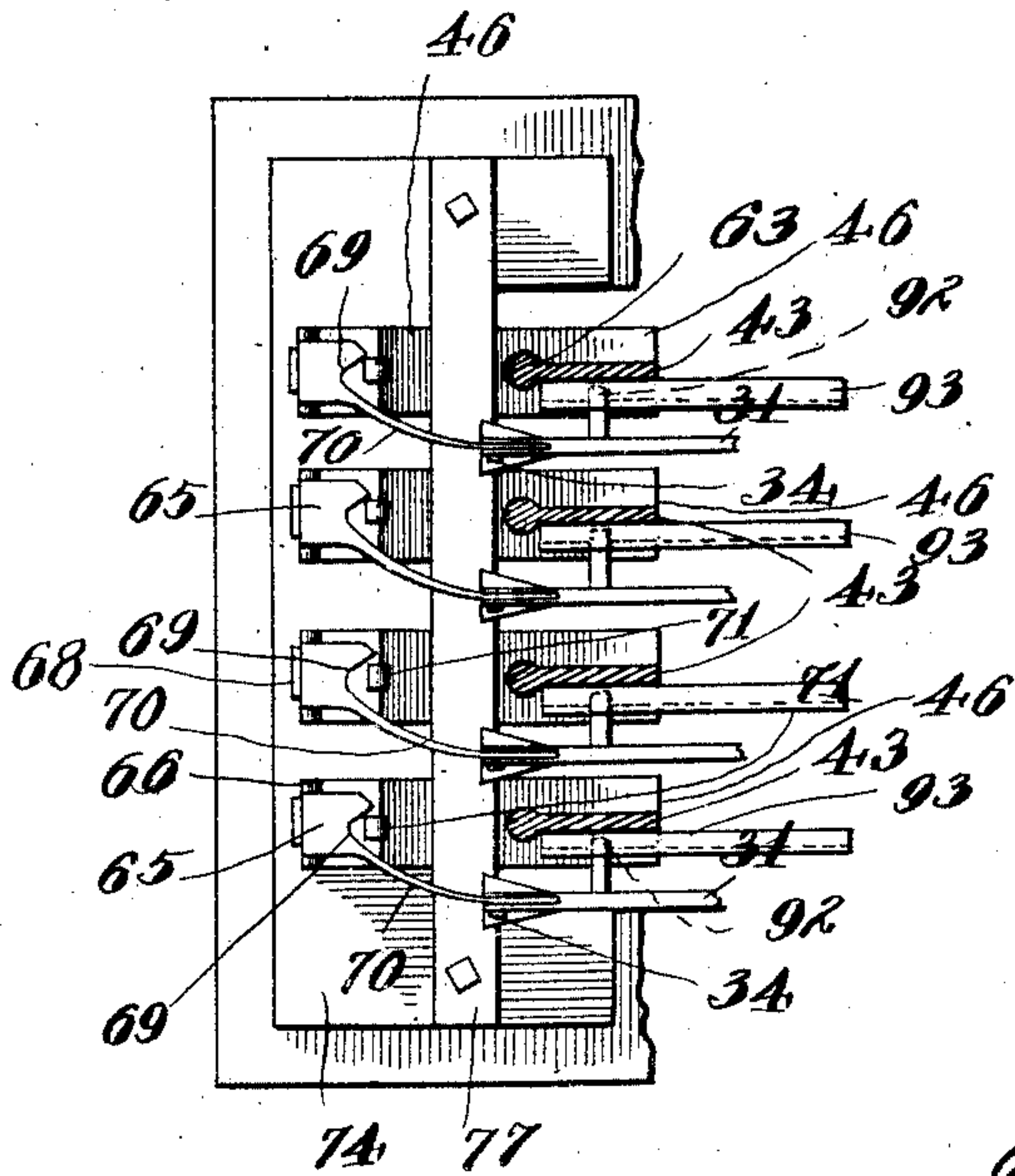


Fig. 6.

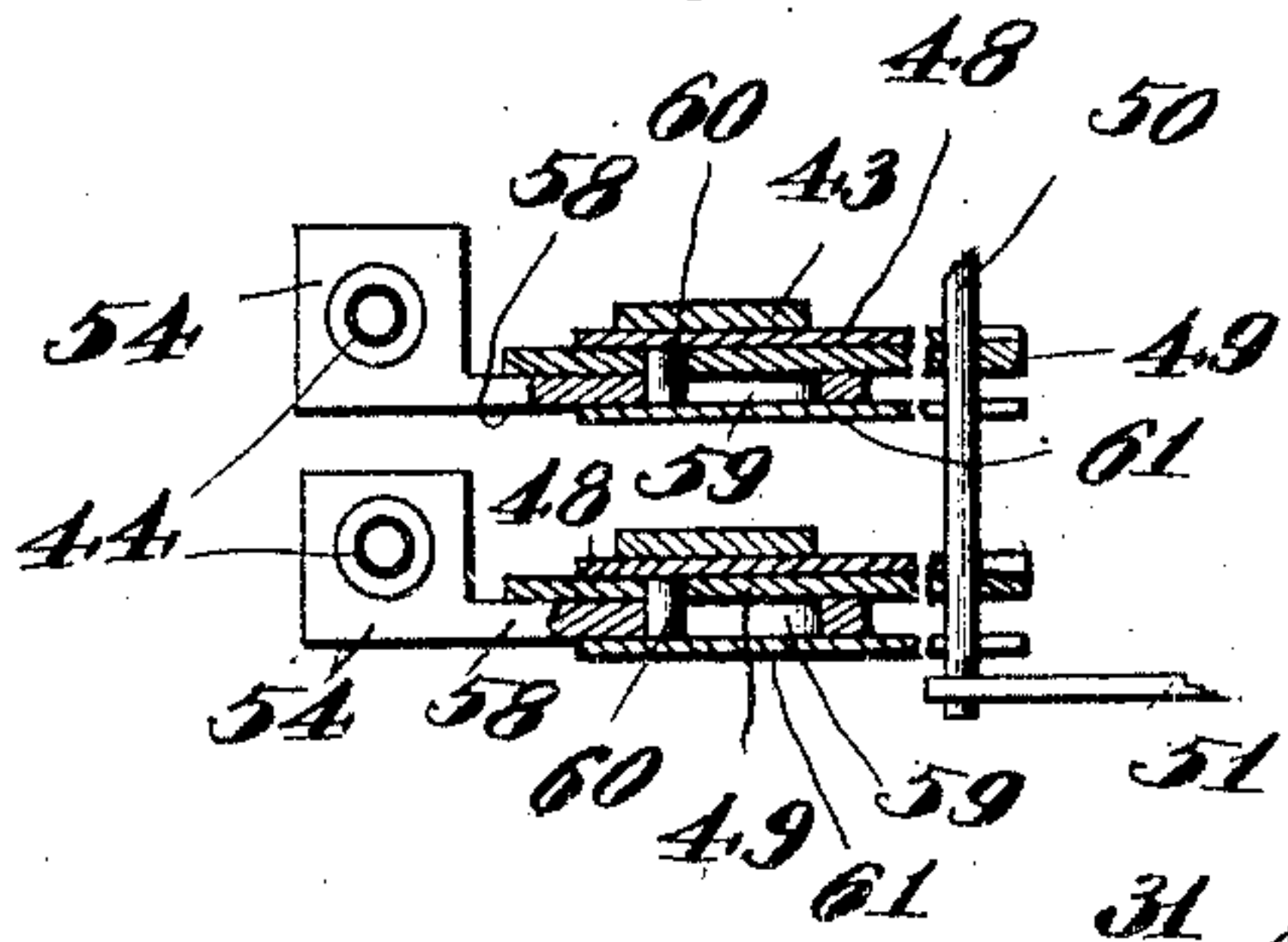


Fig. 7a.

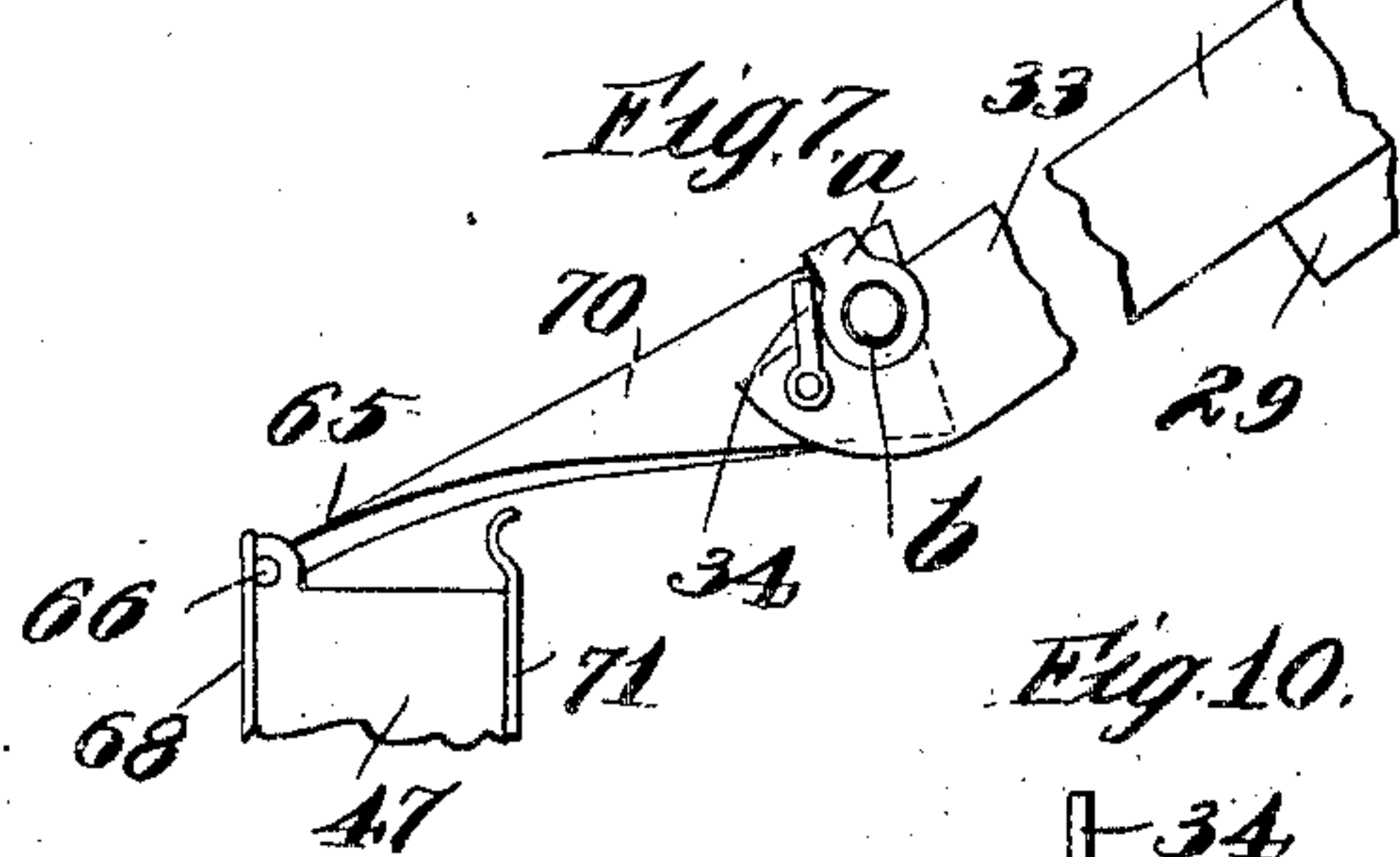


Fig. 10.

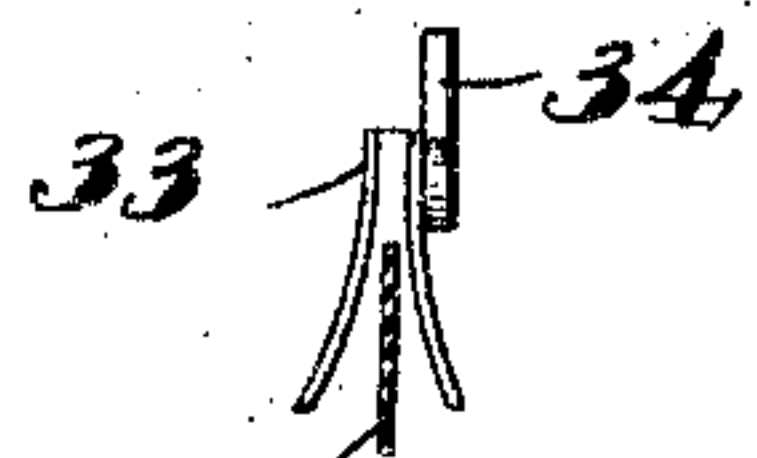


Fig. 12.



Fig. 8.

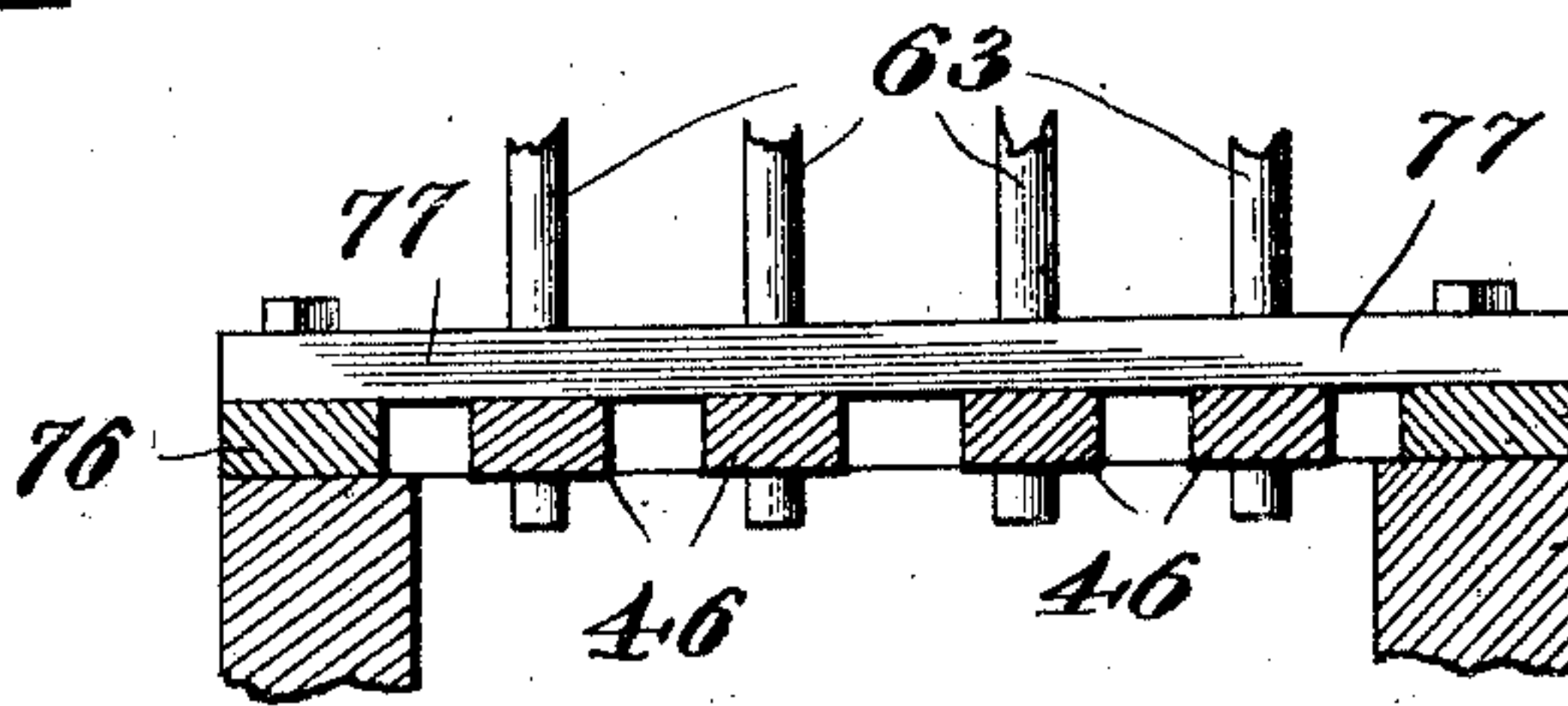


Fig. 11.

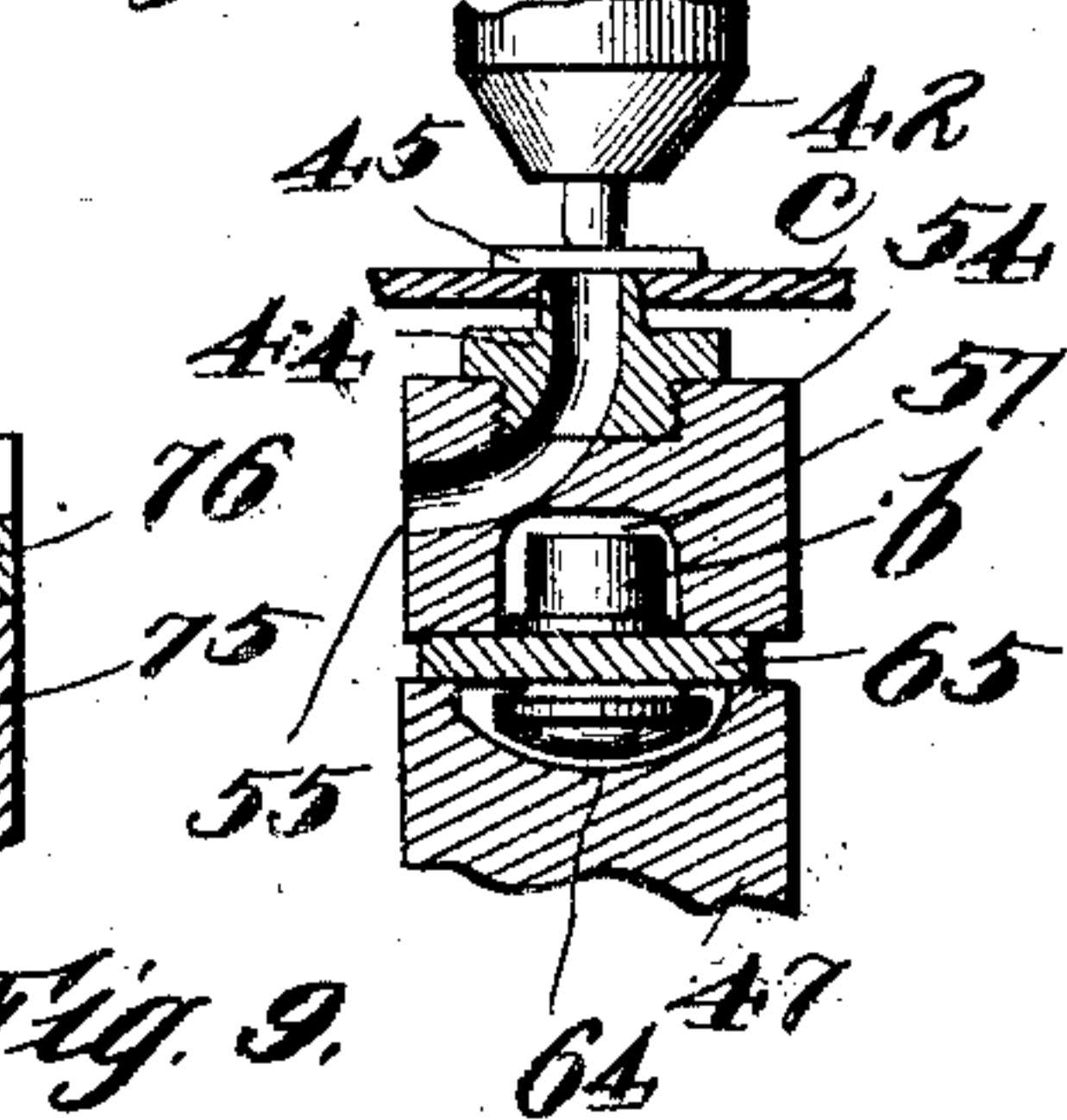
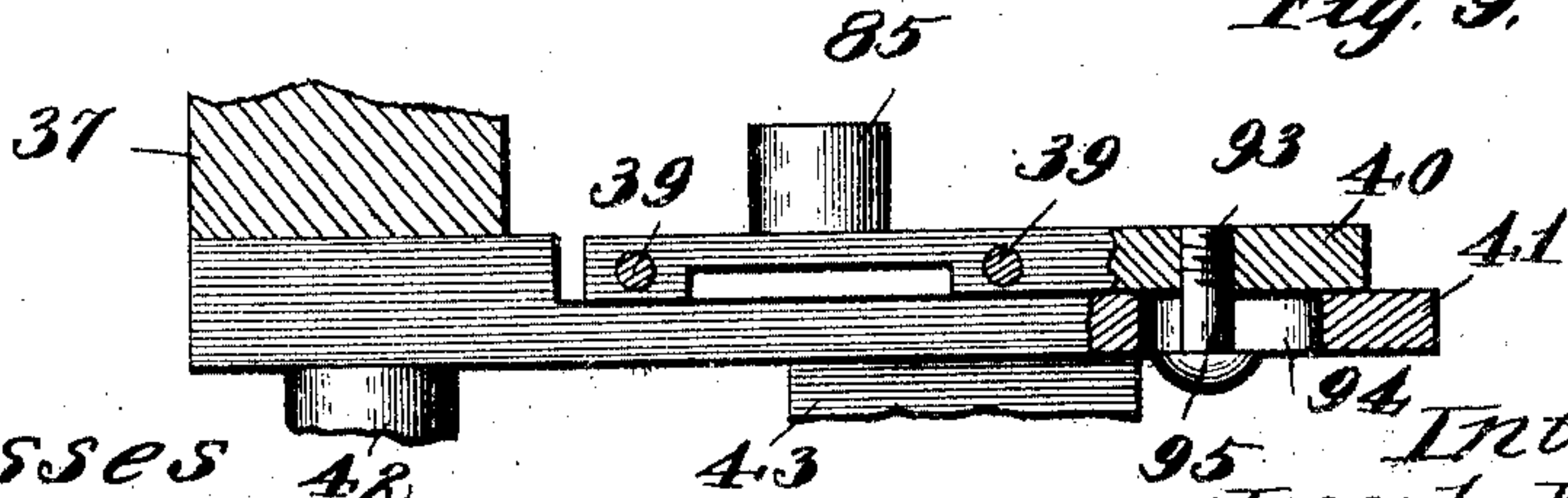


Fig. 9.



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# UNITED STATES PATENT OFFICE.

JOSEPH W. BARNA AND VALENTINE HOFFMAN, OF CHICAGO, ILLINOIS.

## HOOK-SETTING MACHINE.

No. 883,379.

Specification of Letters Patent.

Patented March 31, 1908.

Application filed April 23, 1906. Serial No. 313,143.

To all whom it may concern:

Be it known that we, JOSEPH W. BARNA and VALENTINE HOFFMAN, citizens of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Hook-Setting Machines, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a machine for setting fastening devices, such as lacing hooks, along the edges of the uppers of boots, shoes, and other articles.

The invention has for one of its objects to provide in a machine which punches the holes for the fastening devices and then affixes the fastening devices in such holes, means for varying the spacing between the punching devices and setting devices of each gang or series so that such machine may be employed in operating upon uppers of varying sizes and styles.

Other objects and advantages of the invention will be pointed out in the appended description.

The invention consists of the organizations and arrangements of parts hereinafter fully described and then pointed out in the appended claims.

In the accompanying drawings—Figure 1 is a view in side elevation of a hook setting machine showing an embodiment of the various features of our invention; Fig. 2 is a vertical sectional view partially in elevation and on an enlarged scale showing the positions assumed by the parts during the punching operation; Fig. 3 is a similar view showing the positions of the parts after the punching operation and with the punches retracted; Fig. 4 is a view in rear elevation particularly illustrating the adjustable carriers for the punches and sets and the means for adjusting such carriers, the view being taken on the line 4—4 of Fig. 1; Fig. 5 is a horizontal sectional view on the line 5—5 of Fig. 4; Fig. 6 is a detail plan view partially in section, showing two of the punch blocks and punches and the guides therefor; Fig. 7 is a view in side elevation of one of the movable sets showing its holder in its receiving position, and the associated hook guide; Fig. 8 is a detail sectional view on the line 8 of Fig. 1; Fig. 9 is a detail view in side elevation and on a larger scale of a portion of one of the adjustable carriers for the cooperating sets and associated punch;

Fig. 10 is a detail sectional view illustrating the bifurcated delivery end of one of the hook guides and the tongue of the hook holder entering the same to remove the end hook; Fig. 11 is a detail sectional view on the line 11—11 of Fig. 2; Fig. 12 is a detail view of one of the work supports; and Fig. 13 is a detail view of a punch and set with a work support.

In the present instance, we have shown the various features of our invention embodied in a hook setting machine. It will be obvious, however, that certain of the features may be used independently of each other and for setting other fasteners than shoe hooks.

Referring to Fig. 1, 20 indicates the base of the machine which has a standard 21. The standard 21 is provided with a raceway 22, the supporting frame 23 of which is adapted to slide back and forth in the usual manner of such devices. The means for reciprocating the raceway consists of a lever 24 which is pivoted between its ends to the standard and at its upper end, as at 25, is in pivotal engagement with the raceway frame, the other end of the lever cooperating with a suitable cam 26 shown in dotted lines in Fig. 1 and fixed on a suitable drive shaft 27 journaled on the frame of the machine. A contractile spring 28 is anchored at one end to the lever 24 and at its other end to a fixed part of the standard. The spring 28 is designed to move the raceway frame forward, while the cam 26 cooperates with the lever to retract the raceway in opposition to the spring. The raceway is composed of a plate 29 which is inclined at a suitable angle, and a plurality of guides which consist in the present instance of suitable strips standing on edge on the upper face of the plate and of a thickness slightly less than the opening of the hooks so that the latter will straddle and slide freely thereon. As shown in Fig. 1, each guide is in two sections the rear section 30 being fixed to the plate 29 while the front section 31 is hinged to the rear section at 32 so as to be capable of swinging laterally. The forward end of each hinged section 31 is split vertically or bifurcated, at 33, and the lower portions of the leaves forming the bifurcation are flared outwardly, as shown in Fig. 10. Adjacent the end of each guide is a pivoted finger 34 which serves as a stop to arrest the hooks and hold them until removed from the guide, in the manner herein-



after explained. The hooks *a* are fed to the guides from a suitable reservoir (not shown) and the number of guides corresponds to the number of hooks to be set at each operation.

5 The standard 21 is provided with a forwardly extending arm 35 having a depending head 36 to which is fixed and from which projects downwardly an abutment 37. This  
10 abutment has at its ends rearwardly extending brackets 38, supporting a transverse guide which in the present instance consists of a pair of rods 39 the ends of which are fixed to the brackets. A plurality of carriers, the number of which corresponds to the  
15 number of hooks to be set at each operation and which by their lateral adjustment vary the spacing of the punches and sets, are slidably mounted on the guide rods 39. Each of these carriers consists in the present instance of a plate 40 having suitable apertures through which the guide rods 39 pass, a forwardly extending plate 41 secured to the  
20 plate 40 and carrying the stationary set 42, a depending guide strip 43 on which the associated punch 44 and anvil 45 are mounted, as hereinafter described, and a forwardly extending arm 46 slidably mounted on the guide and carrying the movable set 47:

As shown in Figs. 2 and 3 the forward end  
30 of the plate 41 extends under the abutment 37 and abuts thereagainst, and the set 42 secured to the under face of the same may be of the usual or any suitable character. The guide strips 43, which are fixed to and depend from the plates 41, are provided on corresponding faces with horizontal guide ways  
35 which extend longitudinally of the machine and in the present instance consist of channel plates 48. In each channel plate is a slide 49 standing on edge, the rear ends of the several slides being connected by a cross rod 50, on which they are slidably mounted for lateral adjustment. The rod 50 has pivoted to its end links 51 the rear ends of which are  
45 slotted, as at 52, each to receive a stud 53 on the plate 29 of the raceway. By reason of this connection the slides 49 are reciprocated simultaneously by the raceway and lost motion between the raceway and slides is produced at the beginning of the movement of  
50 the raceway in either direction. Associated with each slide 49 is a punch block 54 having fixed thereto on its upper face the punch 44 which may be of any suitable form, the aperture therein communicating with a suitable outlet passage 55, in the punch block, to permit of the escape of the punchings, as shown in Fig. 11. The under face of the punch block is inclined or beveled upwardly and  
60 rearwardly, as at 56, and also provided with a recess 57 on its under face, to receive the shank *b* of the hook carried by the associated movable set 47 and which opens through the front face of the punch block to permit of the  
65 withdrawal of the punch after the punching

operation without interference by the hook shank. The punch block 54 is provided with a rearward arm 58 having an elongated slot 59 which receives a stud 60 fixed to the associated slide 49. The anvil 45 of each punch  
70 consists of a flat plate secured to the upper edge of the slide 49, and projects forwardly in its advanced position into the line of movement of the associated punch. By reason of the pivotal connection of each punch block  
75 with its associated slide said punch block is capable of swinging up and down, and owing to the slots 59 lost motion is created between the punch blocks and the slides when the latter are moved by the raceway. The slides and  
80 associated parts are retained in the channels of the plates 49 by cap plates 61, shown in Fig. 4, and the height of the punch arms 58 is less than that of the channel guides to permit of pivotal movement of the punches. A  
85 thin plate 62 of metal is secured to each punch arm under the associated anvil, and this plate is longer than and projects beyond the anvil and is deflected upwardly over the punch as shown in Fig. 13, its outer end being bent downwardly to facilitate the entrance of the material between the punch and anvil. These plates 62 provide work supports and as they move with the anvils are  
90 slotted at their free ends, as shown in Fig. 12, to clear the punches.

The forwardly extending arms 46 which slide on the guides 43 and carry the movable sets are located under the punches, and are designed to be reciprocated in the manner  
100 hereinafter described. As shown in Fig. 5, the arms 46 are bifurcated so as to straddle the guide strips 43, and to prevent the arms from being slipped off the guides horizontally the front edges of the latter are enlarged as  
105 at 63, the bifurcations being similarly shaped so as to embrace the enlargements. The movable sets consist, in the present instance, of suitable posts which are indicated by the numerals 47, each having a depression or  
110 cavity 64 designed to receive the crown of the hook to protect the same from abrasion. The posts are designed to carry the hook holders 65, each of which consists of a plate pivoted at its edge 66 to its associated post,  
115 as shown in Fig. 7.

The pivoted edge of the holder is beveled, as at 67, and cooperating with the angle produced by such bevel is a leaf spring 68 attached to the post. This spring engages the  
120 bevel of the hook holder when the latter is in its open or inclined position, as shown in Fig. 7, while when the holder is in its horizontal or closed position, as shown in Fig. 2, the spring engages the angle, thereby preventing  
125 accidental displacement of the holder in either of its positions. Each holder 65 is provided with a curved recess 69 at its rear edge, as shown in Fig. 5, and at the side of the recess towards its associated guide 31.  
130



the said guides being adapted to move past the sides of the guide strips 43, as shown in Fig. 5, it is provided with a rearward tongue 70 which gradually curves from the plane of the body of the holder to its end which is at a right angle to the body and in the plane of the bifurcation of the associated guide 31, as shown in Figs. 7 and 10, so that as the set is moved upwardly the tongue of its hook holder will pass through the bifurcation and lift the end hook off the guide, which hook moving by gravity will slide along the tongue and seat in the recess of the holder with its shank projecting upwardly. Leaf springs 71 are secured to the sets 47 at the side opposite the springs 68 the purpose of which is to coöperate with the hooks as hereinafter explained.

The standard 21 is provided with a forward extension 72 under the head 36 and this extension is provided with a vertical passage in which is adapted to reciprocate a slide 73. To the upper edge of the slide 73 is suitably fastened, as by a screw 74, a horizontally disposed cross plate or slide 75 forming a support for the arms 46 fixed thereon. As shown in Fig. 2, the rear side of the plate or slide 75 is recessed or cut out to permit of the backward and forward movement of the guides 43. The ends of the plate or slide 75 are provided with spacing blocks 76 on which a cross bar 77 is bolted above the arms 46, and by which the movable arms 46 are tied to the slide 75 so as to be reciprocated by the latter, and at the same time lateral movement of the arms is permitted to permit of the adjustment of the sets as hereinafter explained.

The slide 75 is reciprocated through the medium of a lever 78 pivoted between its ends to the standard 21 and the forward end of which is pivotally connected, as at 79, to the slide 75 while its opposite end is connected to the sleeve 80 of a suitable eccentric 81. This eccentric should be of such character as to advance the movable sets into position to receive the hooks, then force the sets into engagement with the punches to punch the holes, then permit of the retraction of the sets so that the punches may be withdrawn, then advance the sets into coöperation with the stationary sets, and finally restore the movable sets to their original position, such as that shown and described in a patent granted to us April 4, 1905, No. 786,340.

Means are provided for simultaneously moving the carriers for the punches and sets laterally to vary the spacing of the hooks. In the present instance we employ an oscillating or rotating plate which takes the form of a cylinder 82 mounted upon a shaft 83 located above the adjustable carriers and journaled in the brackets 38. This cylinder has a series of cam slots 84 into which enter studs 85 fixed to the plates 40. The slots 84 ex-

tend circumferentially of the cylinder, and are arranged divergently, as shown in Fig. 4, in such relation to each other that when the cylinder is turned the punches and sets will be moved simultaneously such relative distances that they will be equally spaced in any position of adjustment. The shaft 83 is provided with a bevel gear 86 which meshes with a similar gear 87 on a shaft 88 suitably journaled in a bearing 89 on the head 36 and provided with a pointer 90 which plays over a graduated dial 91 on the front of the head 36 and designed to be moved by the operator to adjust the parts. The graduations on the dial are such as indicate a certain predetermined adjustment or spacing when the pointer is opposite a particular graduation.

In order to adjust the hook guides so that they will follow the adjustments of the sets and be in proper positions to deliver hooks to the holders of the movable sets in their different adjustments, the pivoted ends of the guides 31 are connected to the carriers for the sets and punches so that when such carriers are adjusted the guides will be simultaneously and correspondingly adjusted. In the present instance this connection consists of a lateral pivot pin 92 secured to each pivoted section 31 of the hook guides and entering a groove in a plate 93 secured to an associated guide strip 43. By this arrangement the pivoted sections while connected to the guide strips are capable of pivotal movement at the pivot connection and also of relative longitudinal movement as they follow the movement of the guide strips. The grooved plates 93 are of such length as to engage the pivot pins 92 in all positions of the raceway.

It is obvious from the foregoing that by turning the cylinder 87 the sets and punches of each series will be moved simultaneously and that the spacing between the parts will depend merely upon the amount of movement of the cylinder. Furthermore, that owing to the connection between each of the adjustable carriers and the raceway guides the latter will be correspondingly adjusted so as to always be in proper relation to the hook holders of the movable sets.

In order to vary the line of the hooks to conform to the contour of the edges of different uppers or to suit the fancy of the operator, the plates 41 are adjustable longitudinally and independently of each other. To this end each plate 41 is provided with a longitudinal slot 94 through which passes a headed bolt 95 entering the plate 40, as shown in Fig. 9. By unloosening the bolts 93 the plates 41 may be moved backward or forward to adjust the associated sets and punches to vary the line or curvature of the hooks when set. In order to insure rectilinear movement of the parts during such ad-



justment, the plates 40 and 41 may have a tongue and groove connection 96, as shown in Fig. 4.

At the beginning of the operation the hook holders 65 are in the inclined position shown in Fig. 1, and the slide 73 in its lower or depressed position. As the slide 73 is elevated by the eccentric 81, the raceway is moved forward by its cam and as it reaches the forward limit of movement, at which time the punches and anvils are in the position shown in Fig. 1, the tongues of the hook holders enter the bifurcations of the hook guides 31 and lift the end hooks therefrom. The flaring leaves of the bifurcation in the hook guides insure the entrance of the tongues of the hook holders in the event that such tongues are not truly centered with relation to the bifurcations. The hooks then slide by gravity along the tongues and enter the recesses in the holders with their shanks upward. The raceway then begins its retractive movement, and the slide 73 continuing its upward movement forces the hook holders against the inclined faces 56 of the punch blocks thereby throwing the hook holders into horizontal position against the posts 47, when the springs 71 snap past the rear faces of the hooks and engaging the flanges thereof hold the hooks in position and at the same time assist the springs 68 in preventing displacement of the hook holders. Continued upward movement of the slide 73 brings the portions of the hook holders at the sides of the hooks against the portions of the punch blocks at the sides of the recesses 64 as in Fig. 11, forcing the punches through the slots of the work-holders 62 and against the anvils thereby cutting the hook holes in the material *c*, and placing the work holders 62 under tension. As soon as this operation is completed the studs 53 will have reached the end of the slots in the links 51 and the retraction of the slides 49 and anvils begins. As soon as the anvils clear the upper sets 42, the work being still held in position by the engagement of the punches 44 in the holes cut thereby, the spring work-holders 62 spring upward stripping the work from the punches and forcing it on the teats of the stationary sets 42, as shown in Fig. 13. The slide 73 now drops slightly by gravity, owing to the operation of the eccentric 81, releasing the punch blocks which then drop downward into the position shown in Fig. 1. By this time the studs 60 of the slides 49 will have reached the rear ends of the slots in the arms 58 of the punch blocks, thereby through the agency of the rearwardly moving raceway retracting the punches. The slide 73 now advances again under the operation of the eccentric moving the movable sets 47 into cooperation with the stationary sets to affix the hooks in the material, after which the slide 73 is retracted by the eccentric to re-

store the parts to their original positions. The hook holders 65 of the movable sets are restored to their inclined receiving positions by the act of removing the material.

Having described our invention what we claim, is—

1. In a machine of the class described, punching mechanism, opposed series of cooperating hook-setting sets, and means to adjust the punching mechanism and the sets of both series to vary the spacing thereof.

2. In a machine of the class described, punching mechanism, opposed series of cooperating hook-setting sets, and means common to the punching mechanism and the sets of both series to adjust them laterally to vary the spacing thereof.

3. In a device of the class described, punching mechanism, opposed series of cooperating hook-setting sets one of which series is movable relatively to the other, a carrier for each opposing pair of sets, and means to adjust the carriers and punching mechanism simultaneously.

4. In a machine of the class described, opposed series of cooperating hook-setting sets, means for moving the sets of one series relatively to the other, a carrier for each opposing pair of sets, punching mechanism on the carriers and means to adjust the carriers simultaneously to vary the spacing of the sets.

5. In a device of the class described, a plurality of carriers each of which is provided with a fixed set and a relatively movable set and with punching mechanism, means for moving the movable sets to cooperate with the fixed sets, and means to adjust the carriers simultaneously to vary the spacing of the sets.

6. In a device of the class described, a raceway, a plurality of carriers each having an opposing pair of sets, and a member having cam slots cooperating with the carriers to adjust the same laterally to vary the spacing of the sets.

7. In a device of the class described, a raceway, a plurality of carriers each of which is provided with a fixed set, an opposing series of sets movably mounted on the carrier and one of which is associated with each fixed set, means for moving the movable sets into cooperation with the fixed sets, and a rotatable member having cam slots cooperating with the carriers to adjust the same laterally to vary the spacing of the sets.

8. In a device of the class described, a raceway, a plurality of carriers each of which is provided with a fixed set and a vertical guide, an arm slidably mounted on each guide and provided with a set having a hook holder to which the hooks are delivered by the raceway, a reciprocating slide for moving the arms on the guides, a stud on each carrier, and an axially mounted curved plate



having cam slots engaged by the studs whereby when the curved plate is moved on its axis the carriers will be adjusted laterally to vary the spacing of the sets.

5 9. In a device of the class described, laterally slidable carriers each of which is provided with cooperating sets a punch, and an anvil associated with each punch, and means for sliding the carriers simultaneously  
10 to vary the spacing of the punches and sets.

10. In a device of the class described, laterally slidable carriers each of which is provided with cooperating sets a punch and an associated anvil, means for sliding the carrier  
15 to vary the spacing of the sets and punches, and means for moving the punches into cooperation with the anvils.

11. In a device of the class described, a plurality of carriers each of which is provided with cooperating sets a punch and an anvil, studs on the carriers, and a transversely disposed curved plate having cam slots engaged by the studs to move the carriers laterally to vary the spacing of the sets  
20 and punches.

12. In a device of the class described, a plurality of punches each having an associated anvil, a carrier by which each punch and anvil is supported, a plate on which each  
30 carrier is adjusted longitudinally of the machine to permit of independent adjustment of each punch to vary the line of the holes cut by the punches, and means for moving the plates laterally to vary the spacing of the  
35 punches.

13. In a device of the class described, a series of punches each of which is provided with an associated anvil, means for moving the punches into cooperation with the anvils,  
40 a carrier for each punch and its anvil, cooperating sets on each carrier, means to adjust the punches and anvils on the carrier to vary the line of the holes cut by the punches, and means to adjust the carriers to vary the spacing  
45 of the punches and sets.

14. In a device of the class described, opposed series of sets one of which series is movable relatively to the other, guides for delivering hooks to the sets of one of the series,  
50 and means for varying the spacing of the sets of each series and the guides associated therewith simultaneously.

15. In a device of the class described, a series of sets, guides for delivering hooks to the sets, and means for varying the spacing  
55 of the sets and guides simultaneously.

16. In a device of the class described, laterally adjustable punches and cooperating sets, and raceway guides adjustable simultaneously with the punches and sets.  
60

17. In a device of the class described, opposed series of sets one of which series is movable relatively to the other, guides for delivering hooks to the sets of the movable series,  
65 means for varying the spacing of the sets,

and connections between the sets and the guides to simultaneously adjust the guides.

18. In a device of the class described, a plurality of laterally adjustable carriers each of which is provided with a punch and an opposing pair of cooperating sets, and a raceway having the delivery portions connected to the carriers so as to be adjustable there-with.  
70

19. In a device of the class described, a plurality of laterally adjustable carriers each of which is provided with a punch and an opposing pair of cooperating sets, a raceway provided with pivoted guides having sliding and pivotal engagement with the carriers.  
75 80

20. In a device of the class described, a guide having a bifurcated end, a stationary set, and a movable set having a hook holder provided with a tongue to direct the hook to the holder and which passes through the bifurcation of the guide to remove the hook therefrom.  
85

21. In a device of the class described, an edgewise disposed guide having a vertical recess in its end, a stationary set, and a movable set having a hook holder provided with a tongue which when the movable set is moved towards the stationary set passes through the recess of the guide to remove the hook therefrom and direct the same to the holder.  
90 95

22. In a device of the class described, a raceway guide formed with a bifurcation having outwardly flaring leaves, a stationary set, and a movable set having a hook holder provided with a tongue which when the movable set is moved towards the stationary set passes through the bifurcation to remove the hook from the guide.  
100

23. In a device of the class described, a plurality of raceway guides each of which is formed with a bifurcation at its delivery end, stationary sets, and cooperating movable sets having hook holders provided with tongues which when the movable sets are moved towards the stationary sets pass through the bifurcations to remove the hooks from the guides.  
105 110

24. In a device of the class described, a plurality of punches, a similar number of hook-setting sets, and means to adjust the punches and sets simultaneously to vary the spacing thereof.  
115

25. In a device of the class described, a plurality of punches, an opposed series of cooperating sets for affixing the hooks after the punching operation, and means to adjust the punches and sets simultaneously to vary the spacing thereof.  
120

26. In a device of the class described, a plurality of punches each of which is provided with an anvil, means for advancing and retracting the punches, a series of stationary sets, an opposed series of movable sets for first moving the punches when advanced into cooperation with their anvils  
125 130



and then cooperating with the stationary sets after the retraction of the punches, and means to adjust the punches and sets simultaneously to vary the spacing thereof.

27. In a device of the class described, a plurality of carriers each of which has a set fixed thereto, an opposed series of movable sets connected to the carriers and movable thereon, a plurality of punches carried by the carriers, and means for adjusting the carriers laterally to vary the spacing of the sets and punches.

28. In a device of the class described, a plurality of carriers each of which has a set fixed thereto, an opposed series of movable sets connected to the carriers and movable thereon, a plurality of punches carried by the carriers, and a rotatable member having cam slots for moving the carriers laterally to vary the spacing of the punches and sets.

29. In a device of the class described, a plurality of carriers each of which has a set fixed thereto, an opposed series of movable sets connected to the carriers and movable vertically thereon, a plurality of punches carried by the carriers, means for adjusting the carriers laterally to vary the spacing of the sets and punches, a rotatable member having cam slots, and studs on the carriers engaging the slots whereby as the rotatable member is turned the carriers are moved laterally simultaneously to vary the spacing of the sets and punches.

30. In a device of the class described, a series of punches, a series of hook-setting sets, and means for varying the spacing of the punches and simultaneously varying the spacing of the sets to correspond with the spacing of the punches.

31. In a device of the class described, a plurality of carriers each of which is provided with a stationary set, a movable set connected to the carrier and cooperating with the stationary set, a corresponding number of punches and associated anvils, and means to adjust the carriers simultaneously to vary the spacing of the punches and sets.

32. In a device of the class described, a plurality of stationary sets, movable sets cooperating with the stationary sets, a corresponding number of punches and associated anvils, means to adjust the sets and punches simultaneously to vary the spacing thereof, and a raceway for delivering the hooks to the movable sets irrespective of the spacing thereof.

33. In a device of the class described, a series of laterally adjustable carriers each of which is provided with a fixed set, a series of movable sets each of which is connected to an associated carrier and is movable thereon, punches and associated anvils movable into the path of the movable sets and operated thereby, means for moving the punches and

anvils into and out of the path of the movable sets, and means to adjust the carriers laterally to vary the spacing of the sets and punches.

34. In a device of the class described, a raceway, a plurality of carriers each of which is provided with a fixed set, a series of movable sets connected to the carriers and movable thereon, connection between the raceway and the punches and anvils for moving the same into and out of the path of the movable sets, means for moving the movable sets, and means for adjusting the carriers laterally to vary the spacing of the punches and sets.

35. In a device of the class described, a raceway provided with a plurality of guides having pivoted delivery ends, carriers each of which is provided with a fixed set, movable sets connected to the carriers and movable thereon, punches each of which is provided with a punch block, connection between the punch blocks and the raceway to move the punches into and out of the path of the movable sets, means for moving the carriers to vary the spacing of the punches and sets, and connections between the carriers and the pivoted portions of the raceway guides to adjust such pivoted portions.

36. In a device of the class described, a raceway provided with a plurality of guides having pivoted delivery ends, a plurality of carriers each of which is provided with a fixed set and a depending guide, arms slidably mounted on the guides and provided with sets, a slide mounted on each guide and having a punch pivoted thereto, an anvil on each slide for each punch, connection between the slides and the raceway to move the punches and anvils into and out of the path of the movable sets, a reciprocating slide for moving the arms of the movable sets, a curved plate having circumferential cam slots, and studs on the carriers engaging the slots, whereby as the plate is turned the carriers are moved laterally to vary the spacing of the sets and punches.

37. In a device of the class described, a stationary set and a movable set, a punch and an anvil therefor, means for moving the punch and anvil into and out of the line of movement of the movable set, and a work support for forcing the work upon the stationary set after the punching operation and upon the retraction of the anvil.

38. In a device of the class described, a stationary set and a movable set, a punch and an anvil therefor, a lost motion connection between the punch and anvil, means for moving the punch and anvil into and out of the line of movement of the movable set, and a spring work support which upon the retraction of the anvil and before the retraction of the punch strips the work from the punches and forces it on the stationary sets.



39. In a device of the class described, a stationary set and a movable set, a punch provided with a spring work support, means for moving the punch and anvil into the line of movement of the movable set to be actuated by the latter, and a lost motion connection between the punch and anvil to permit of the retraction of the anvil before the punch, whereby upon the retraction of the anvil the work is stripped from the punch by the work support and forced on the stationary set.

40. In a device of the class described, a raceway, a plurality of stationary sets and movable sets, punches having slotted arms and provided with spring work supports, slides to which the slotted arms are pivoted to provide lost motion between the parts, anvils fixed to the slides, connections between the slides and raceway to move the punches and anvils into and out of the line of movement of the movable sets, said punches when in the former position being engaged by the movable sets to perform the punching operation and place the work supports under tension whereby upon the retraction of the anvils the work supports are released and strip the work from the punches and force the same on the stationary sets.

41. In a device of the class described, a raceway, a stationary set, a pivoted punch and an anvil therefor, and a movable set to which the devices to be set are delivered by

the raceway, means to operate the movable set to engage the punch and move the same against the anvil and then partially retract and then advance the said set again to cooperate with the stationary set, and a lost motion connection between the anvil and raceway and between the punch and anvil whereby as the raceway is retracted the anvil is withdrawn and the punch retracted after the partial retraction of the movable set.

42. In a device of the class described, a raceway, a plurality of stationary sets, pivoted punches having spring work-supports and anvils, and movable sets to which the devices to be set are delivered by the raceway, means to operate the movable sets to engage the punches and move the same against the anvils and also place the work supports under tension and then partially retract the said sets, means to withdraw the punches and anvils, whereby the work supports are released and strip the work from the punches and force it on the stationary sets, and means to finally advance the movable sets into cooperation with the stationary sets.

In testimony whereof we affix our signatures in presence of two witnesses.

JOSEPH W. BARNA.

VALENTINE HOFFMAN.

Witnesses:

ARTHUR B. SEIBOLD,

J. McROBERTS.