

(No Model.)

6 Sheets—Sheet 1.

H. S. DUKES.  
TYPE WRITING MACHINE.

No. 587,431.

Patented Aug. 3, 1897.

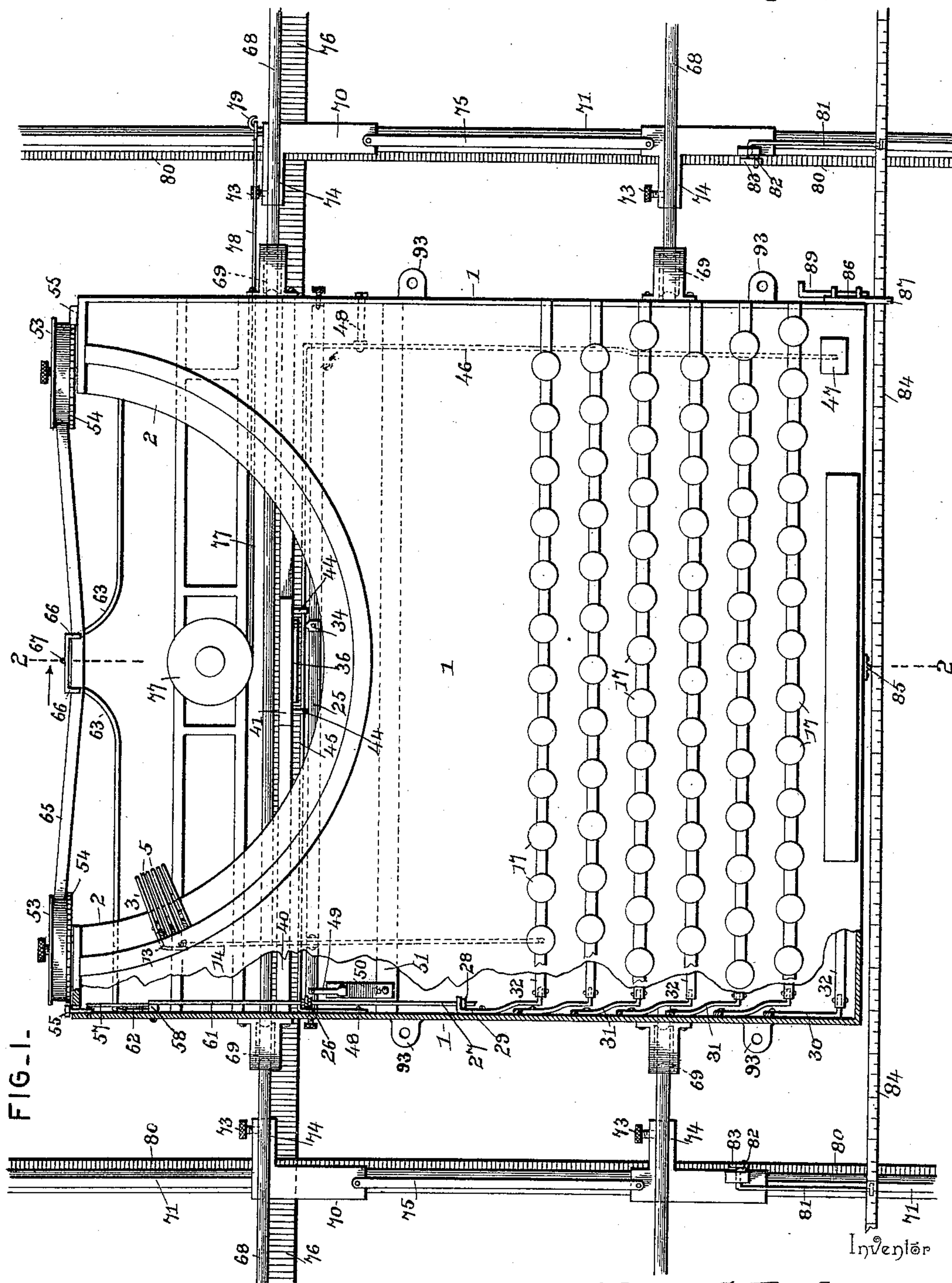


FIG. 1.

Witnesses

Jas. K. McLaughlin  
*[Signature]*

By His Attorneys,

Harry S. Dukes  
*[Signature]*

(No Model.)

6 Sheets—Sheet 2.

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FIG. 6.

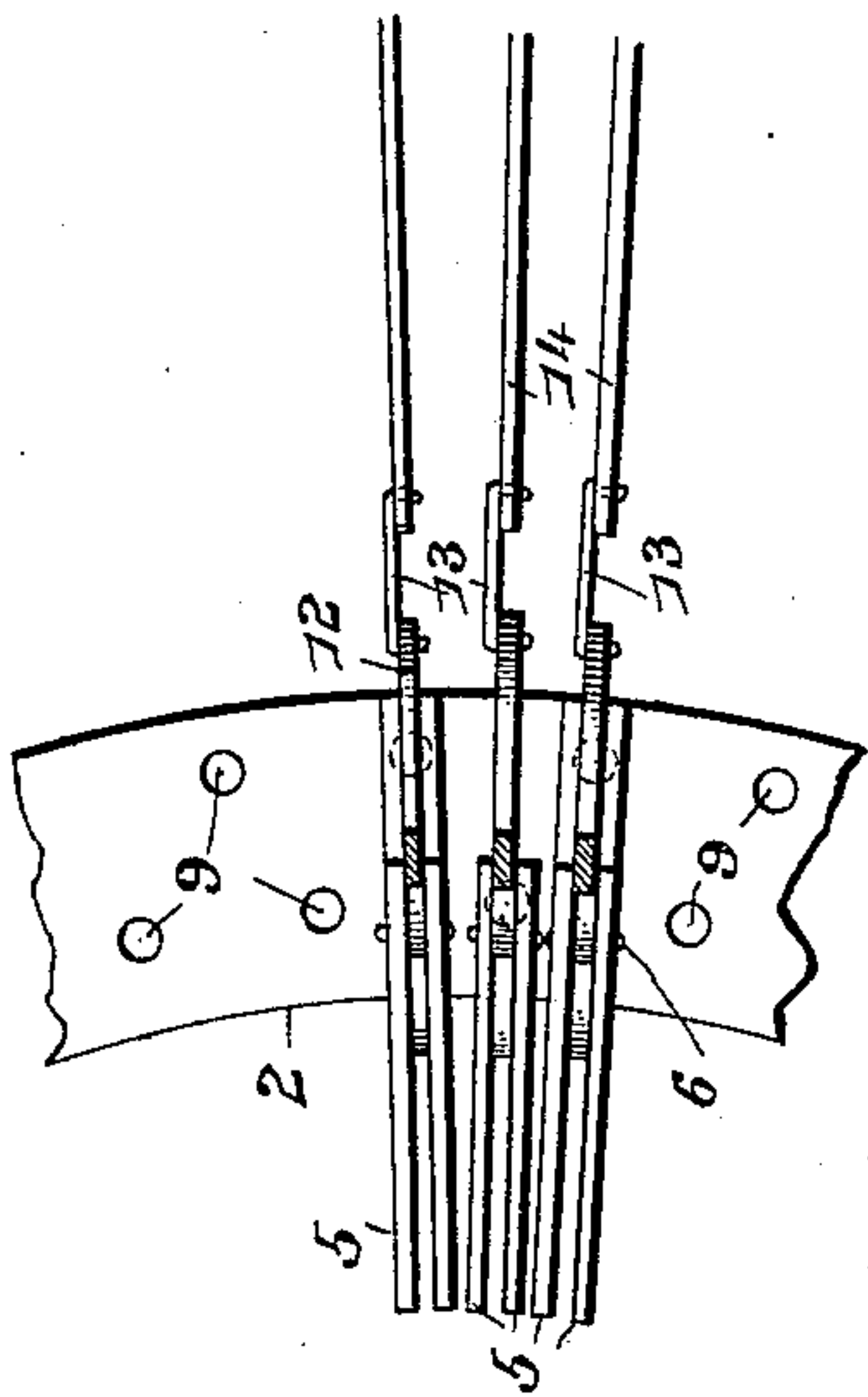
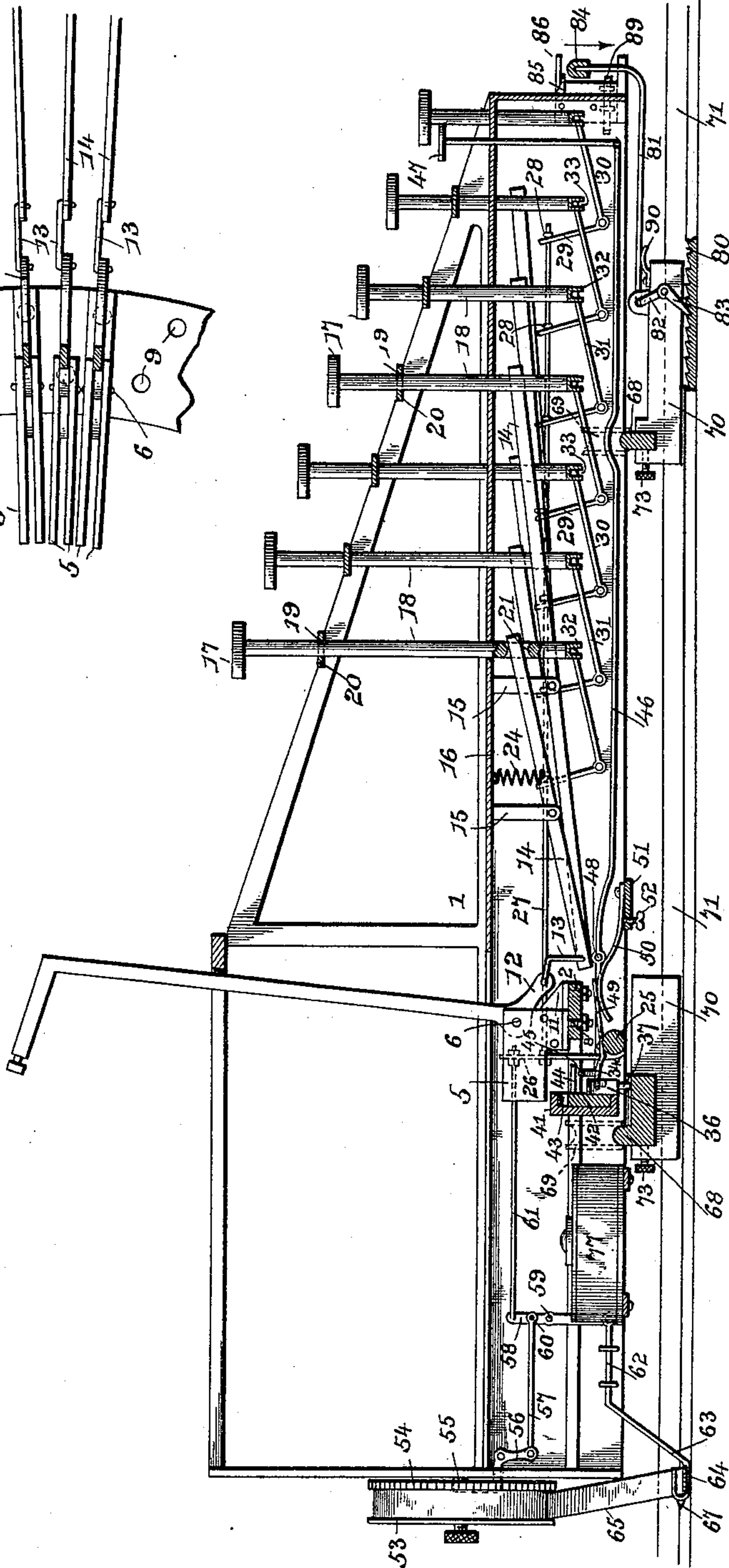


FIG. 2.



Inventor

Witnesses

*Jas. K. McElhannon*  
*[Signature]*

By *his* Attorneys.

*Harry S. Dukes*

*CA Snow & Co.*



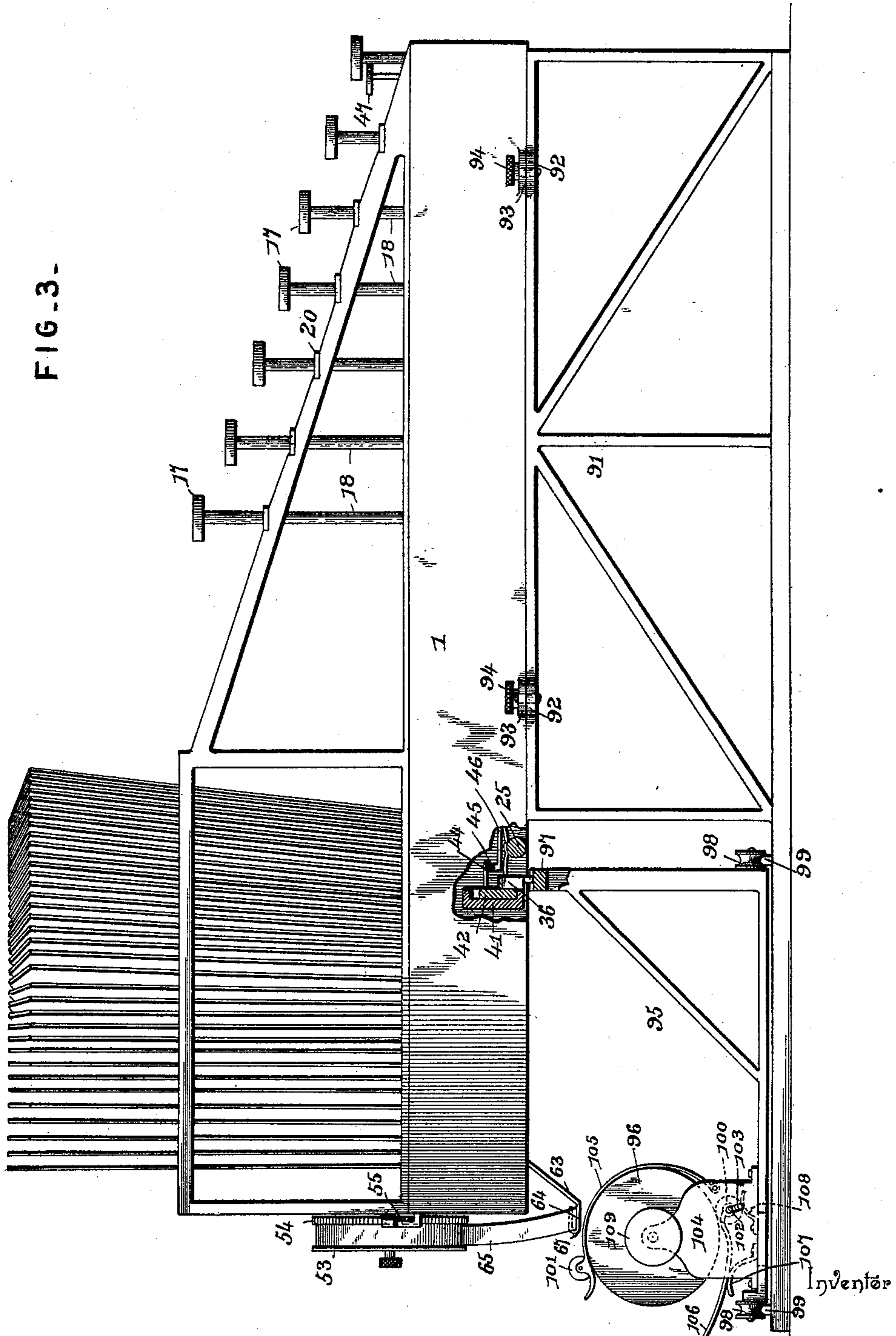
(No Model.)

6 Sheets—Sheet 3.

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Witnesses

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(No Model.)

6 Sheets—Sheet 4.

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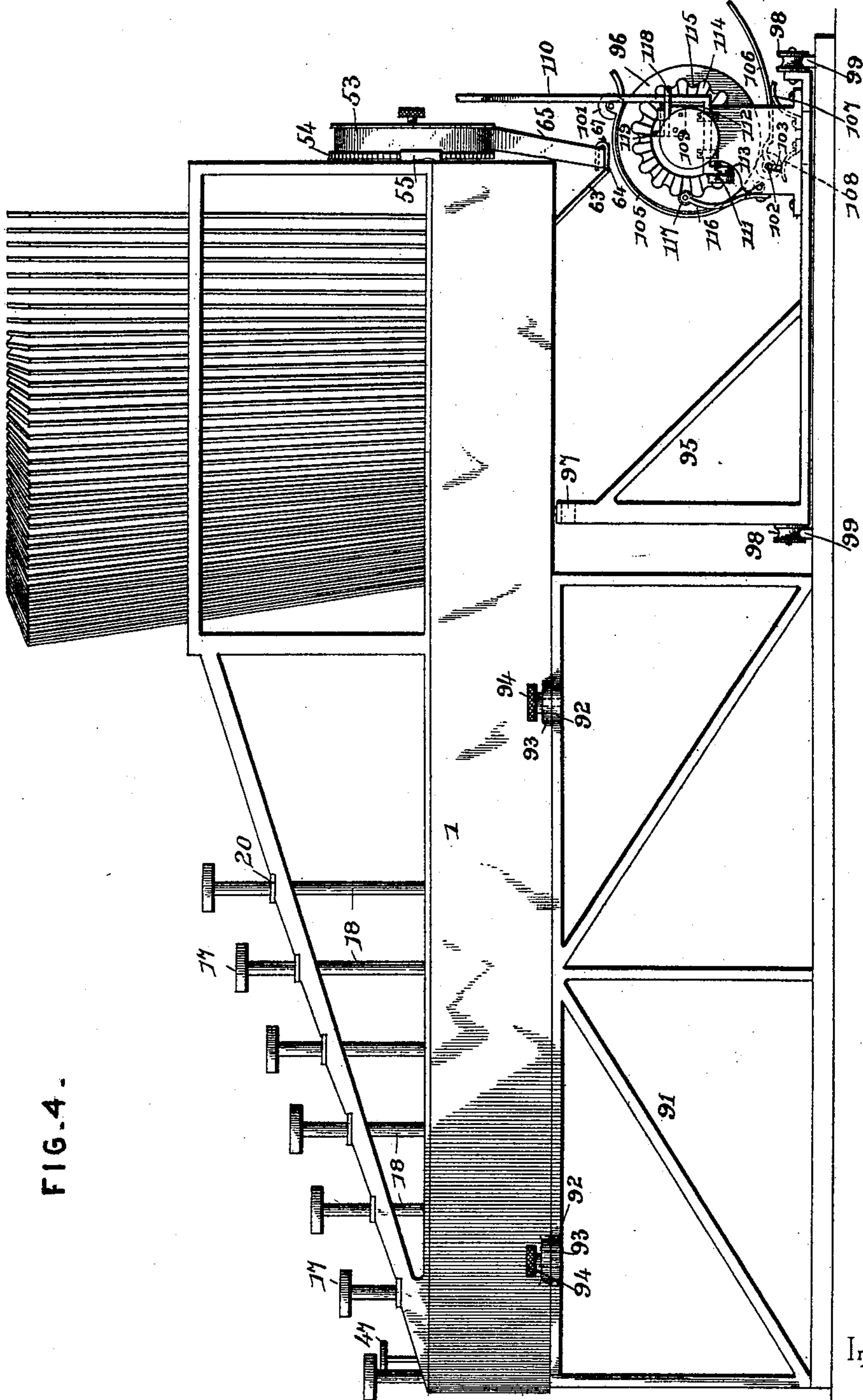


FIG. 4 -

Witnesses

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Harry S. Dukes  
By *[Signature]* Attorneys,

*Chas. Snow & Co.*



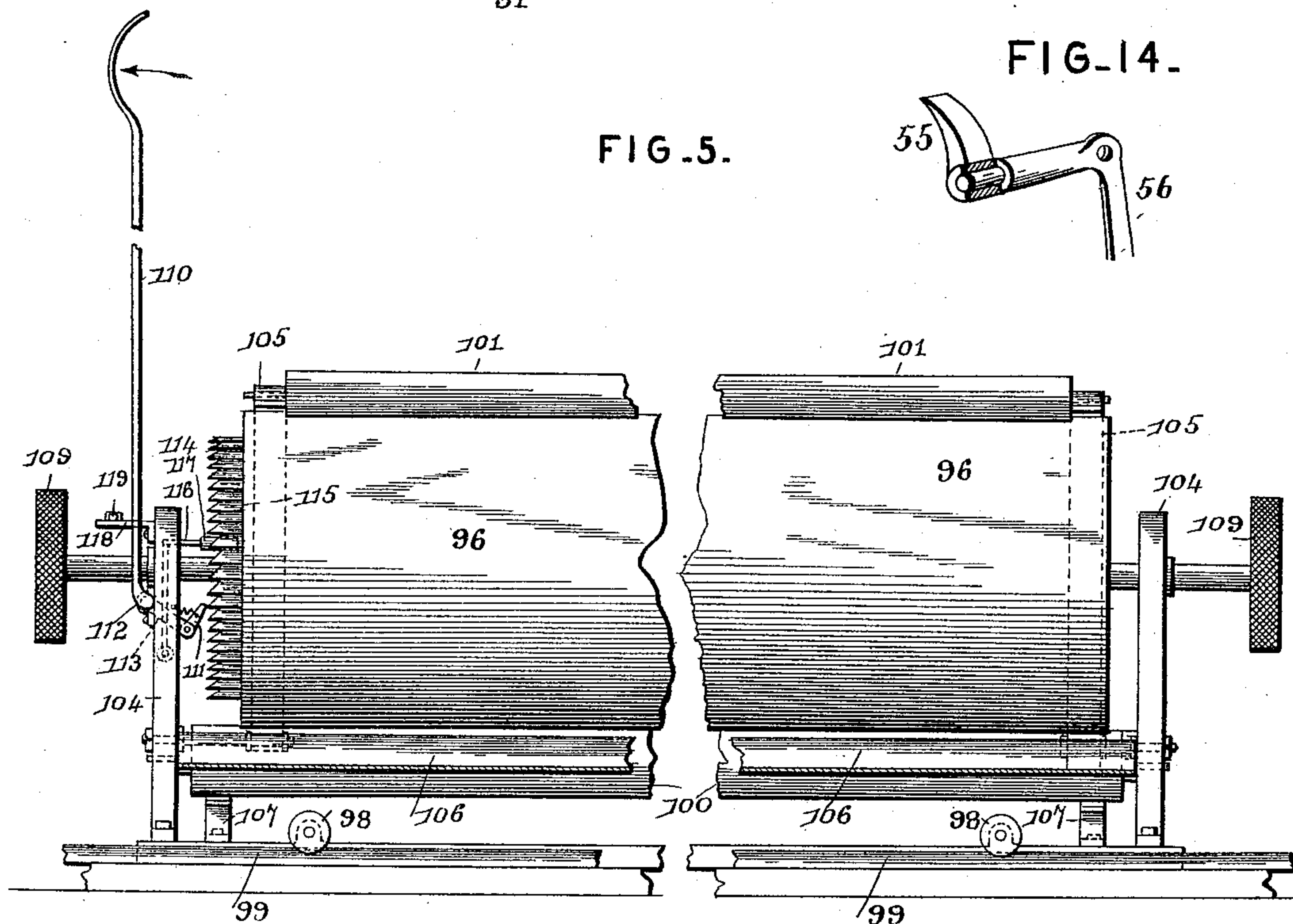
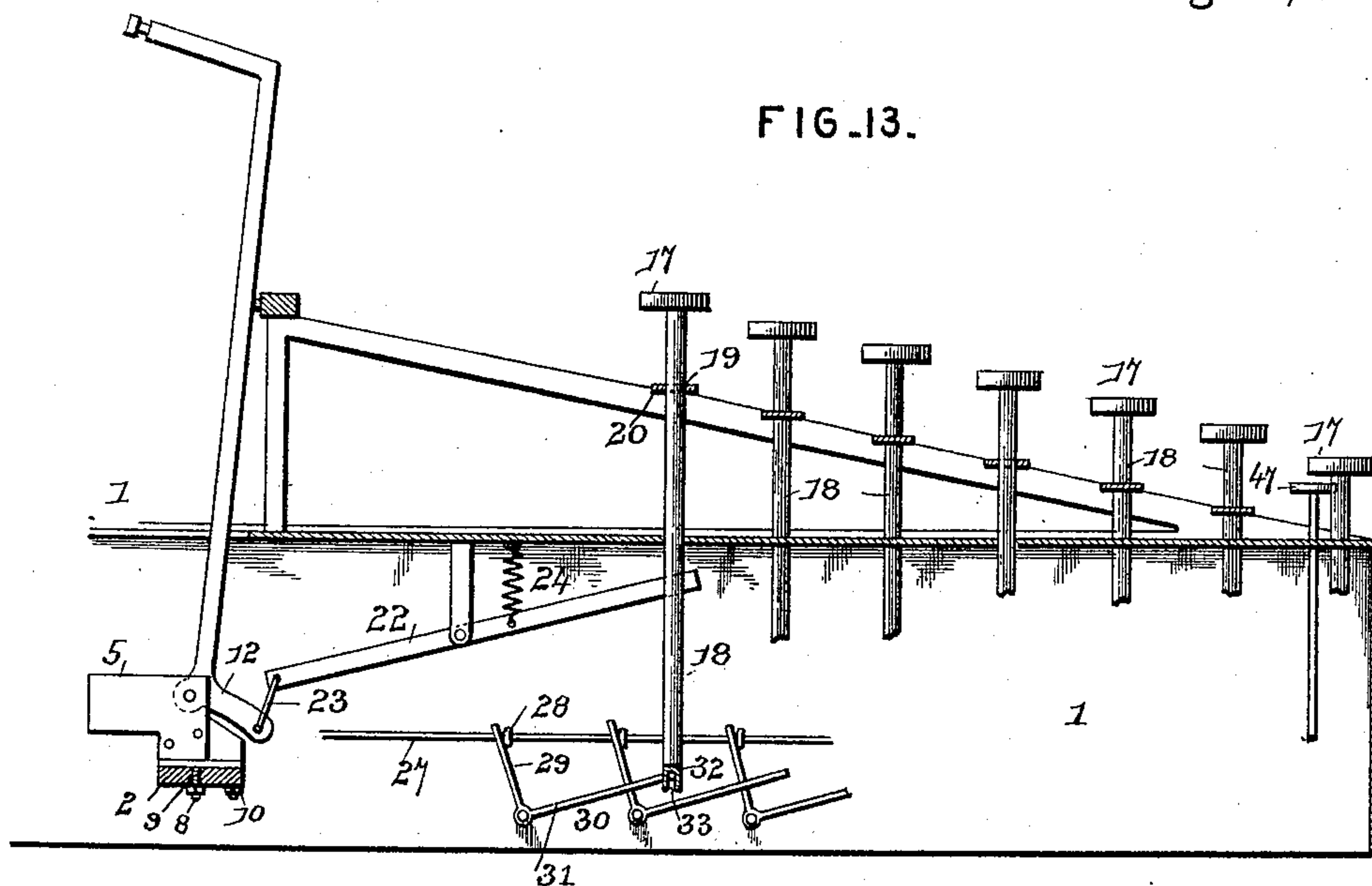
(No Model.)

6 Sheets—Sheet 5.

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Inventor

Harry S. Dukes

Witnesses

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By his Attorneys.

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(No Model.)

6 Sheets—Sheet 6.

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FIG. 10-

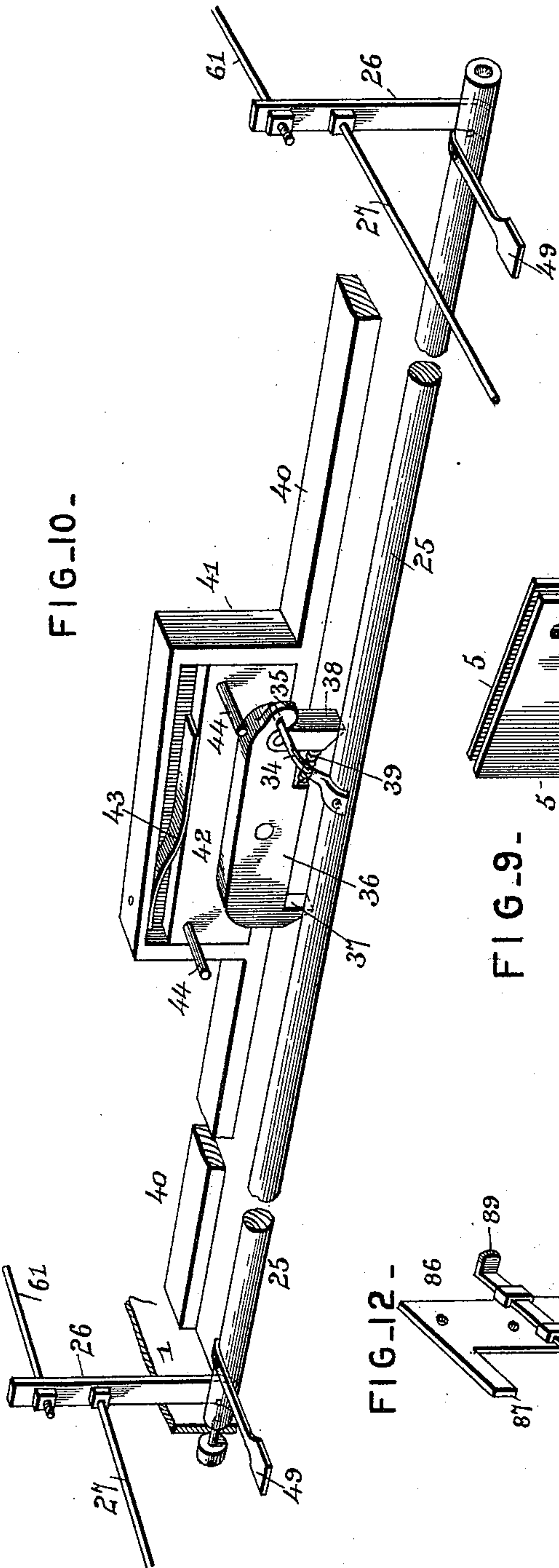


FIG. 11-

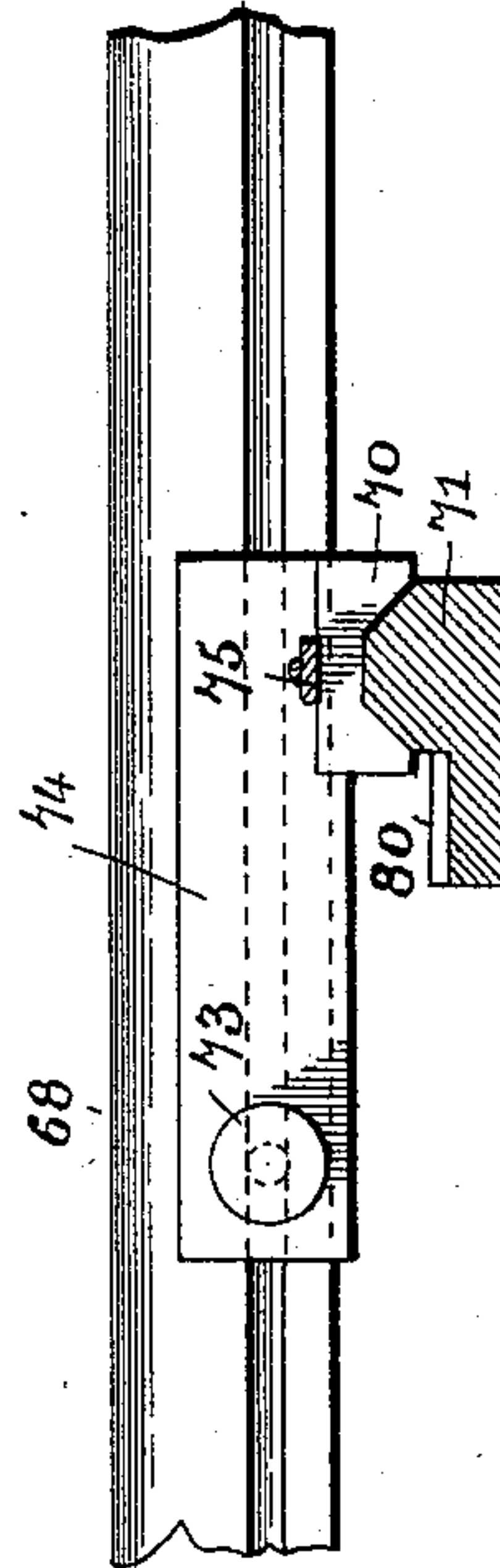


FIG. 9-

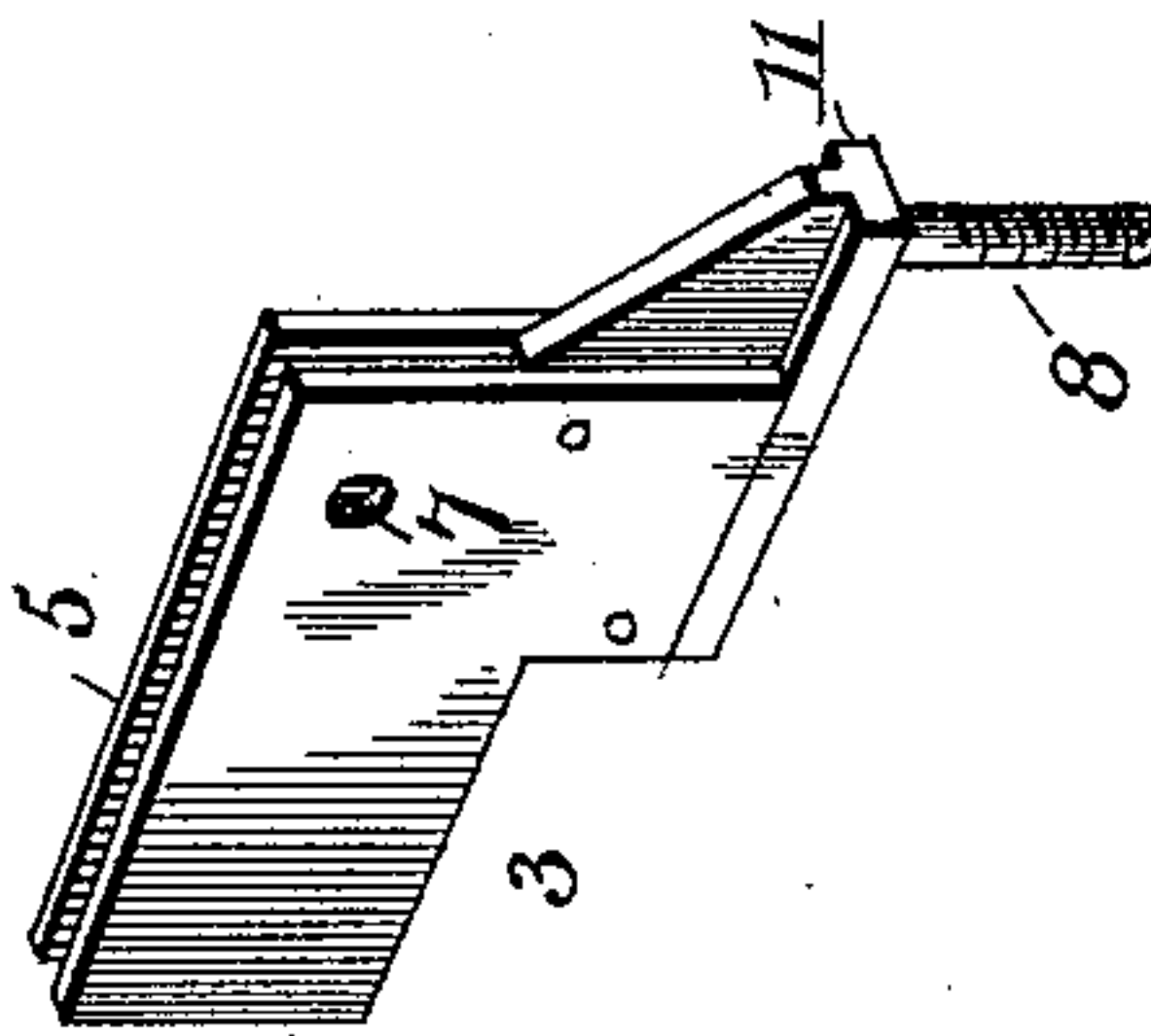


FIG. 8-

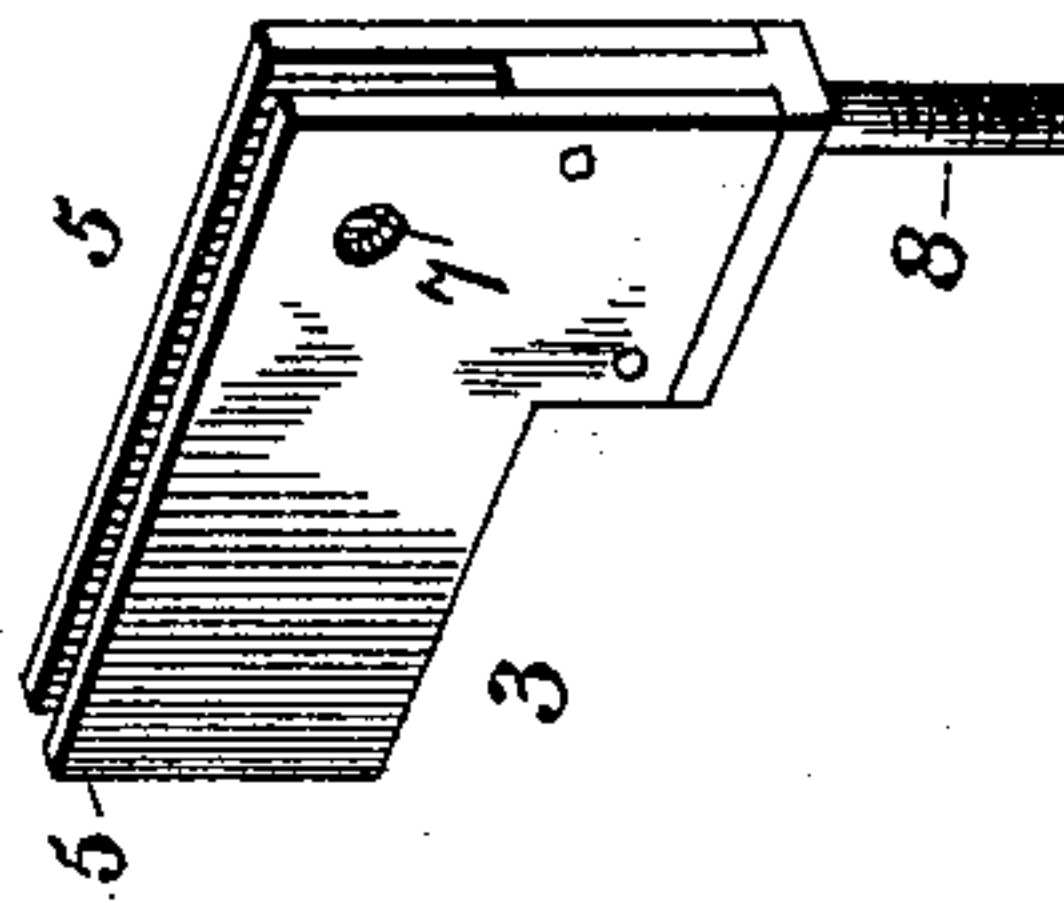


FIG. 12-

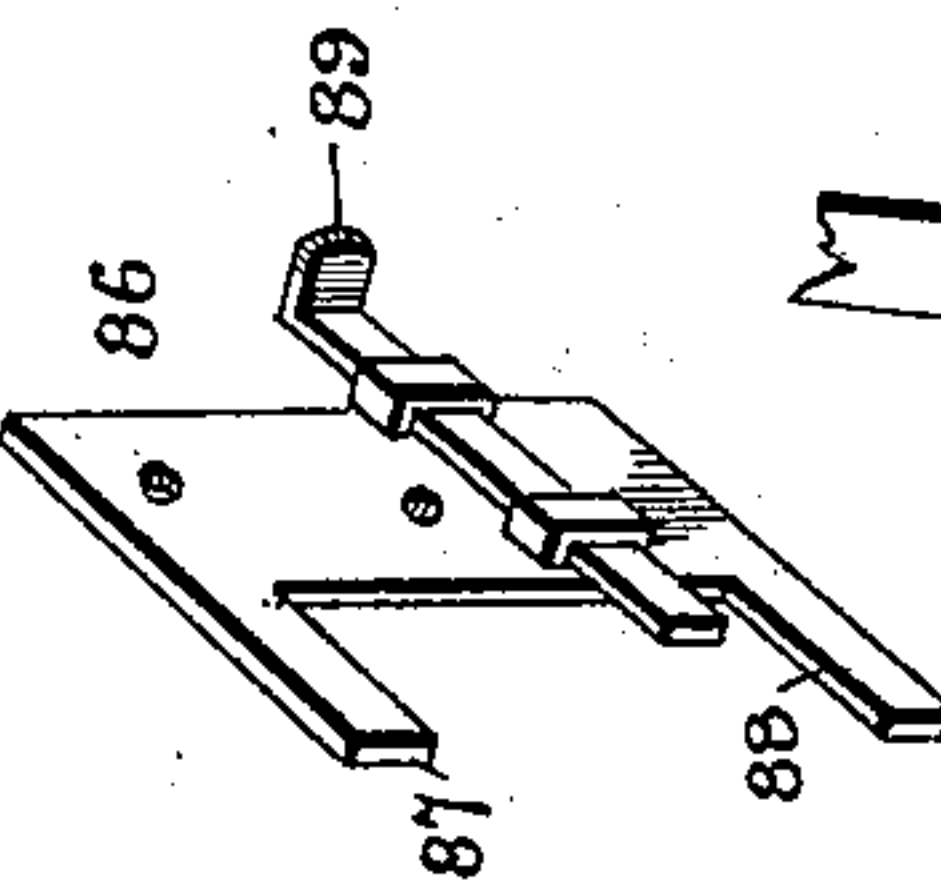
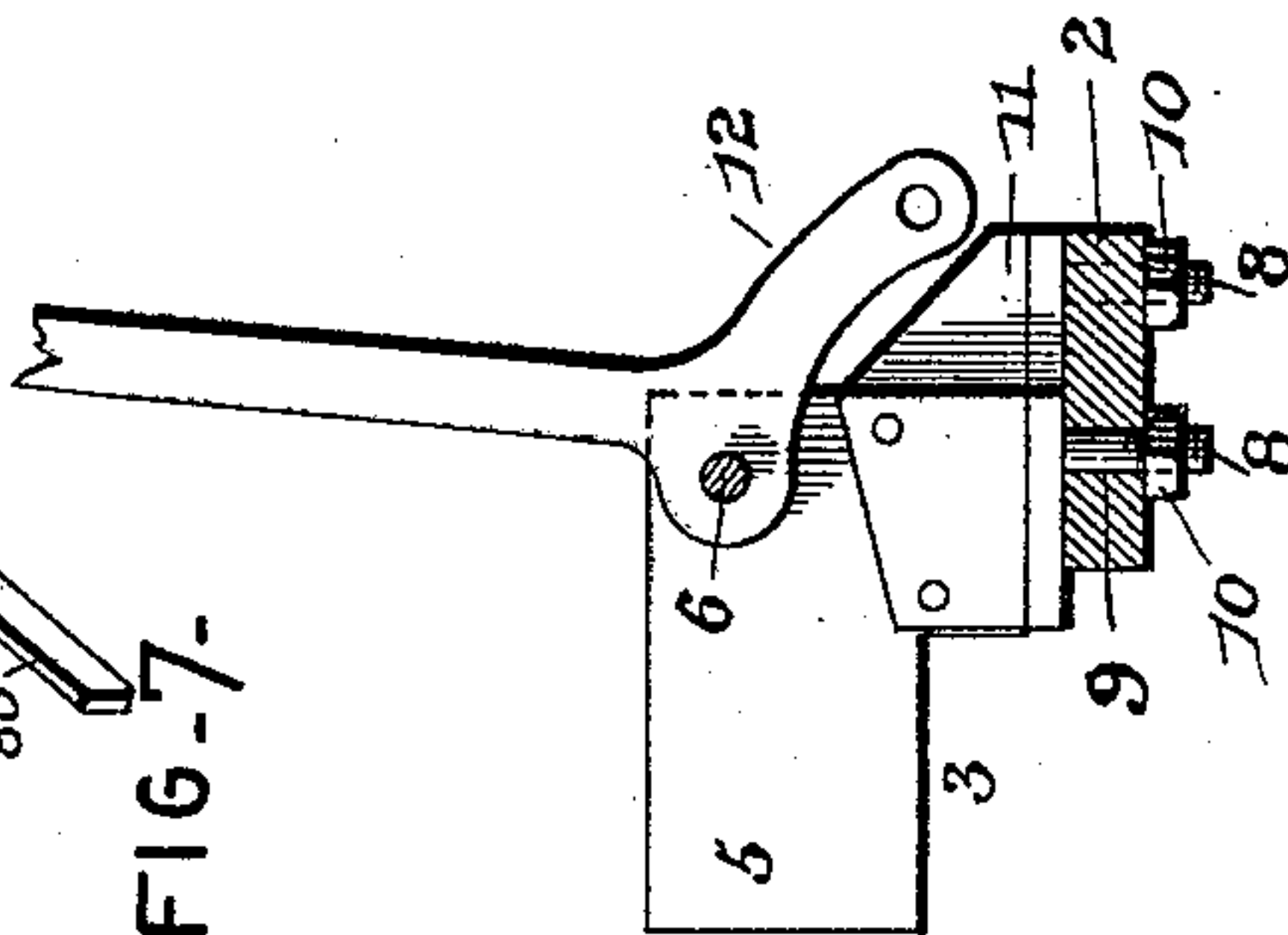


FIG. 7-



Inventor

Harry S. Dukes

By His Attorneys,

C. A. Snow & Co.

Witnesses

Jas. K. McLaughlin  
*[Signature]*



# UNITED STATES PATENT OFFICE.

HARRY S. DUKES, OF ST. LOUIS, MISSOURI.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 587,431, dated August 3, 1897.

Application filed February 28, 1895. Serial No. 540,039. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY S. DUKES, a citizen of the United States, residing at St. Louis, in the State of Missouri, have invented a new and useful Type-Writing Machine, of which the following is a specification.

My invention relates to type-writing machines, and particularly to that class of machines designed for use in bookwork, and the objects in view are to provide a simple, light, efficient, and durable machine capable of adjustment to adapt it for either bookwork or for general writing, the main frame being provided with the printing, inking, and feeding mechanisms, whereby when used in connection with stationary tracks or guides it is adapted to move parallel with the lines of writing, and when mounted upon a stationary base and used in connection with a moving part or carriage adapted to travel parallel with the lines of writing it may be used for general work, such as letter-writing, the paper-feeding mechanism which must be used in connection with the machine when the frame is mounted upon a stationary base being independent of such frame and being supported by the moving part or carriage.

My invention further contemplates the provision of improved printing mechanism, including ribbon-operating devices, whereby the line of writing is exposed at all times, except during the depression of a key, to enable the operator to view the same without displacing the machine or any part thereof.

A further object of the invention is to provide improved letter-spacing mechanism and means for disengaging the parts thereof to allow free manual adjustment of the frame.

The invention further relates to improvements in line-spacing mechanism and in combining therewith readily-accessible means for adjusting the carriage to bring the printing-point at any desired space in the printing-line.

Further objects and advantages of the invention will appear in the following description, and the novel features thereof will be particularly pointed out in the appended claims.

In the drawings, Figure 1 is a plan view of a machine constructed in accordance with my invention. Fig. 2 is a transverse central sec-

tion of the same on the line 2 2 of Fig. 1. Fig. 3 is a side view, partly in section, of the machine mounted upon a stationary base, as seen when used in connection with the paper-carriage. Fig. 4 is a similar view showing the opposite side of the machine. Fig. 5 is a rear view, partly in section, of the paper-carriage and connections. Fig. 6 is a detail plan view of a portion of the type-bar-supporting ring, showing the manner of mounting the type-bars thereon. Fig. 7 is a transverse vertical section of the same. Figs. 8 and 9 are detail views of the bearing brackets and guides which are arranged alternately upon the type-bar-supporting ring to hold the type-bars in operative position thereon. Fig. 10 is a detail view in perspective of the letter-spacing mechanism. Fig. 11 is a detail view of the transverse or line-spacing guides or tracks. Fig. 12 is a detail view in perspective of an adjustable stop for regulating the movement of the line-spacing lever. Fig. 13 is a transverse section of the machine, showing a slightly-modified arrangement of connections between the keys and type-bars. Fig. 14 is a detail view of one of the ribbon-spool feed-pawls and the contiguous portion of the bell-crank lever upon which it is mounted.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Any suitable form of skeleton frame 1 may be employed in connection with the improved machine, and supported thereby is a type-bar-supporting ring 2 of crescent or arc shape, and secured to this ring are bearing-brackets 3 for the type-bars. The bearing-brackets are constructed with parallel-spaced ears 5, which extend inward or toward the center of the arc formed by the supporting-ring to prevent lateral vibration of the type-bars as they approach and reach their operative positions and thus maintain the alinement of the characters, the pivot-pins 6 being located near the outer upper angles of the ears, as shown by the perforations 7 in Figs. 8 and 9, said perforations being designed for the reception of the pivot-pins 6. Depending from the bearing-brackets are the threaded stems 8, which extend through the perforations 9 in the supporting-ring and are engaged below the plane thereof by securing-nuts 10. The forms of



brackets shown, respectively, in Figs. 8 and 9 are arranged alternately upon the supporting-ring, the stems 8 thereof being arranged, respectively, upon the body portion and upon  
 5 an outward extension 11 of the brackets. The object of this arrangement is to provide for the disposition of the openings 9 alternately near the inner and outer edges of the supporting-ring, and this staggered arrange-  
 10 ment of the openings 9 is employed to avoid unnecessarily weakening said ring and provide for the use of large securing-nuts.

The type-bars are provided with outwardly-extending arms 12, which are connected by  
 15 means of rods 13 with key-levers 14, fulcrumed at intermediate points (approximately at their centers) upon hangers 15, depending from the horizontal portion 16 of the frame 1. The keys 17 are provided with  
 20 stems 18, which are fitted in suitable guide-openings 19 in the longitudinal bars 20 of the frame and are slotted near their lower ends, as shown at 21, to receive the front ends of the key-levers. In the modification of this  
 25 construction which is shown in Fig. 13 the key-levers 22, instead of terminating at their rear ends below the plane of the arms 12 of the type-bars, terminate above the same and are connected with said arms by means of  
 30 rods 23, whereby instead of pushing upward upon the arms 20 to operate the type-bars motion is communicated by an upward pull. Coiled retracting-springs 24 are connected to the key-levers to assist in elevating the keys  
 35 and thereby relieve other parts of the mechanism, which are hereinafter described.

The letter-spacing mechanism includes a rock-shaft 25, provided with an upstanding arm 26 near each end connected to the ex-  
 40 tremities of draw-rods 27, which are arranged, respectively, near the sides of the frame. These draw-rods are provided at intervals with enlargements or buttons 28, arranged in the paths of the approximately vertical  
 45 arms 29 of bell-crank levers 30, which are pivoted upon or adjacent to the sides of the frame. The long arms 31 of said bell-crank levers are connected by longitudinal bars 32, which are engaged by the bifurcated lower  
 50 ends 33 of the key-stems, whereby when a key is depressed motion is communicated through the longitudinal connecting-bar and bell-crank levers to the draw-rods 27, and a partial rotation of the rock-shaft is produced.  
 55 This rock-shaft is further provided near its center with a trip-finger 34, which engages a projection 35 in the form of an eye at one end of a rocking pawl 36, said rocking pawl being pivoted approximately at its center and  
 60 having at one end a fixed or stop tooth 37 and at the other end a movable spring-actuated operating-tooth 38. This operating-tooth is provided with a return-spring 39, which retracts the tooth when disengaged from the  
 65 rack (hereinafter described) to provide for engagement with the succeeding tooth of such rack when the pawl is returned to its

normal position by the release of the key. The body portion of the pawl is provided with a cavity in which the upper end of the de-  
 70 pending spring-actuated tooth is pivoted, and the cavity thus formed is extended to receive the spring 39, whereby both spring and pivotal joint are housed and thereby protected from accumulations of dust. 75

Mounted upon the frame parallel with the rock-shaft is a bar 40, provided at an intermediate point with a guide 41, in which is arranged to slide a block 42, and pivotally  
 80 mounted upon this block is the feed-pawl 36, the block being held in its normal or depressed position by means of a leaf-spring 43, arranged within the guide. Projecting forward from the block 42 are pins 44, and under these pins is arranged the longitudinal  
 85 bar 45 of the release-key lever 46, having connected to one end thereof the release-key 47. This release-key lever is fulcrumed upon horizontal pins 48, carried by the frame. To return the rock-shaft to its normal position  
 90 upon the release of a key by which it has been moved, I employ the arms 49, against which bear the free ends of return-springs 50, secured to a supporting-bar 51, extending parallel with the rock-shaft and shown in Figs. 95  
 1 and 2, and in order to adjust these springs to vary their tension I employ set-screws 52, threaded in said bar with their extremities engaging the springs.

In connection with the letter-spacing mech-  
 100 anism I employ inking mechanism, including the ribbon-spools 53, arranged at the rear of the frame and provided with ratchet-disks 54, with which are engaged pivotal pawls 55, carried by bell-crank levers 56, the pawls  
 105 having sleeves fitted upon reduced extensions of the levers, as shown clearly in Fig. 14, in which one side of the sleeve is broken away. These bell-crank levers are connected by means of rods 57 with rocking levers 58, ful-  
 110 crumed at an intermediate point, as at 59, to the frame, and connected to these levers at points more remote from their fulcrums than are the pivotal points 60 of the rods 57 are rods 61, which communicate motion to the  
 115 rocking levers from the arms 26. Thus when the rock-shaft 25 is operated by the depression of a key the rocking levers 58 and attachments communicate motion to the pawls 55, and thus impart a step-by-step rotary mo-  
 120 tion to the spools. The lower arms of the rocking levers are of greater length than the upper arms thereof, and connected to the extremities of the same are parallel arms 62 of the ribbon-guide 63, said ribbon-guide being  
 125 provided at a point opposite the center of the rear of the frame with a loop 64, through which the ribbon 65 extends in passing from one spool to the other. The spring 50, by which the rock-shaft is returned to its nor-  
 130 mal position after the depression of a key, also serves to return the parts of the ribbon-spool-feeding mechanism to their normal positions, and when said parts, including the



rocking lever 58, are in their normal positions the ribbon-guide is retracted, as shown in Figs. 1 and 2, to hold the ribbon out of alinement with the spools, and thereby discover the line of writing, whereby the latter may be viewed over the machine by the operator. The viewing of the line of writing during the progress of the work is facilitated by the crescent or arc shape of the supporting-ring and type-bars. When a key is depressed to communicate a partial rotary motion to the rock-shaft and the rocking levers 58 receive motion through the connecting-rods 61, the ribbon-guide is extended to bring its looped portion in alinement with or in the vertical plane of the spools 53, and hence over the line of writing. The looped portion of the ribbon-guide consists of parallel-spaced hooks 66, connected by a rod having a pointer 67, and the type-heads strike the ribbon between said hooks. When the ribbon is to be wound on one spool, the pawl must be manually disengaged from the other spool.

In connection with the above-described mechanism it is necessary to employ a base the features of which differ according to the class of work, whether book or general writing. When designed for use in bookwork, the base preferably consists of longitudinal guides or tracks 68, arranged parallel with the line of writing and traversed by guide-wheels 69, mounted upon the frame, said guides or tracks being fitted in slides 70, mounted upon the transverse guides or tracks 71, which are arranged parallel with each other and transverse to the line of writing. The longitudinal or letter-spacing guides 68 are fitted in seats 72 in the slides 70 and are secured in place by means of set-screws 73, said seats being extended parallel with the line of writing, as shown at 74, to strengthen the points of connection of the letter-spacing guides with the slides, and the slides are connected in pairs by the straps 75 to hold the same at the proper intervals.

In connection with the letter-spacing mechanism above described, and including a rock-shaft, pawl, and connections, I employ a rack-bar 76, fixed to the base and preferably, as shown in Figs. 1 and 2, formed integral with one of the line-spacing guides 68, whereby it is held in position for engagement alternately by the teeth 37 and 38 of said pawl, and mounted upon the frame is an operating-spring 77, connected, by means of a suitable tape 78, with a fixed hook 79 on the base. I also employ racks 80 in connection with the line-spacing guides 71 and line-spacing levers 81, fulcrumed upon the slides 70 and having crank-arms 82, carrying pawls 83 to engage said racks, whereby when the front ends of the line-spacing levers are depressed transverse movement will be communicated to the frame. The guides 71 are preferably semi-hexagonal in cross-section, as shown clearly in Fig. 11, and the under or bearing sides of the slides are similarly shaped.

The line-spacing key consists of a bar 84, which connects the front ends of the line-spacing levers 81 in front of the frame and adjacent to the front of the keyboard, and said bar is provided with graduations, as shown clearly in Fig. 1, whereby in connection with a pointer 85 on the front of the frame and opposite the point of impact of the type-bars it performs the function of a scale, whereby the frame may be set to cause the impression of a character at any desired point in the line of writing. In order to limit the depression of this line-spacing key to enable the frame to be set for either single or double line spaces, I employ a stop 86, (shown in detail in Fig. 12,) having upper and lower permanent lugs 87 and 88 and an intermediate adjustable lug 89, which may be arranged in the path of the bar 84 when the motion of the frame is to be limited to single spaces. A return-spring 90 is employed in connection with each line-spacing lever to return the same to its elevated or normal position.

In Figs. 3, 4, and 5 I have shown the frame mounted upon a fixed base 91, provided with lateral ears 92 for alinement with similar ears 93 on the sides of the frame, said ears being connected by means of thumb-screws 94 engaging said perforated ears, and mounted upon this base is a paper-carriage 95, supporting a paper-roll or platen 96 and having a rack-bar 97, which is similar in construction to the rack-bar 76 and is arranged in the same position as said bar 76 with relation to the letter-spacing mechanism, including the operating-pawl 36, as clearly shown in Fig. 3. This carriage is provided with travelers 98, mounted upon suitable tracks 99 on the base 91, said tracks being arranged parallel with the paper-roll or platen 96. In connection with this paper-roll or platen, which is disposed under the ribbon-feeding mechanism, as above described, I employ paper-guiding rolls 100 and 101, the former of which is located below the paper-roll, with its trunnions 102 mounted in slots 103 in the standards 104, and the latter of which is located above the paper-roll and is supported by the spring-guides 105, which are arc-shaped and conform to the surface of the paper-roll. The guard 106 is fulcrumed upon the axis of the guide-roll 100 and is supported in operative position by means of springs 107, and similar springs 108 are arranged under the guide-roller 100 to hold the same in contact with the surface of the paper-roll.

The trunnions of the paper-roll terminate in hand-wheels 109, and mounted upon one of the standards 104 is a line-spacing lever 110, provided with a terminal spring-actuated pawl 111, which is connected to said lever at a point beyond its fulcrum 112. The short arm 113 of this lever is arranged at an angle to the main or body portion thereof, and the pawl 111 is arranged in such position with relation to the lever that its free end terminates below the plane of the fulcrum 112



thereof, whereby when the line-spacing lever is moved in the direction indicated by the arrow in Fig. 5 the free end of the pawl 111 swings toward the plane of the ratchet-wheel 114, and after engaging a tooth thereof rotary motion is imparted to the paper-roll. The periphery of this ratchet is provided with a series of rounded grooves 115, spaced apart to agree with the desired intervals between lines of writing, when such lines of writing are arranged at single space, and a detent 116 is secured to the standard and consists of a spring-arm terminating in an antifriction-roll 117 to engage said grooves and thus hold the paper-roll at the desired adjustment. The movement of the line-spacing lever is limited by means of a stop 118, constructed substantially as described in connection with the stop 86 and having an adjustable lug 119 for use when single spaces between the lines are desired.

From the above description it will be seen that when the machine is used for bookwork the entire frame moves parallel with the line of writing and receives a step-by-step motion through the letter-spacing mechanism which operates in connection with a stationary rack-bar, and when the machine is adapted for use in general work, such as letter-writing, the frame is held stationary and the letter-spacing mechanism coöperates with a rack arranged parallel with the line of writing and supported by a paper-carriage having line-spacing mechanism. When the machine is adapted for bookwork, the entire frame is affected by the line-spacing mechanism, whereas when adapted for general work the line-spacing mechanism affects the paper-roll or platen.

The operation of the mechanism will be readily understood from the foregoing description without further explanation, and it will be understood that various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of this invention.

The construction of the base, which is designed for use in connection with the machine in bookwork, is such as to provide for adjustment to vary the length of the lines to suit the width of the book, and hence the adjustability of the longitudinal guides in the seats of the slides and the extension of said seats parallel with the longitudinal guides secures the parts of the base from springing or yielding at the joints between the longitudinal guides and the slides, and hence insures the rigidity of the structure. In addition to this adjustability of the base the line-spacing key, by which the line-spacing levers are connected, is adjustably connected to one of the levers, as shown in the drawings, whereby when the parts of the base are adjusted to suit the size of the book a similar adjustment of the connection between the line-spacing levers and said key may be made.

It is obvious that when the stationary base is employed in connection with the frame carrying the printing mechanism the extremity of the tape which, in connection with the operating-spring is used to communicate motion to the frame in the construction shown in Figs. 1 and 2, is attached to the carriage in order to advance the latter under the control of the letter-spacing mechanism.

Having described my invention, what I claim is—

1. In a type-writing machine, the combination of a type-bar-supporting ring having perforations arranged in a zigzag or staggered series, bearing-brackets having a pair of parallel guiding-ears and a single depending stem secured in one of the perforations of the supporting-ring, the stems of adjacent brackets being arranged at different distances from the inner ends thereof to agree with the staggered disposition of the perforations in the supporting-ring and engaged below the ring by nuts, type-bars mounted between the parallel ears of the bearing-brackets, and operating connections for the type-bars, substantially as specified.

2. The combination with printing mechanism, of letter-spacing mechanism having a rock-shaft arranged parallel with the line of writing and operatively connected with the printing mechanism, an intermediately-pivoted pawl provided at one end with a fixed tooth 37 and at the other end with a depending spring-actuated pivotal tooth 38, the pivotal end of the tooth 38 and the spring whereby it is actuated being arranged in a cavity in the body of the pawl, whereby they are housed, an arm on the rock-shaft connected to the pawl, and a rack-bar for engagement by the tooth of the pawl, substantially as specified.

3. The combination with printing mechanism, of letter-spacing mechanism having a rock-shaft arranged parallel with the line of writing and operatively connected with the printing mechanism, an intermediately-pivoted pawl provided at opposite ends, respectively, with a fixed tooth and a spring-actuated pivotal tooth, an arm on the rock-shaft connected to the pawl, a rack-bar for engagement by the teeth of the pawl, a spring-pressed sliding block mounted in a stationary parallel-sided guide for movement perpendicular to the plane of the rack-bar and carrying the pawl, and means for moving the block to disengage the pawl from the rack-bar, said means consisting of a release-key lever having a transverse rod, and pins carried by the block and arranged in the path of the transverse rod, substantially as specified.

4. In a type-writing machine, the combination with letter-spacing mechanism including a yielding spring-retained member, as a rock-shaft, of type-keys arranged in transverse series, transverse bars arranged respectively contiguous to the transverse series of keys



and operatively connected therewith for depression thereby, duplicate pull-rods connected to the rock-shaft and provided with spaced transversely opposite buttons, and  
 5 pairs of bell-crank levers arranged respectively at the extremities of said transverse bars, each lever having one arm connected to a bar and the other bifurcated to engage one of the buttons on the contiguous pull-rod, whereby the pull-rods are common to  
 10 and are adapted to be operated independently of the type-keys, substantially as specified.

5. The combination with letter-spacing mechanism, having a rack-bar, a rock-shaft, and a rocking pawl operatively connected with the rock-shaft and engaging the rack-bar, draw-rods connected to arms carried by the rock-shaft, type-bars, keys operatively connected with the type-bars, and connections  
 20 between the keys and said draw-rods, of rocking levers connected with the rock-shaft to receive motion therefrom, ribbon-spools provided with ratchet-teeth, bell-crank levers carrying pawls to engage said ratchet-teeth, and operatively connected with the rocking  
 25 levers, and a movable ribbon-guide also operatively connected with the rocking lever, substantially as specified.

6. The combination with printing mechanism, and letter-spacing mechanism operatively connected with the printing mechanism, of ribbon-spools having ratchet-teeth, a rocking lever operatively connected with the letter-spacing mechanism, feed-pawls for  
 30 engaging the ratchet-teeth of the ribbon-spools and operatively connected with the rocking lever, and a ribbon-guide having a looped portion arranged contiguous to the printing-point and having parallel arms  
 40 mounted in guides and connected with said rocking levers, whereby the operation of the printing mechanism causes the retraction of the feed-pawl and the simultaneous extension of the ribbon-guide to carry the ribbon into  
 45 the path of the printing devices, substantially as specified.

7. The combination with a frame, of type-bars, keys, connections between the key-stems and the type-bars, letter-spacing mechanism including a pawl and rack-bar and a  
 50 rock-shaft operatively connected with the pawl, plate-return springs arranged in operative relation with fixed arms 49 carried by the rock-shaft, means including set-screws  
 55 for adjusting the tension of said springs, draw-rods connected with other arms on the rock-shaft, transverse bars arranged parallel with the lines of keys and in the paths of the lower ends thereof, and bell-crank lever  
 60 connections between said bars and the draw-rods, the draw-rods having spaced buttons against one side of which the arms of the levers bear, substantially as specified.

8. The combination with a frame, printing mechanism carried thereby, letter-spacing  
 65 mechanism having a fixed rack-bar and a pawl carried by the frame to engage the rack-bar, and operating connections between the printing mechanism and the pawl, of longitudinal guides supporting the frame, trans-  
 70 verse guides having racks, slides mounted upon the transverse guides and supporting the longitudinal guides, means for adjustably connecting the longitudinal guides to the slides, line-spacing levers mounted upon the  
 75 slides and provided with pawls to engage said racks, a line-spacing key connecting said levers in front of the frame and graduated to form a scale for use in connection with a fixed  
 80 pointer carried by the frame and means for adjustably securing the key to said levers, substantially as specified.

9. In a type-writing machine, the combination with a movable frame carrying printing  
 85 mechanism, guides arranged parallel with the line of writing and supporting said frame, letter-spacing mechanism operatively connected with the printing mechanism, transverse guides supporting the longitudinal  
 90 guides, and line-spacing mechanism for advancing the longitudinal guides upon the transverse guides, of a vertically-movable bar arranged parallel with the line of writing contiguous to and in advance of the movable  
 95 frame and provided with graduations for use in connection with a fixed pointer carried by said frame, and connections between said bar and the line-spacing mechanism, substantially as specified.

10. The combination with a base, of a frame  
 100 adapted to be supported by the base, means for detachably securing the frame to the base, line-spacing mechanism, letter-spacing mechanism having a pawl and operating devices carried by the frame and including an inde-  
 105 pendent rack-bar, and printing mechanism carried by the frame, substantially as specified.

11. The combination with a frame carrying  
 110 printing mechanism, of a stationary base adapted to support the frame, a paper-carriage mounted upon the stationary base below the frame for movement parallel with the  
 115 lines of writing, letter-spacing mechanism having a rack-bar on said carriage, and line-spacing mechanism, substantially as specified.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

HARRY S. DUKES.

Witnesses:

JOHN H. SIGGERS,  
 IDA I. CROXTON.