

No. 671,186.

Patented Apr. 2, 1901.

H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 1.

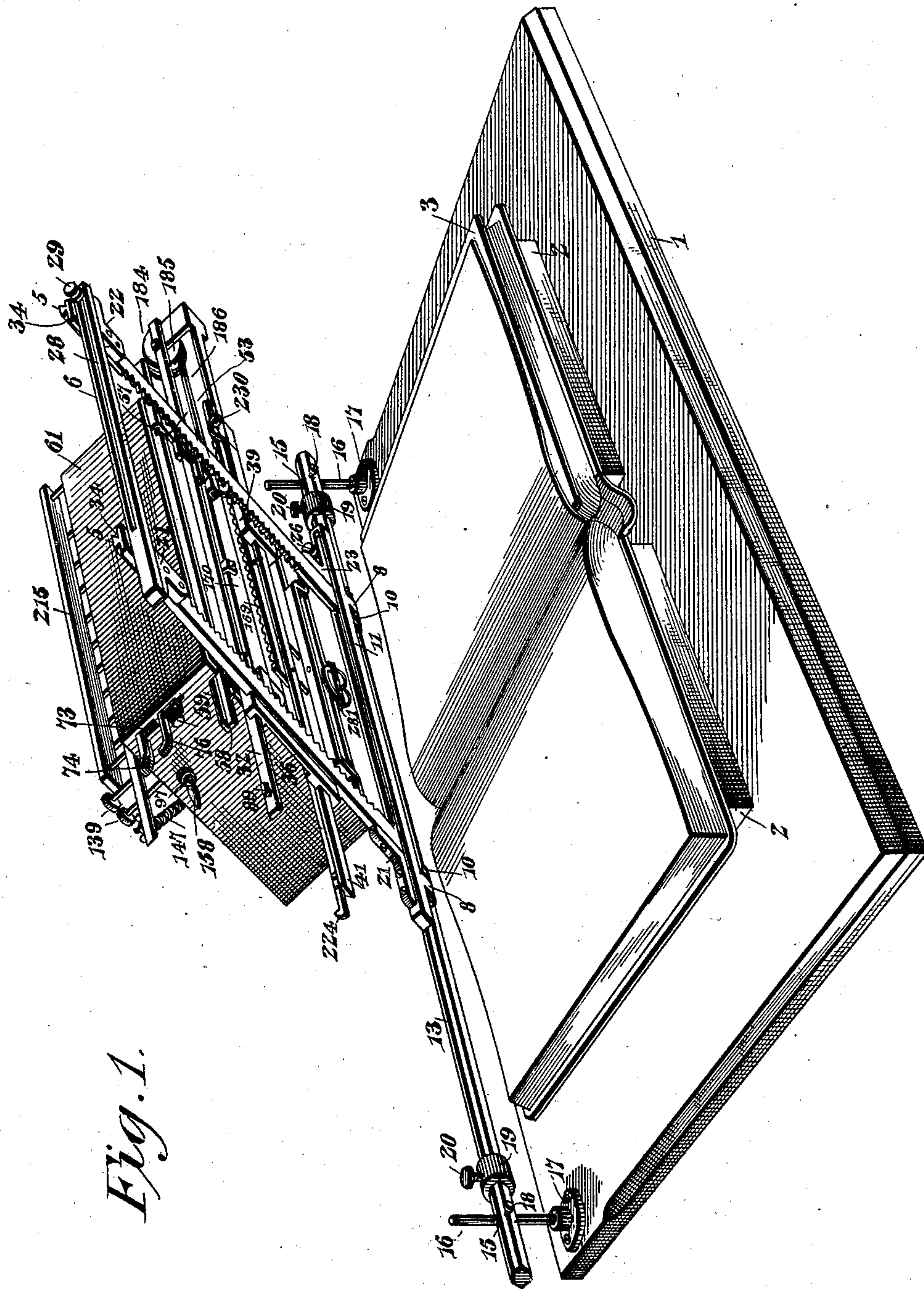


Fig. 1.

Harry S. Dukes, Inventor  
By

E. G. Figgitt  
Attorney

Witnesses  
Jas. E. McClathran  
D. R. Holman

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18 Sheets—Sheet 2.

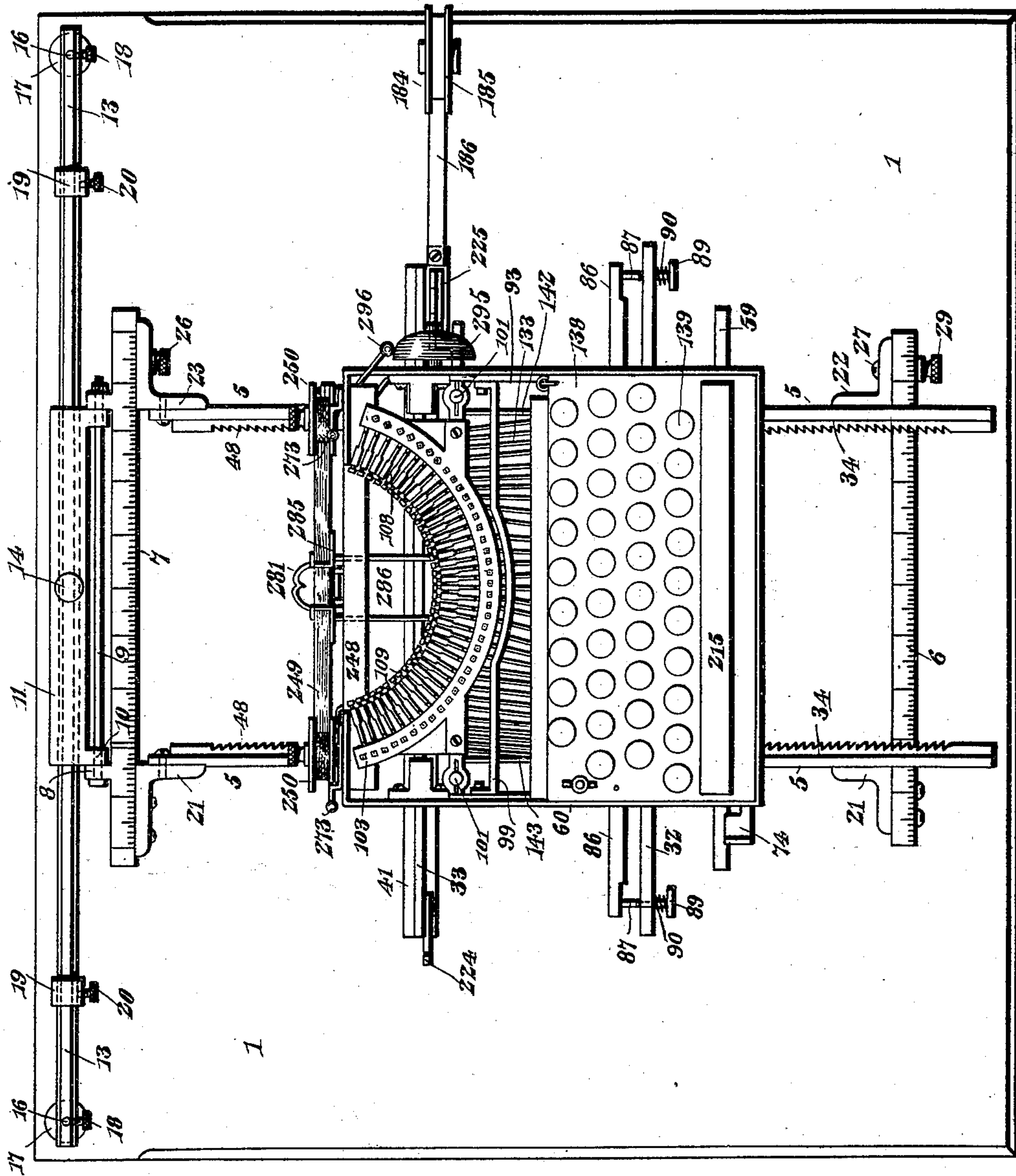


Fig. 2.

Harry S. Dukes, Inventor

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Jas. F. McLaughlin  
D. P. McLaughlin

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18 Sheets—Sheet 3.

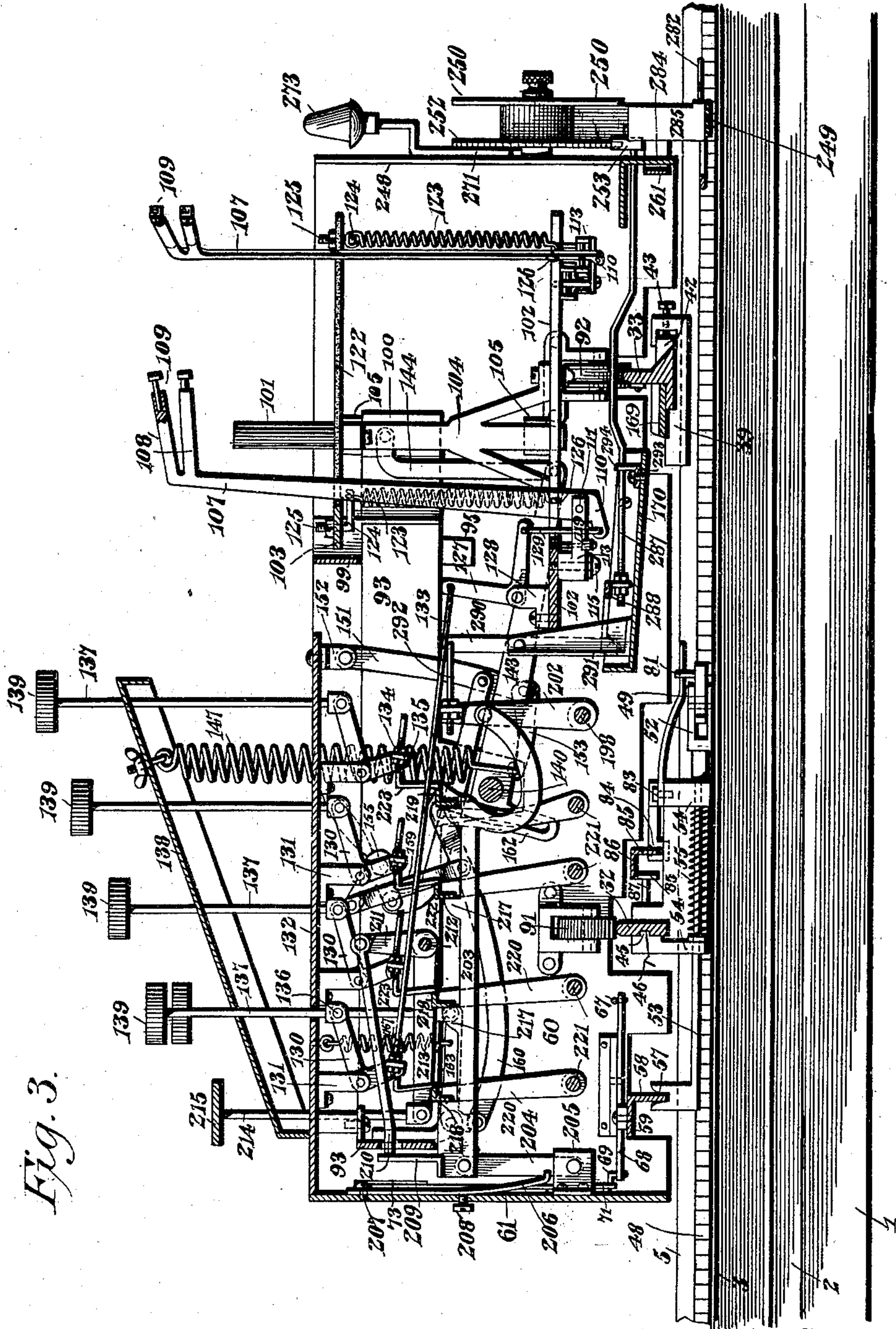


Fig. 3.

Harry S. Dukes Inventor

Witnesses  
Jas. L. McArthur  
D. P. McArthur

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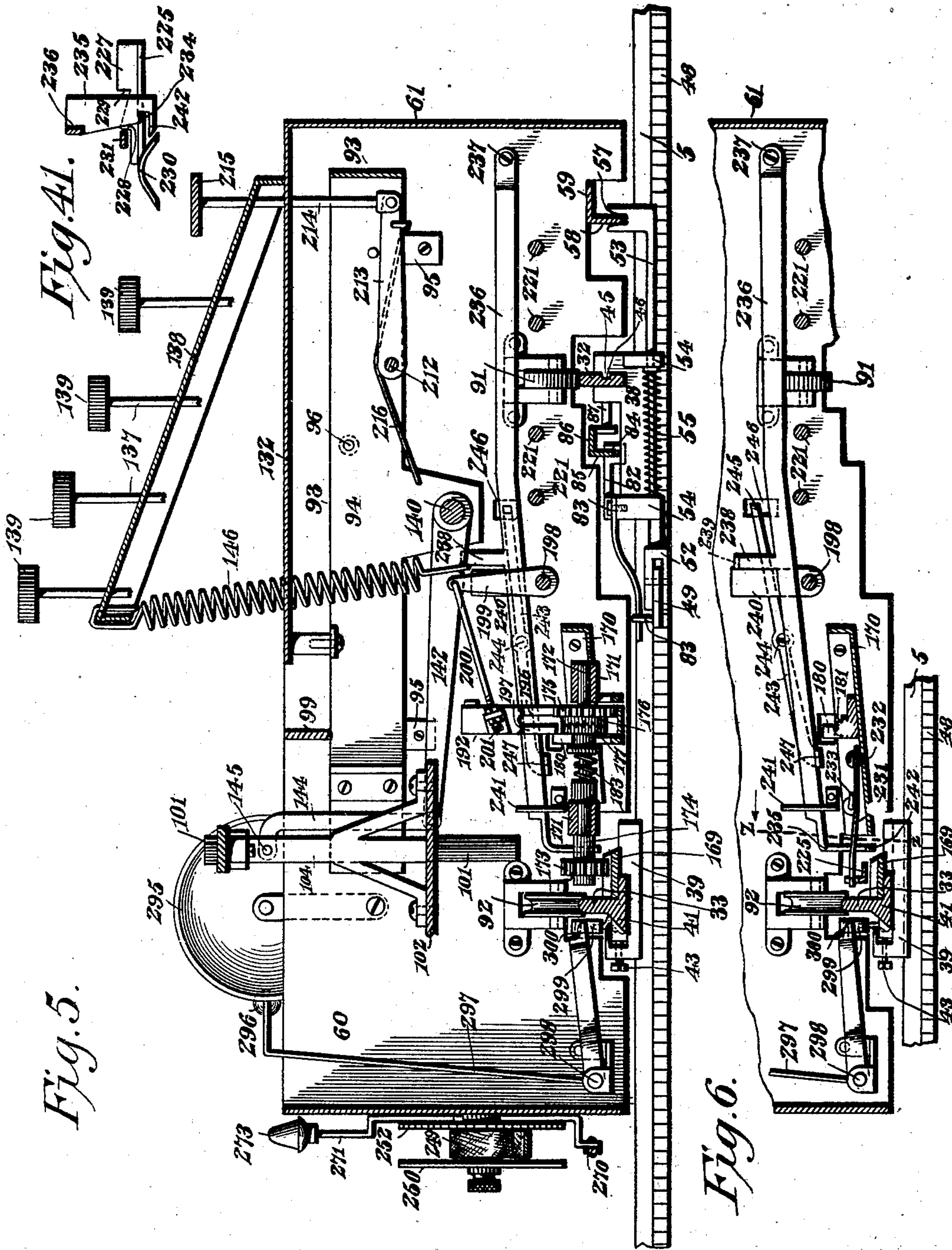


**H. S. DUKES.**  
**TYPE WRITING MACHINE.**

(Application filed Jan. 12, 1900.)

(No Model.)

**18 Sheets—Sheet 5.**



*Harry S. Dukes* Inventor

*By*

<sup>ry</sup> E. G. Figgers

Attorney

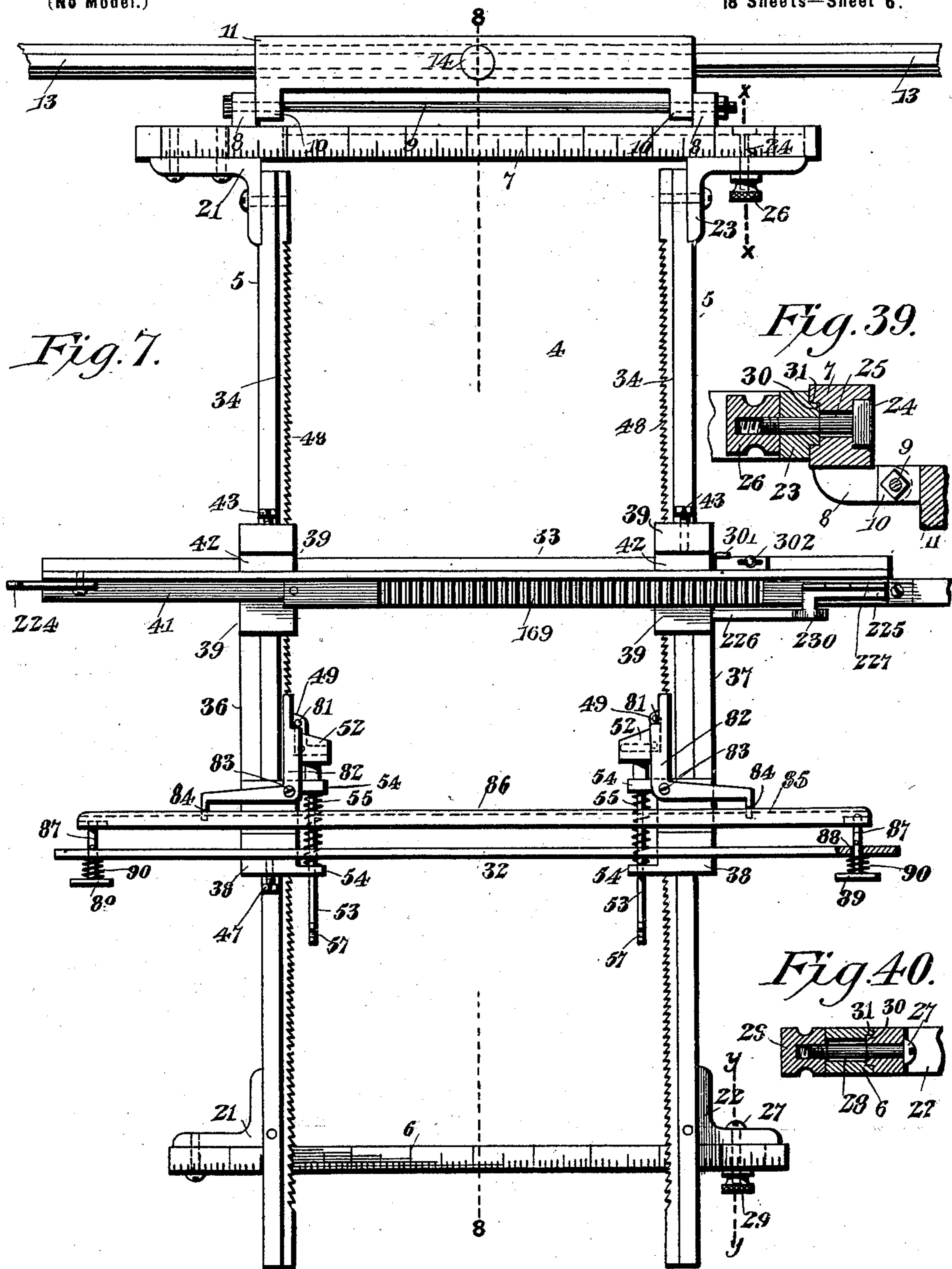
Witnesses  
Jas L. McLaughlin  
D. P. Walhaug.

**H. S. DUKES.**  
**TYPE WRITING MACHINE.**

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 6.



*Harry S. Dukes*      Inventor

Witnesses  
Jas. F. McLaughlin  
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No. 671,186.

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(No Model.)

18 Sheets—Sheet 7.

Fig. 8.

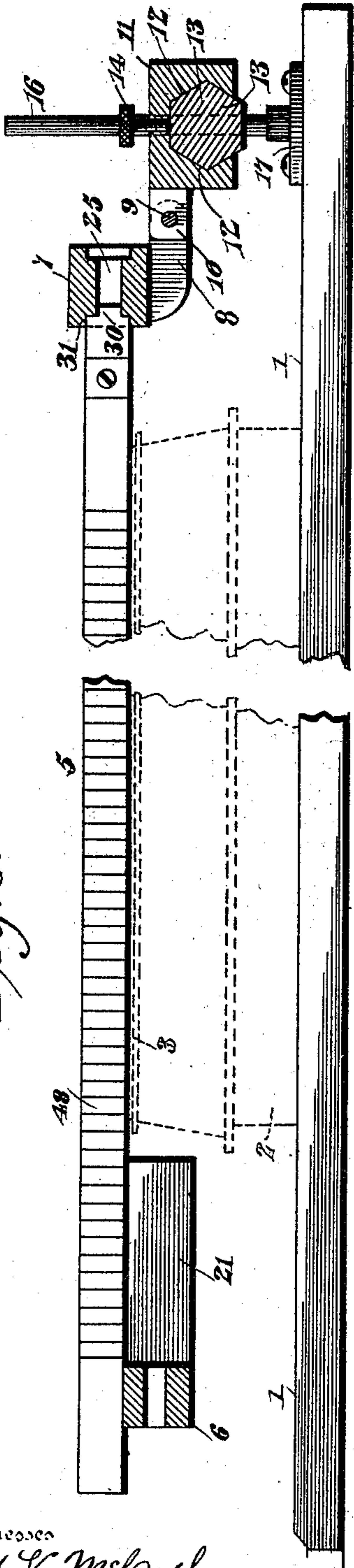


Fig. 22.

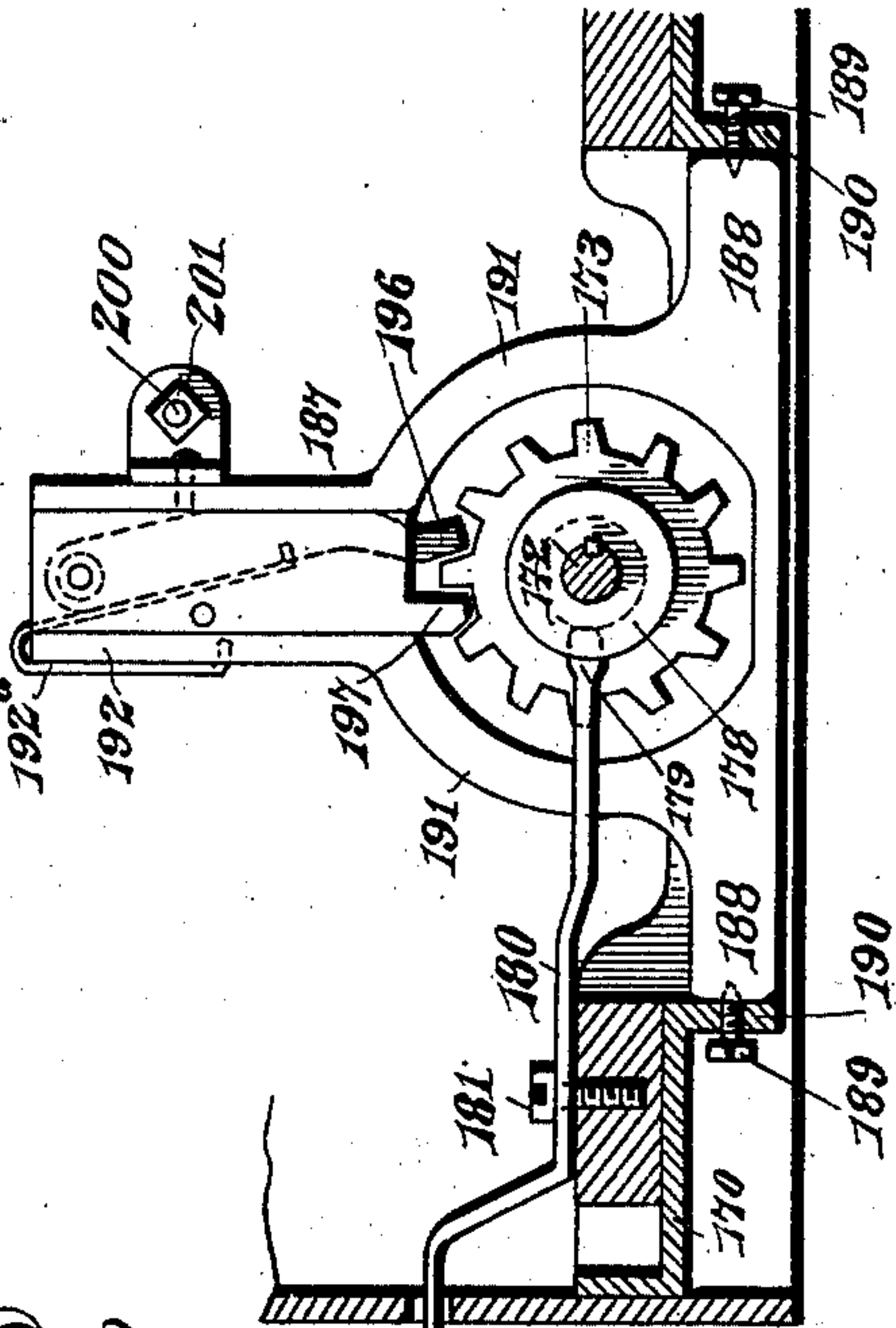


Fig. 31.

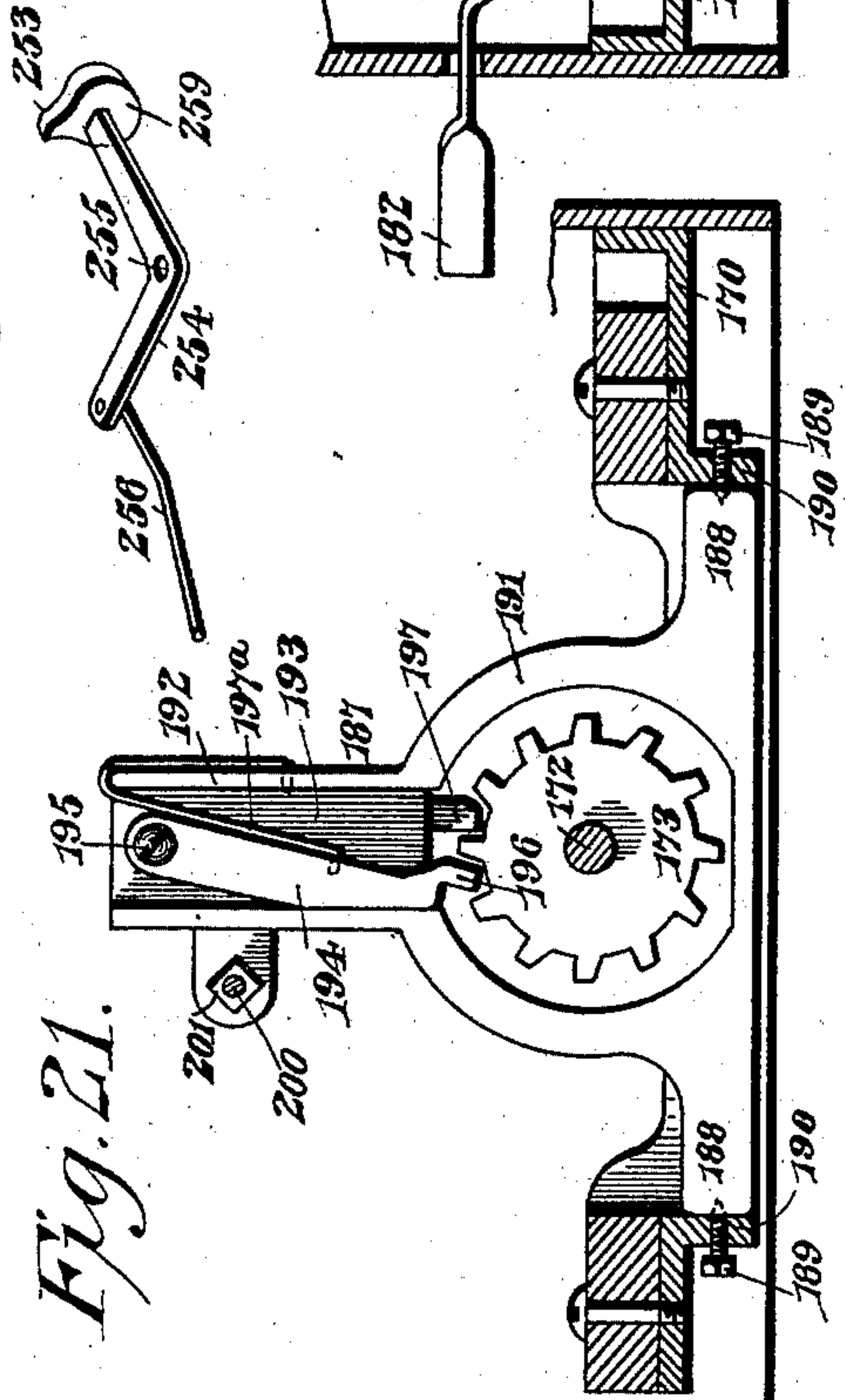
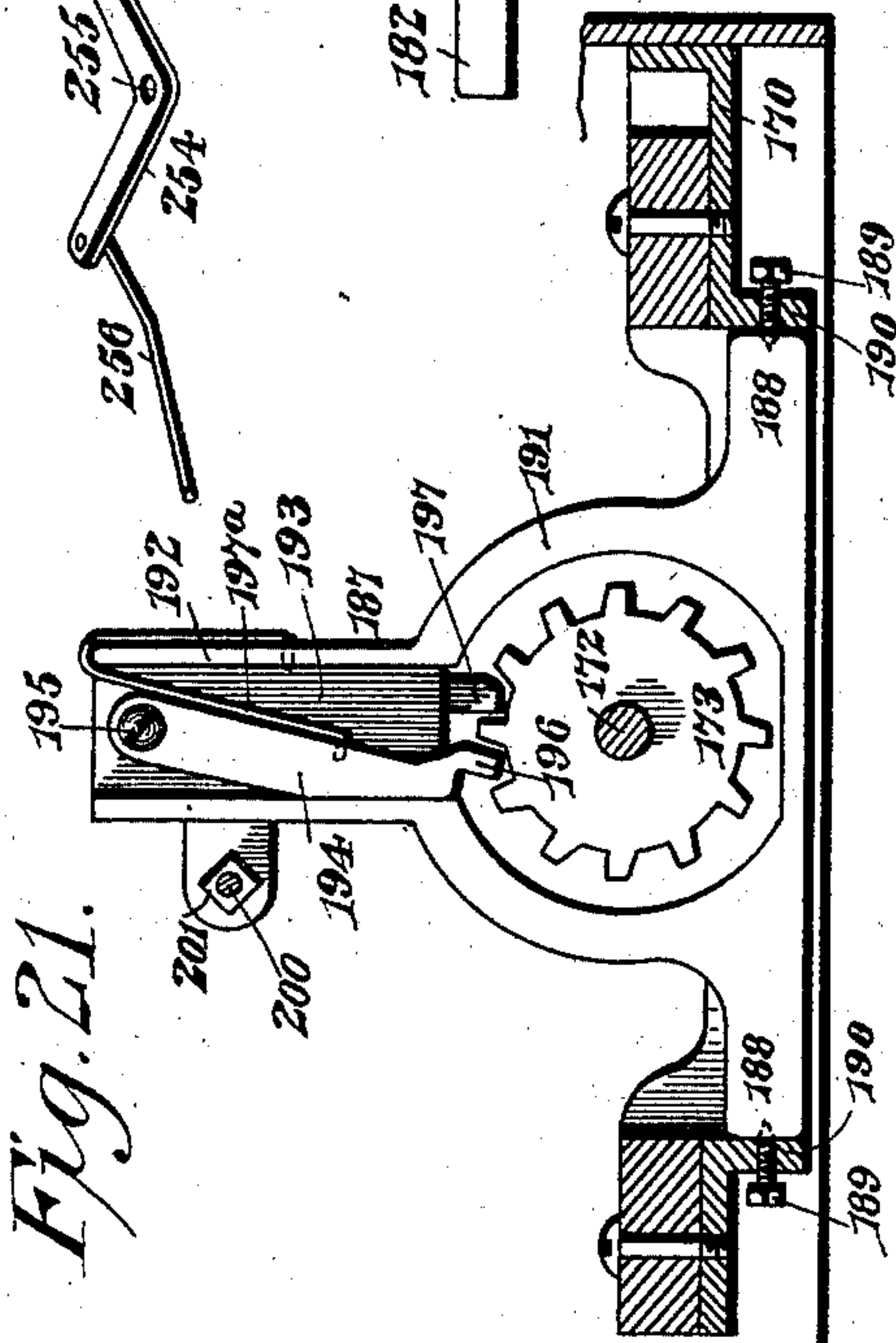


Fig. 21.



Harry S. Dukes, Inventor

By *E. G. Siggers* Attorney

Witnesses  
*Jas. E. McCathran*  
*S. J. Walchaupter*

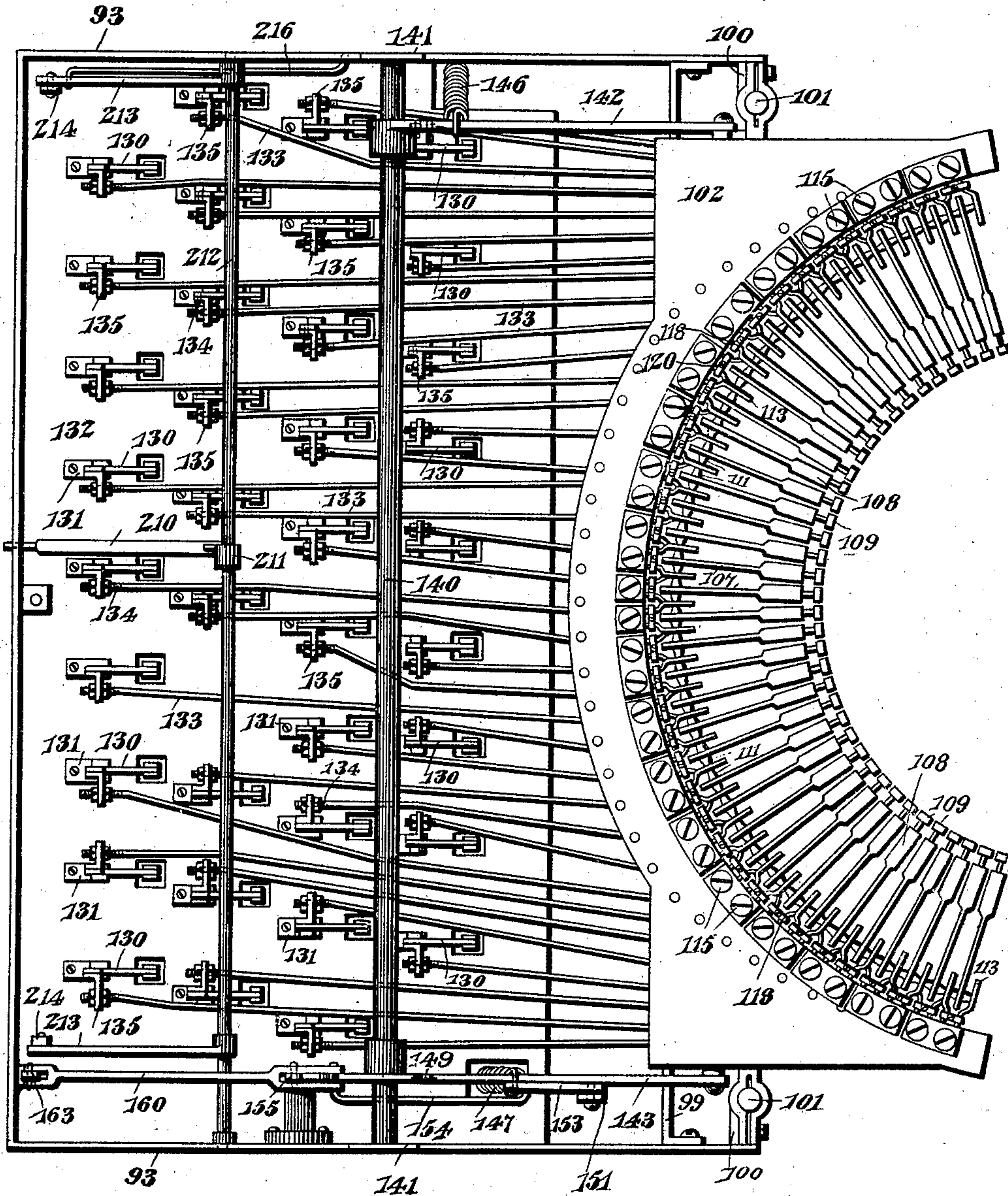
H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 8.

Fig. 9.



Harry S. Dukes Inventor

Witnesses  
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H. S. DUKES.  
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(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 9.

Fig. 10.

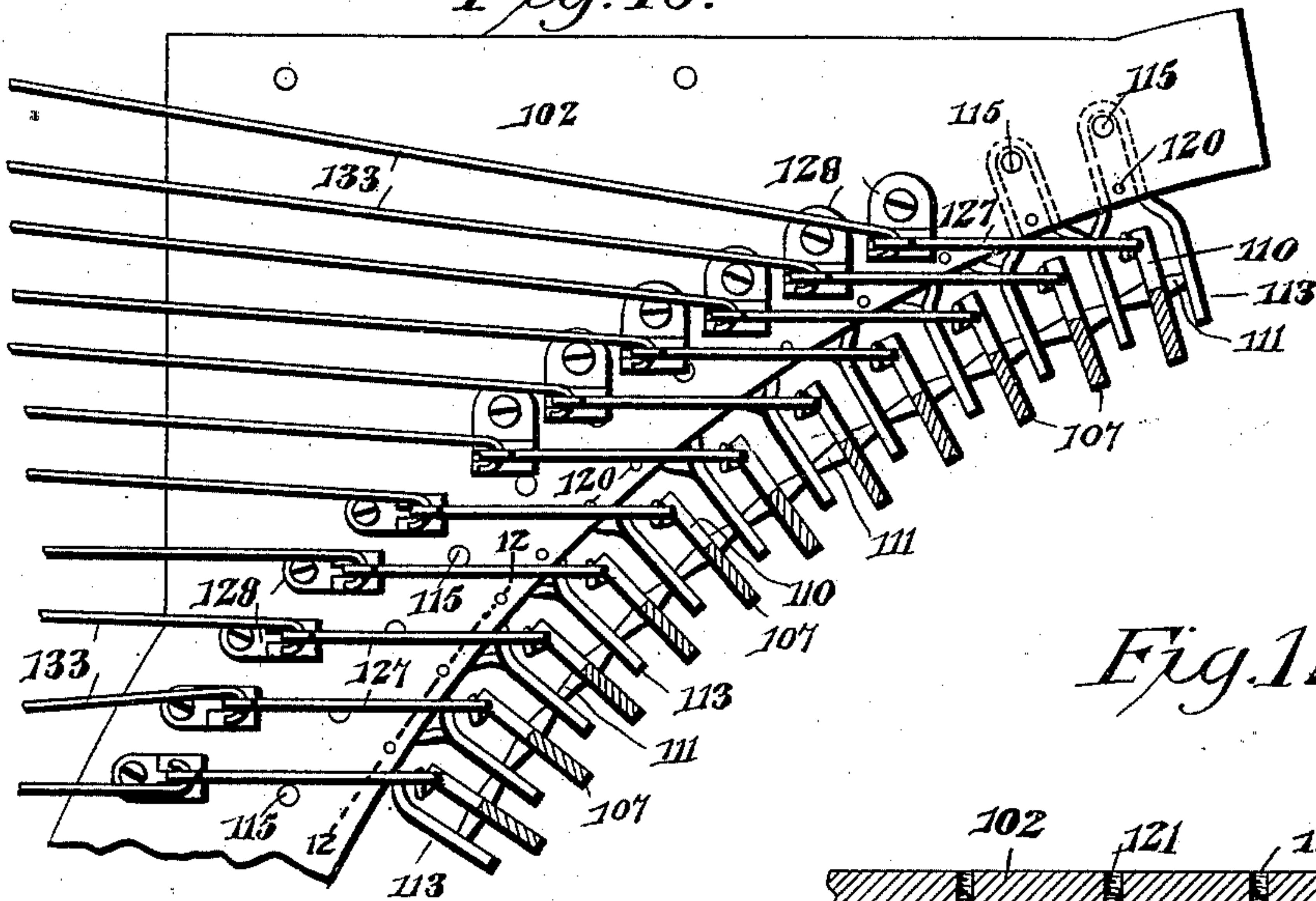


Fig. 12.

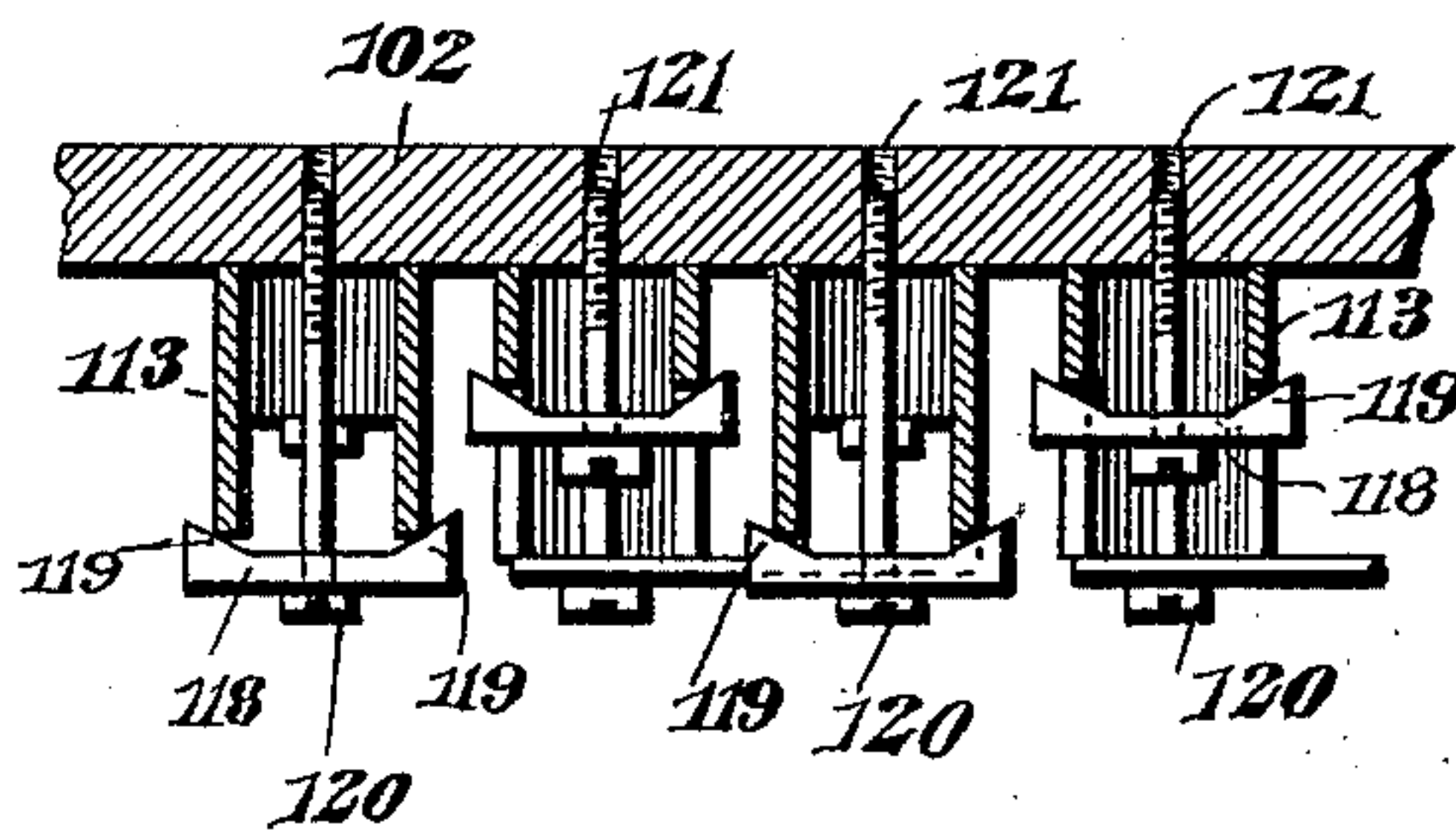


Fig. 11.

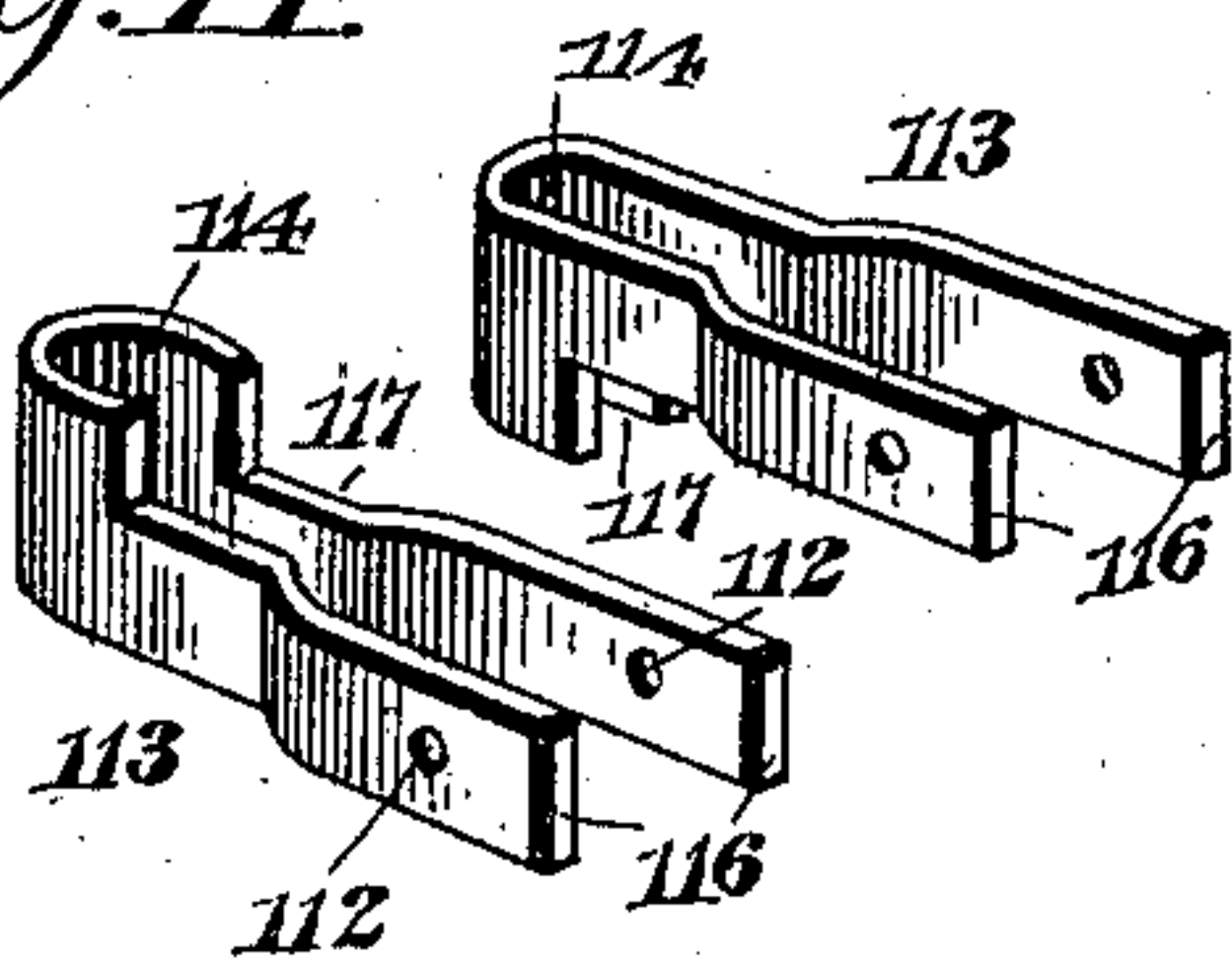


Fig. 27.

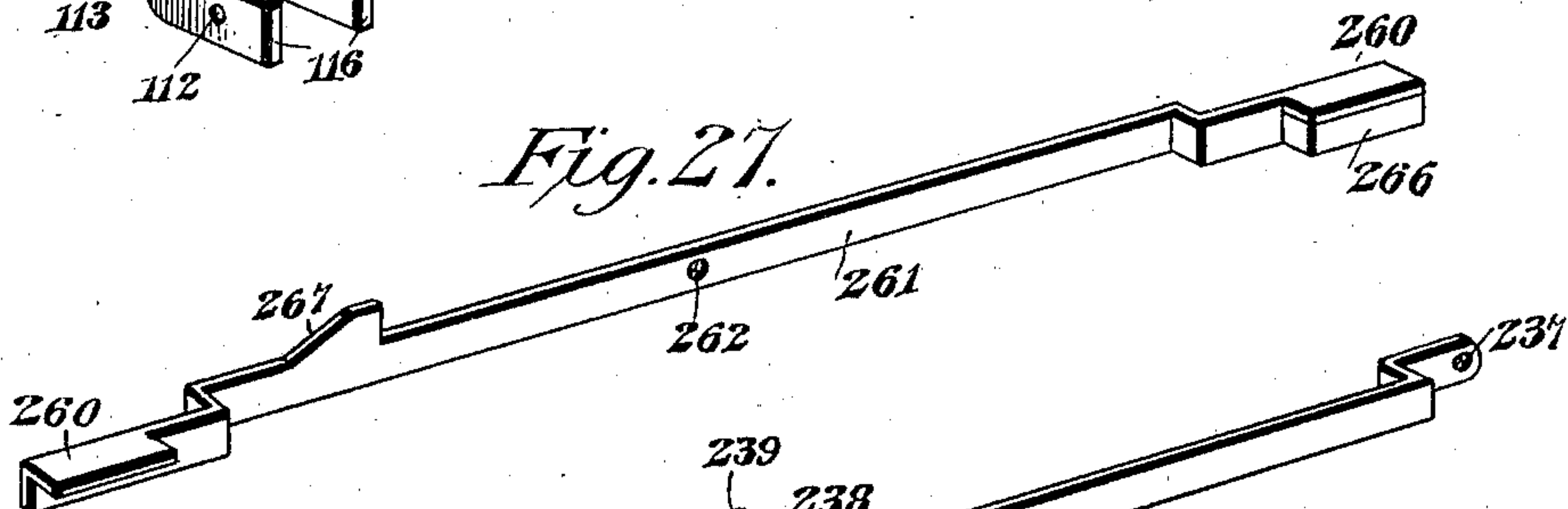
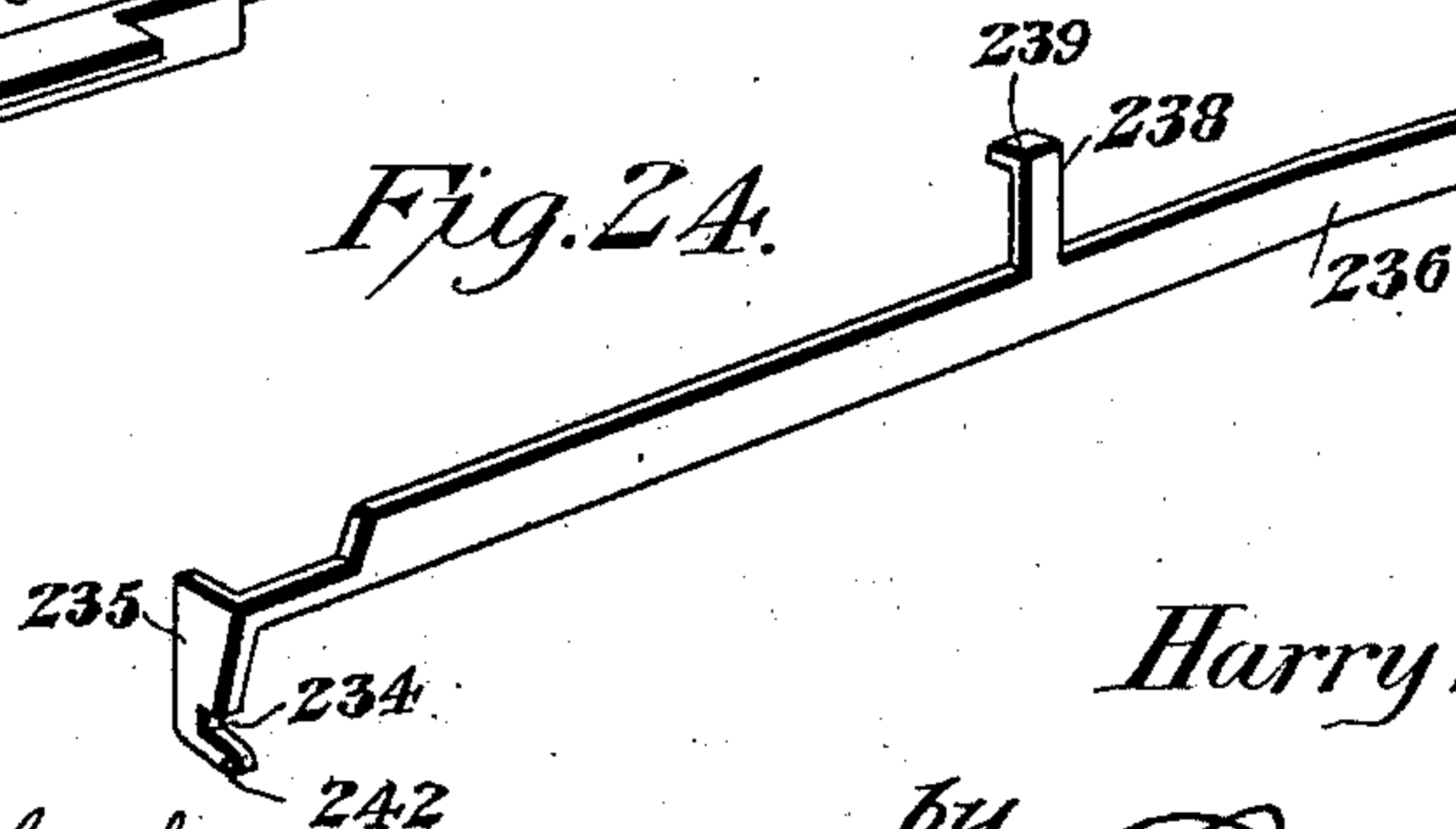


Fig. 24.



Harry S. Dukes Inventor

by

*E. J. Figgess*

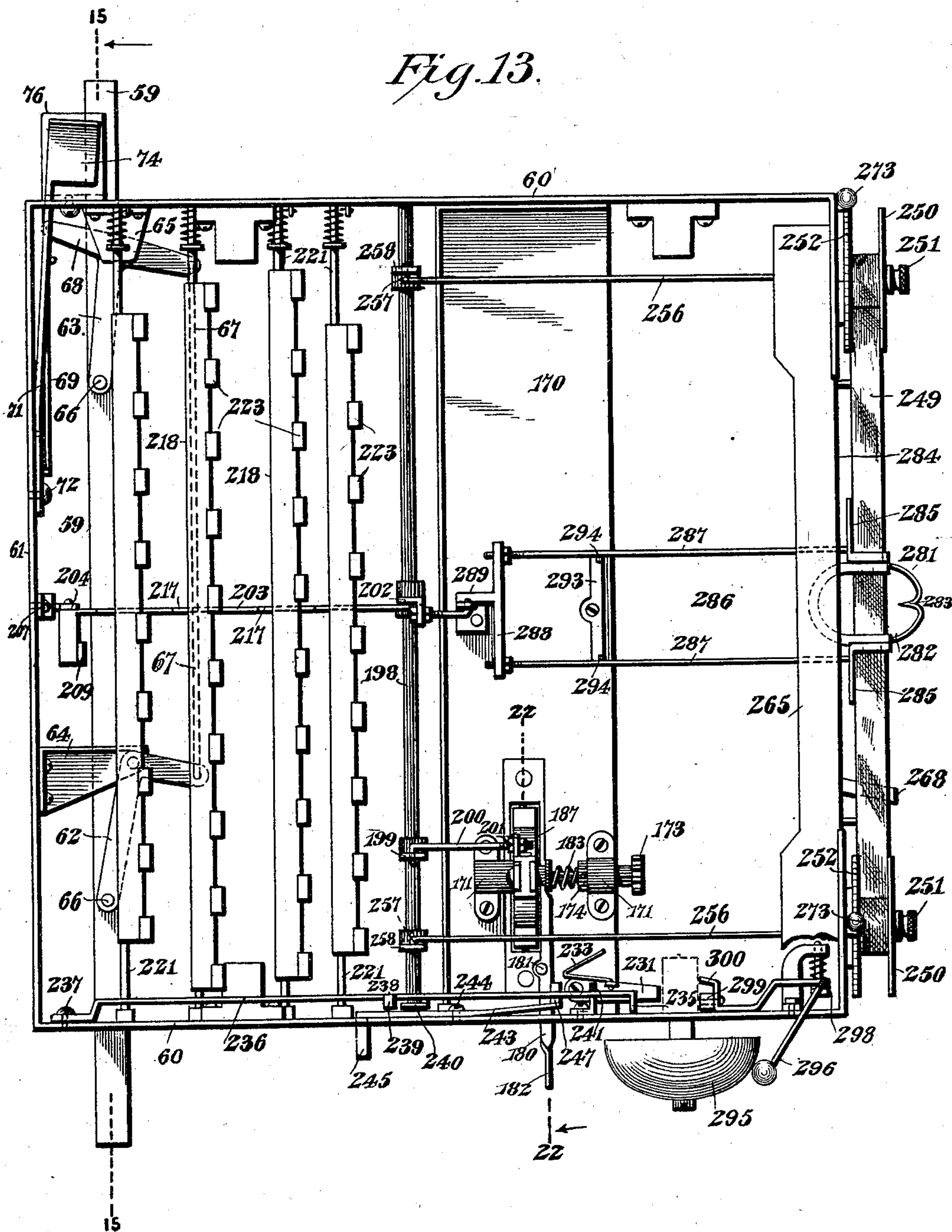
Attorney

Witnesses  
*Jas. K. McLaughlin*  
*J. P. McLaughlin*

**Patented Apr. 2, 1901.**

(Application filed Jan. 12, 1900.)

**18 Sheets—Sheet 10.**



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S. P. Wolhaupter.

By *E. G. Siggers* Attorney



No. 671,186.

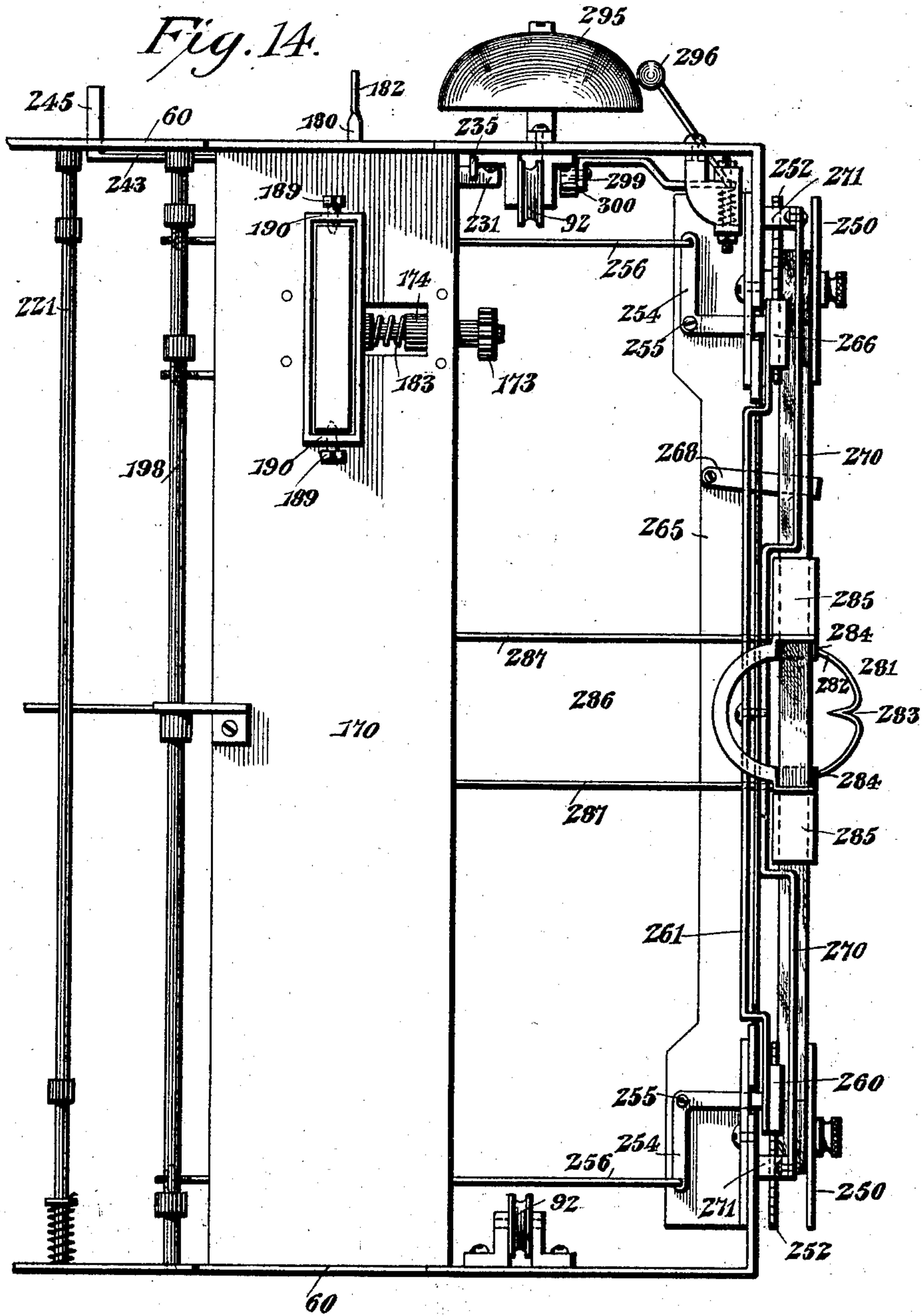
Patented Apr. 2, 1901.

H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet II.



*Harry S. Dukes, Inventor*

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*Jas. K. McLaughlin*  
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H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 13.

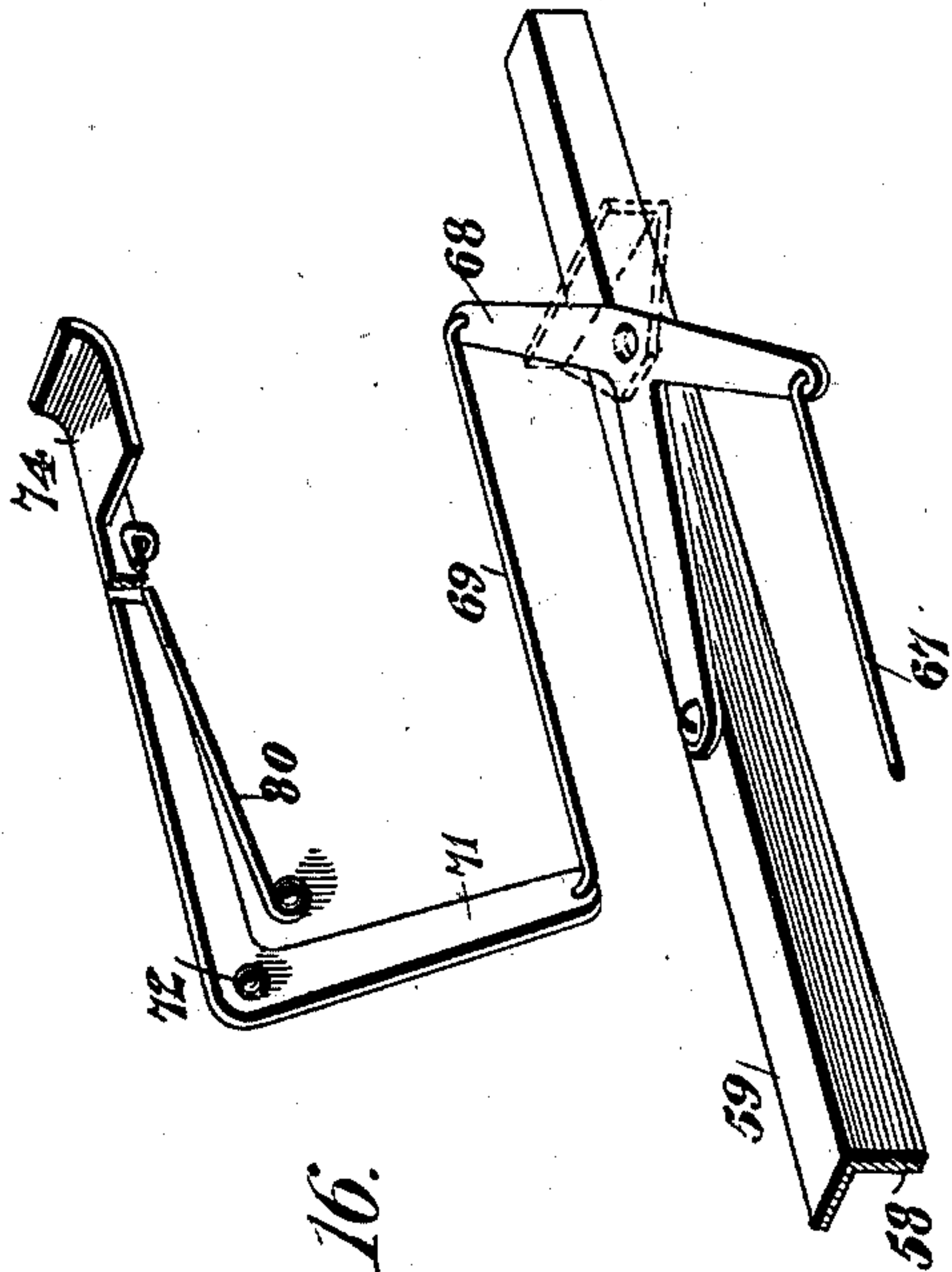


Fig. 16.

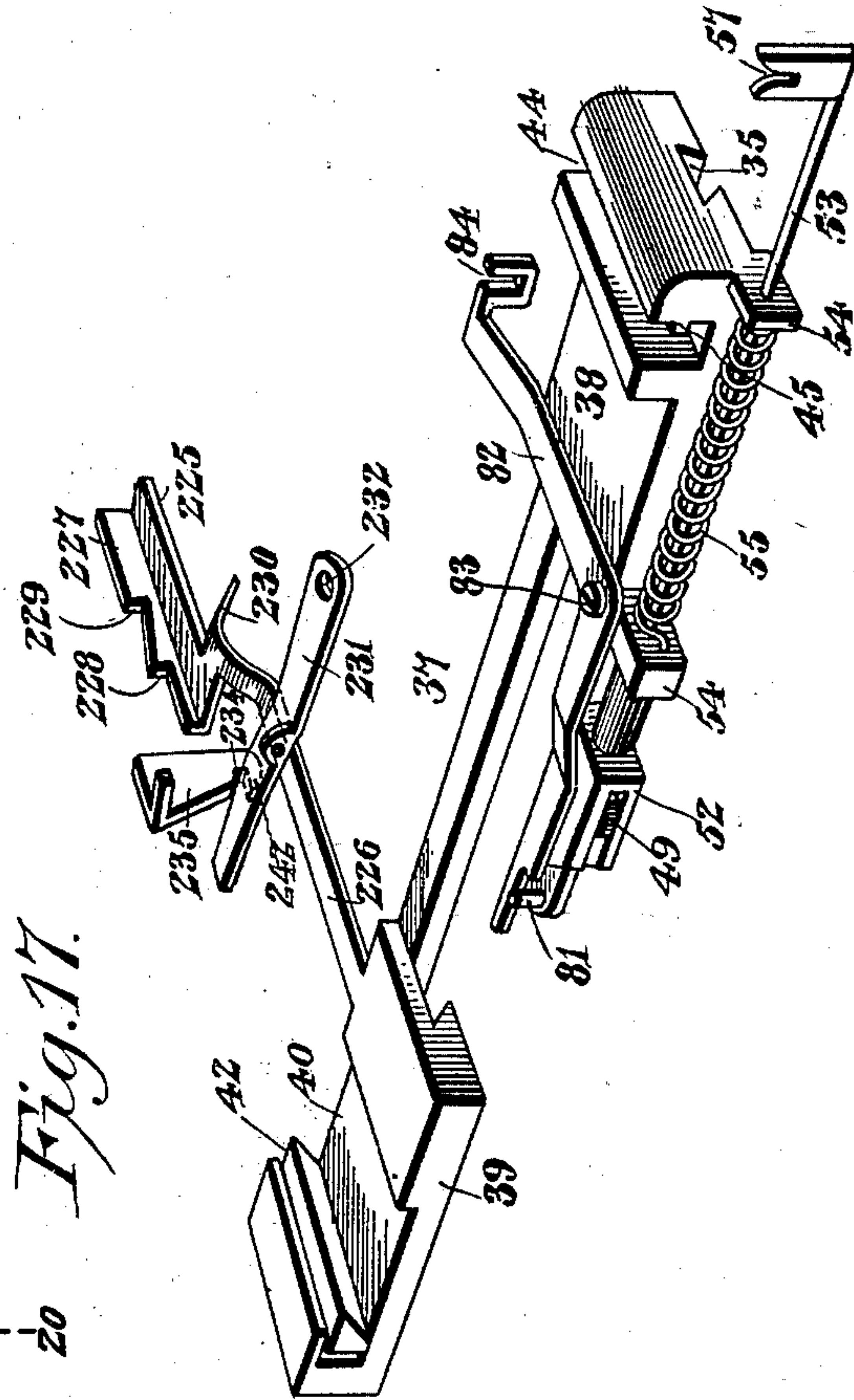


Fig. 17.

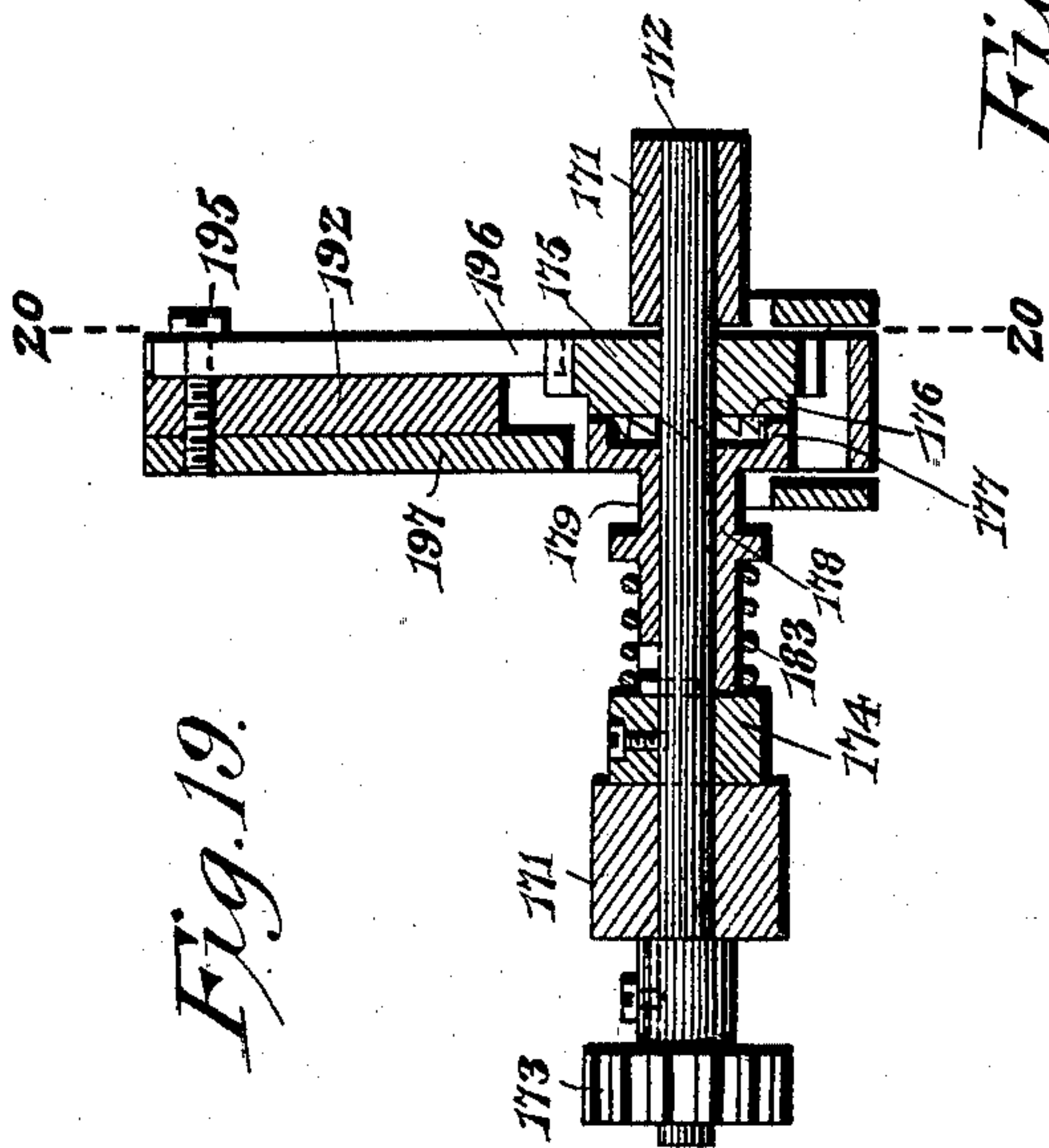


Fig. 19.

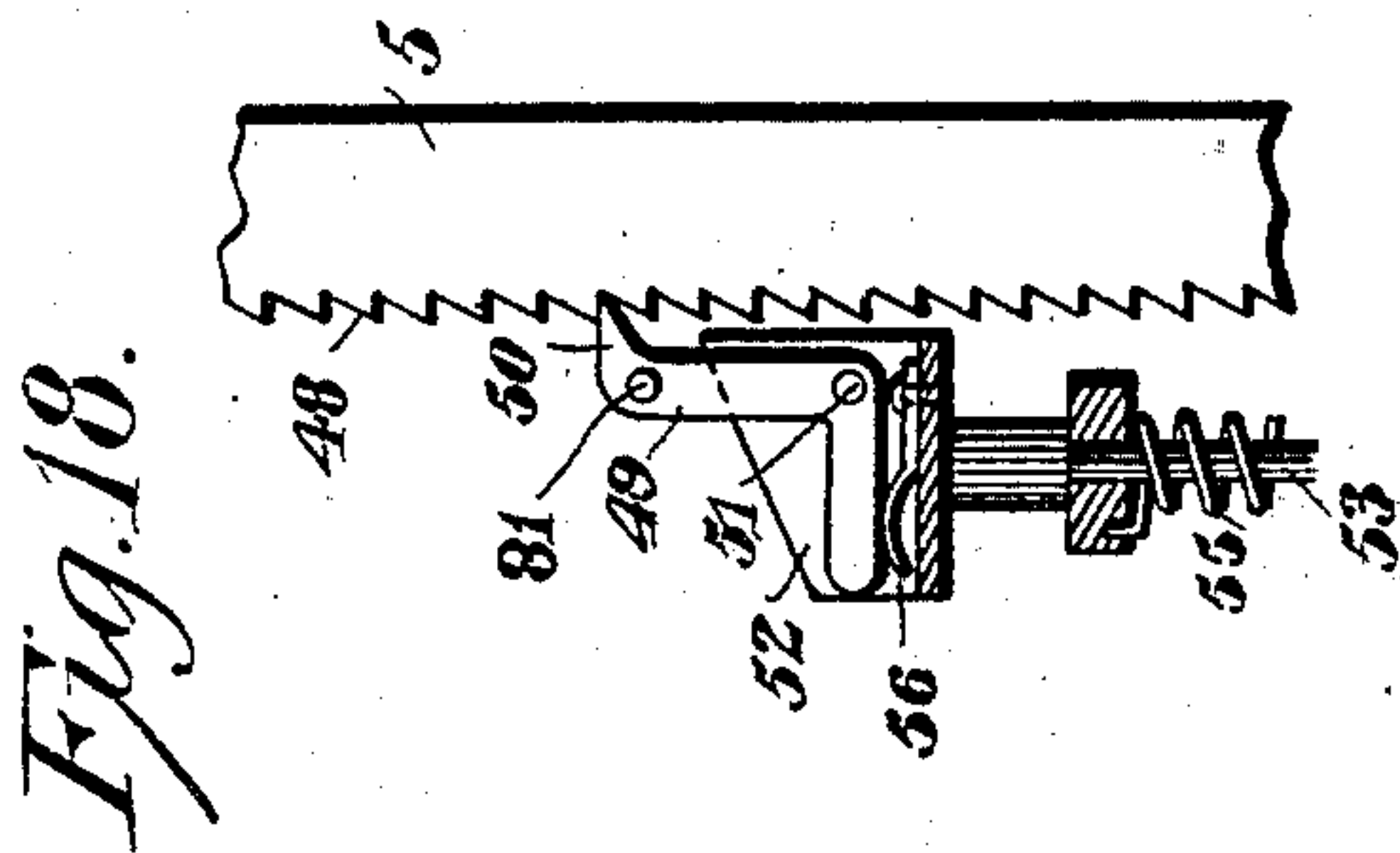


Fig. 18.

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H. S. DUKES.  
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18 Sheets—Sheet 14.

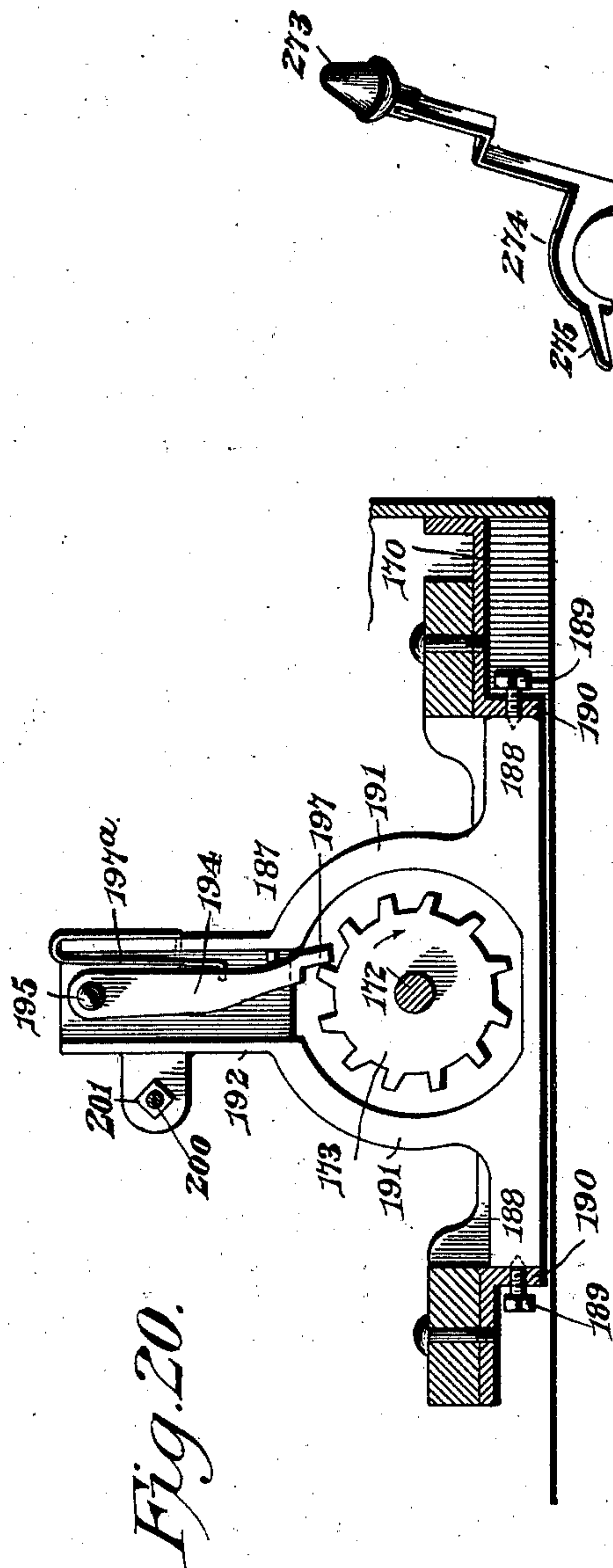


Fig. 20.

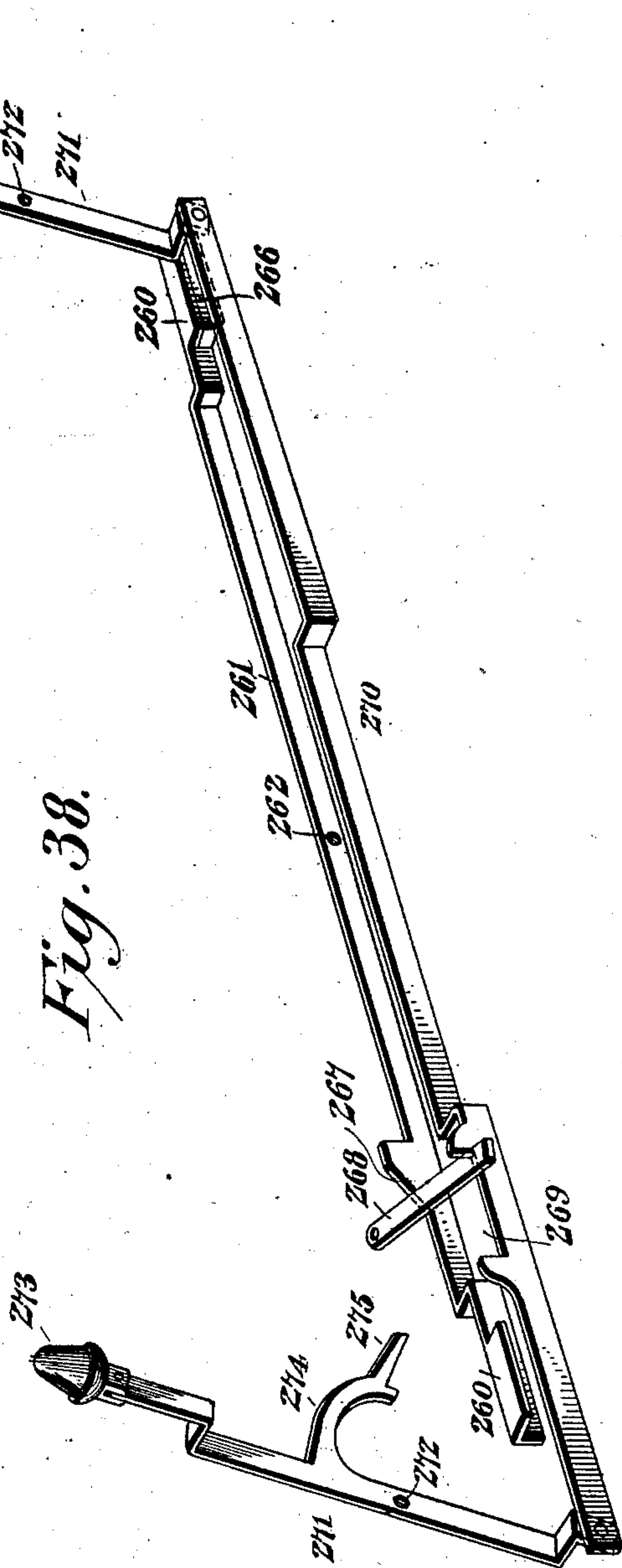


Fig. 38.

Witnesses  
Jas. K. McLaughlin  
S. P. Holchaupt

By *Harry S. Dukes*  
Inventor  
*E. G. Siggers*  
Attorney

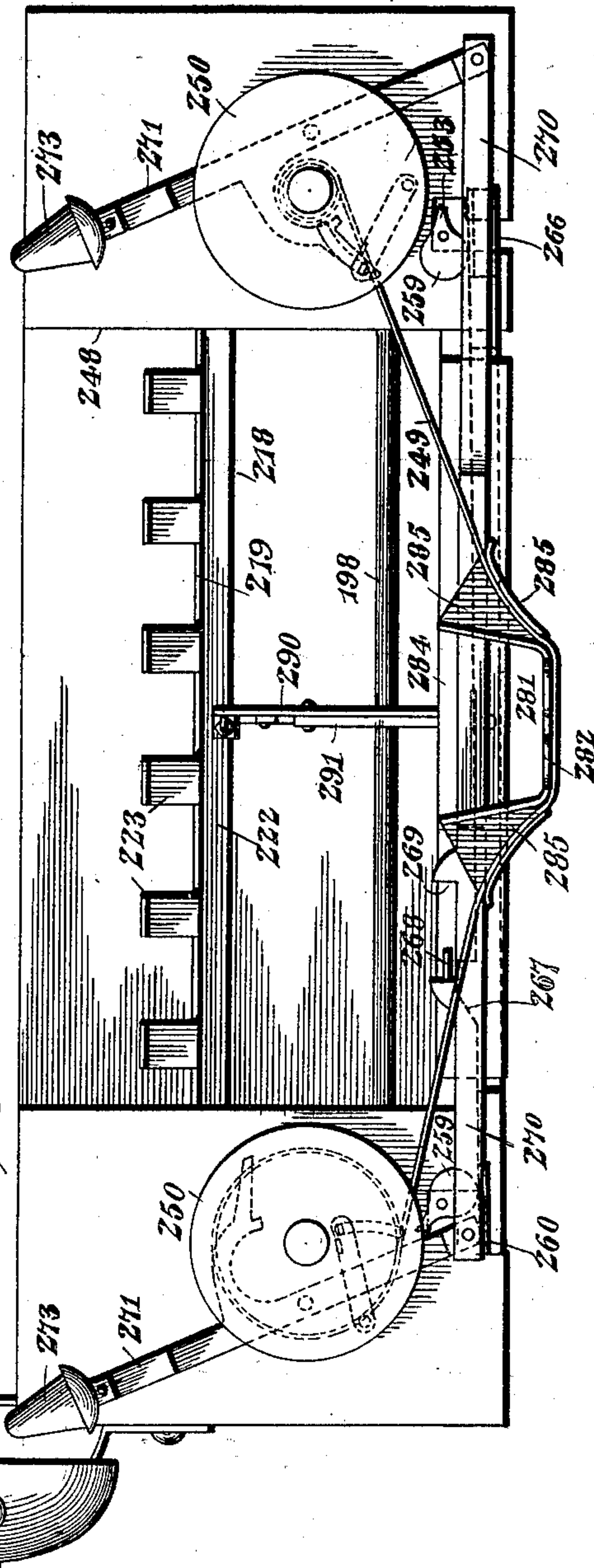
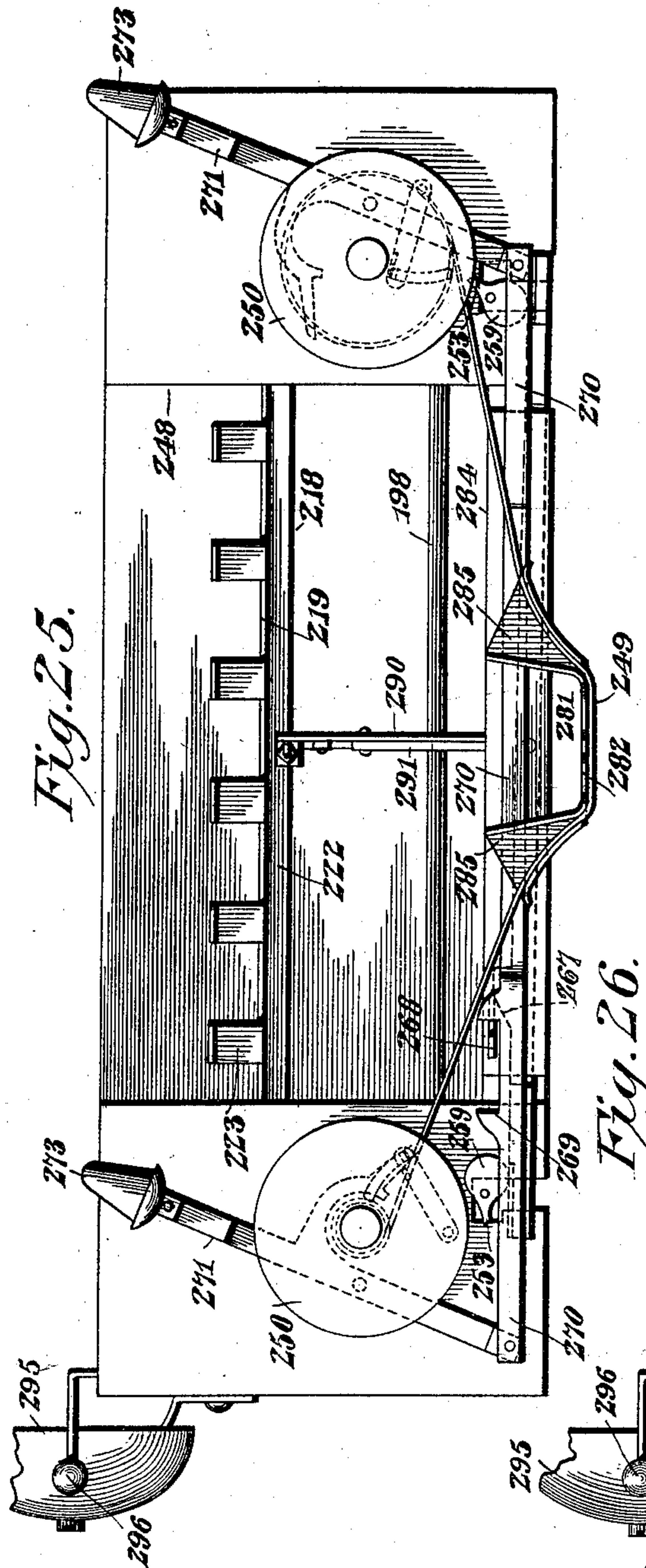


H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 15.



Witnesses  
Jas. F. McLaughlin  
D. R. McLaughlin

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No. 671,186.

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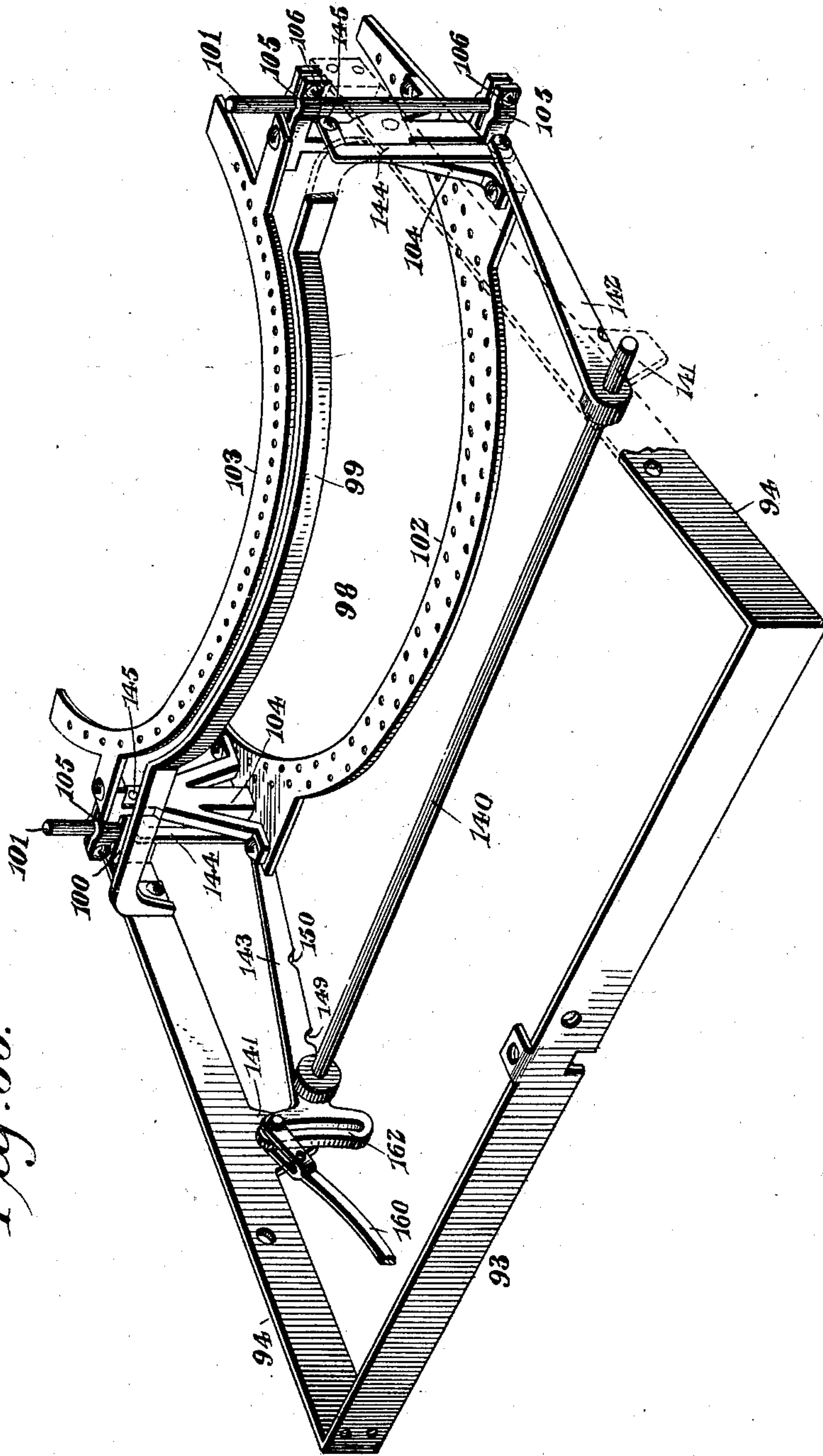
H. S. DUKES.  
TYPE WRITING MACHINE.

(Application filed Jan. 12, 1900.)

(No Model.)

18 Sheets—Sheet 16.

Fig. 35.



Witnesses  
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E. J. Singer  
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No. 671,186.

Patented Apr. 2, 1901.

H. S. DUKES.  
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(No Model.)

(Application filed Jan. 12, 1900.)

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Fig. 37.

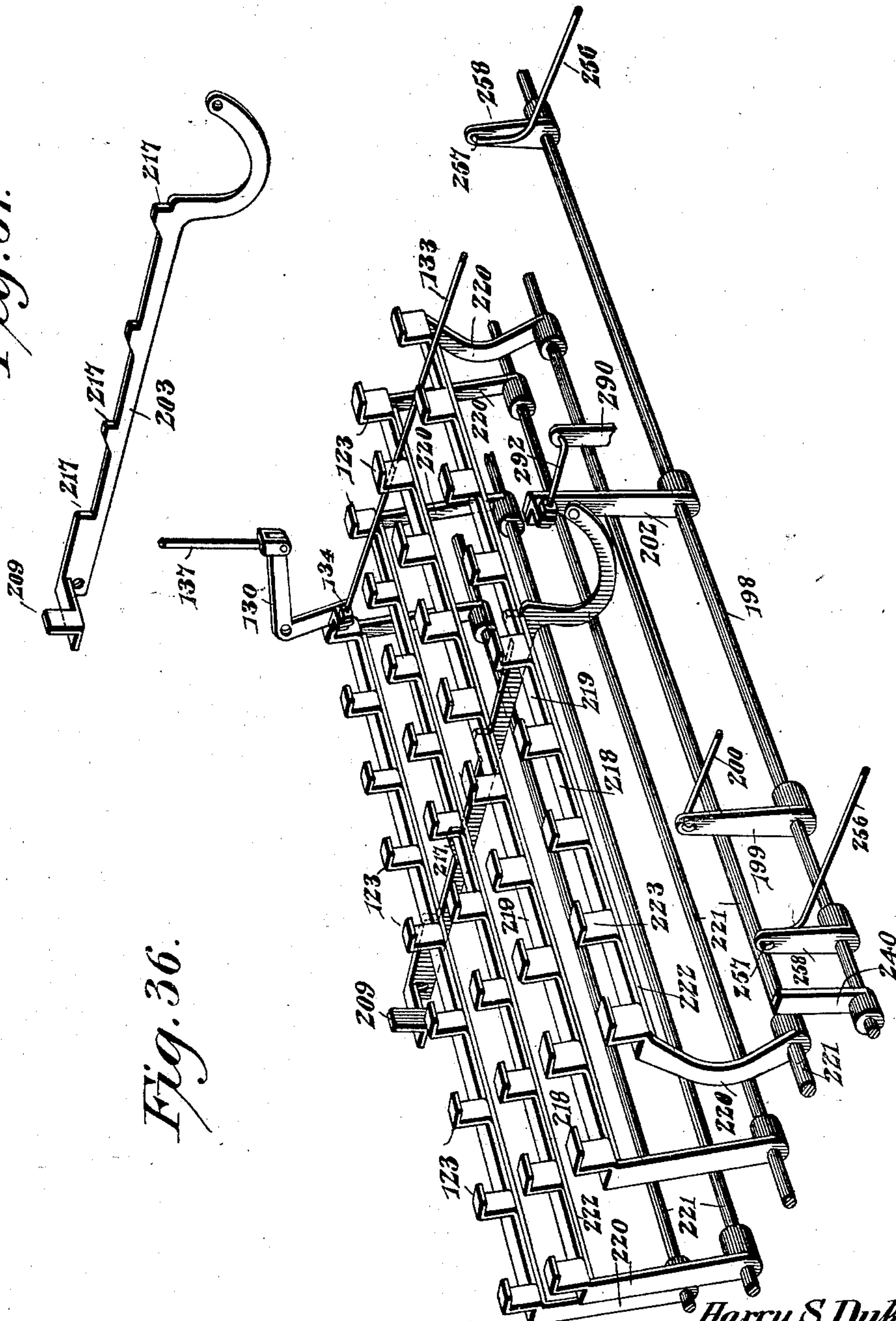


Fig. 36.

Witnesses  
Jas. E. McLaughlin  
J. R. McLaughlin

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Inventor  
C. G. Siggers  
Attorney

No. 671,186.

Patented Apr. 2, 1901.

H. S. DUKES.  
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(No Model.)

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18 Sheets—Sheet 18.

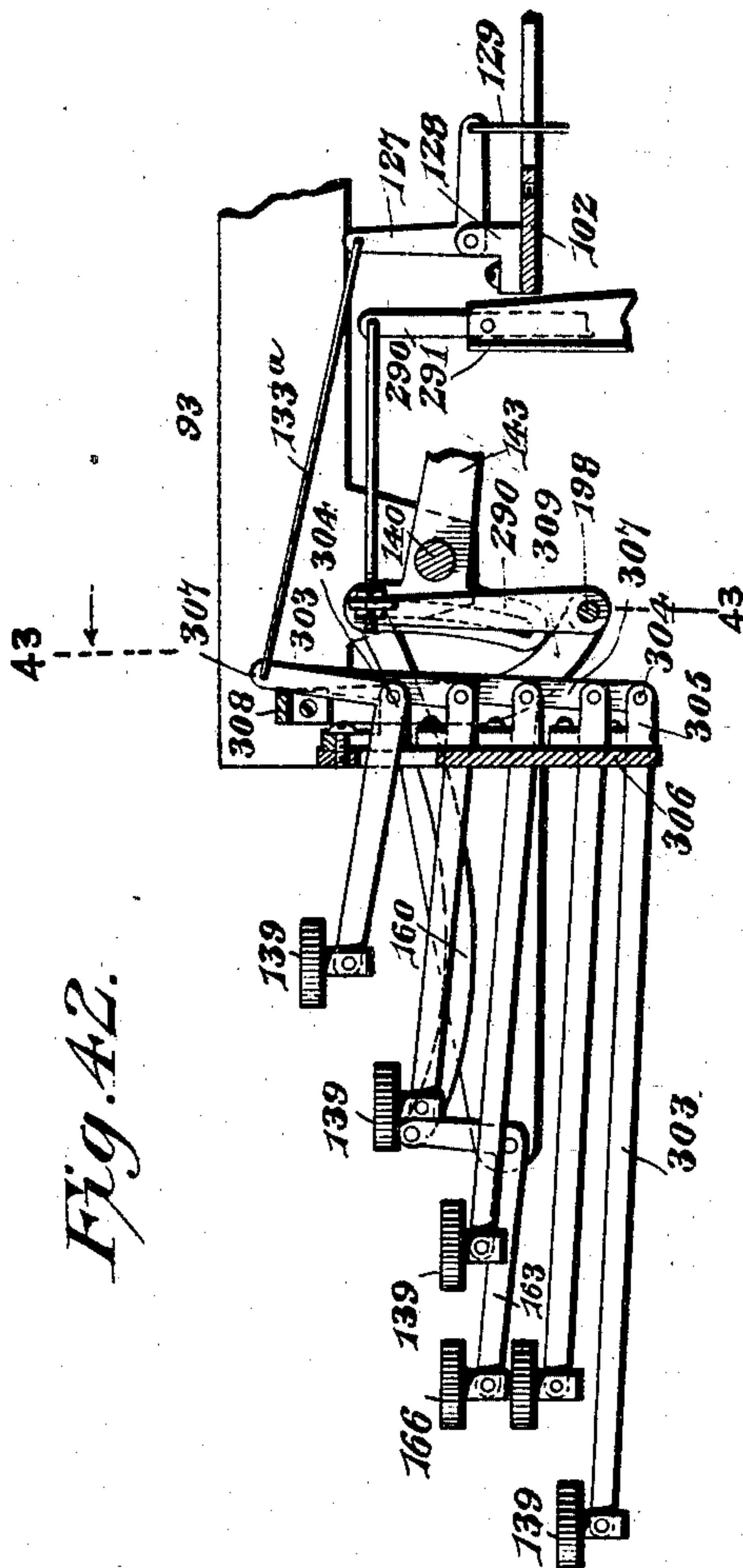
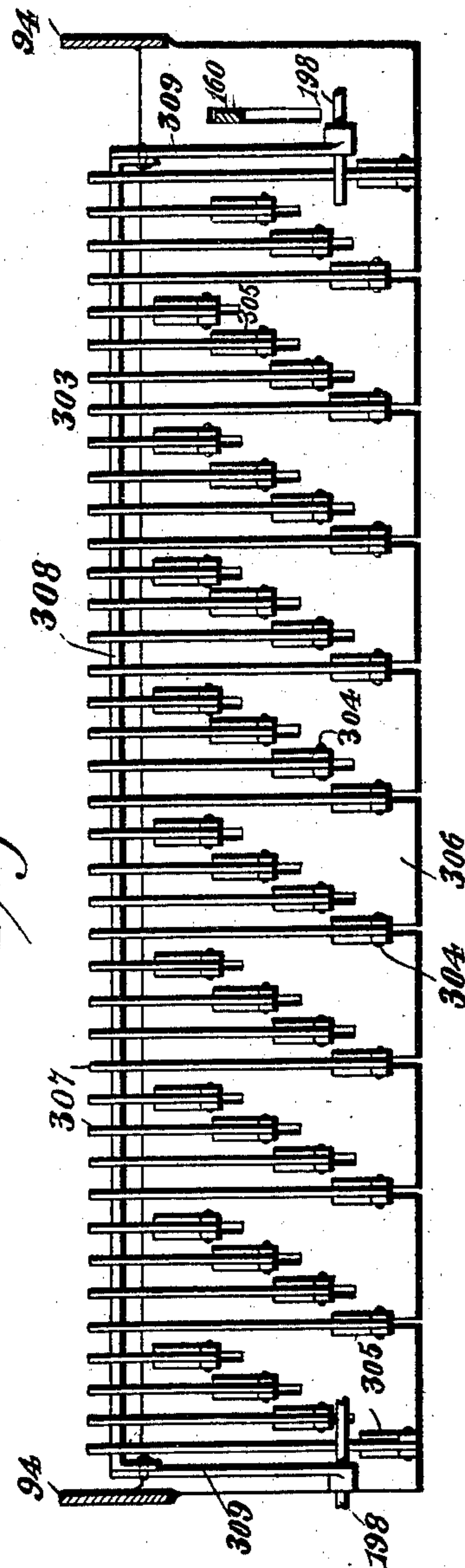


Fig. 42.

Fig. 43.



Witnesses  
Jas. E. McCathran  
J. E. McLaughlin

Harry S. Dukes,  
By Inventor

C. G. Siggers  
Attorney



# UNITED STATES PATENT OFFICE.

HARRY S. DUKES, OF LITTLE ROCK, ARKANSAS.

## TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 671,186, dated April 2, 1901.

Application filed January 12, 1900. Serial No. 1,237. (No model.)

*To all whom it may concern:*

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

This invention relates to type-writing machines, and more particularly to that class of machines especially designed for printing upon the pages of books or upon other surfaces held in a flat or spread-out condition.

To this end the invention contemplates divers improvements upon the different parts of the machine to render the same capable of easy manipulation, while at the same time providing for accurate work and perfectly visible writing. To attain these desired results, the invention has several objects in view, one of which is to provide an improved construction of supporting-frame for the type-carriage, capable of vertical adjustment to allow for the thickness of the book or other object to be printed upon, as well as horizontal adjustment to shift the zone of printing from one page of the book to the opposite page.

The present invention also makes provision for constructing this supporting-frame in such a manner as not only to permit of the adjustments described, but also to provide for the support of the track-rails for the type-carriage in such a manner that the same may be readily adjusted longitudinally of the frame to effect the necessary line-spacing, while also admitting of the transverse travel of the type-carriage to effect the letter-spacing.

Another object of the invention is to associate with the track-carrying frame and the track-rails for the type-carriage a positive and reliable form of line-spacing mechanism controlled by an actuating or operating device on the type-carriage, whereby the line-spacing mechanism is placed under the immediate control of the operator.

The invention further contemplates an improved type-action including novel means for the mounting and adjustment of the type-bars and the key-operated connections therefor, whereby the greatest economy in space will be effected, while at the same time providing for the most positive and direct action

of the type. In carrying out this object the invention also has in view the provision of novel means for effecting the vertical adjustment of the type-bars, whereby either upper or lower case characters can be printed, and also to provide, in connection with the shift mechanism for the type-bars, a new and useful form of reversing device, whereby the type-action may be set for normally printing either upper or lower case characters and the same shift-key employed with the type-action set in either of these positions.

A further object of the invention is to provide improved letter-spacing mechanism having a positive and reliable action to insure a uniform step-by-step feed of the carriage, while at the same time permitting of the free return movement of the carriage and also the release thereof without the necessity of disengaging the dogs of the mechanism from the star-wheel or the spacing-pinion from the rack-bar.

In connection with the letter-spacing mechanism the invention contemplates simple and efficient means for actuating the same from the keys of the keyboard and also to provide a universal motion-transmitting element, preferably in the form of a rock-shaft, for not only transmitting the movement of the keys of the keyboard to the line-spacing mechanism, but also to the ribbon-feed and the ribbon-shift devices.

Another object of the invention is to provide a novel construction of automatically-operating line-stop, which prevents the piling up of letters and also prevents the type from striking the right-hand guide of the main supporting-frame, while at the same time permitting of the completion of a word or the addition of a few extra letters if it should be necessary to add the same to the line before returning the carriage.

With these and many other objects in view, which will more readily appear as the nature of the invention is better understood, the same consists in the novel construction, combination, and arrangement of parts herein-after more fully described, illustrated, and claimed.

The fundamental features of the invention are necessarily susceptible to a wide range of modification as a whole without departing



from the spirit or scope of the invention; but the preferred embodiment of the different instrumentalities is shown in the accompanying drawings, in which—

5 Figure 1 is a perspective view of a type-writing machine constructed in accordance with the present invention and showing the main supporting-frame swung upwardly to a position which permits of the positioning and  
10 removal of the "work," which, as illustrated, is in the form of an open book. Fig. 2 is a top plan view of the entire machine, which includes the main supporting-frame carrying the track-rails and the traveling type-carriage mounted thereon. Fig. 3 is a longitudinal  
15 sectional view through the type-carriage, showing one position of the shifting mechanism for the type-action to normally hold the type-bars in position for printing lower-case characters. Fig. 4 is a similar  
20 view of the type-carriage, showing the shifting mechanism set for holding the type-bars in position for printing upper-case characters. Fig. 5 is a longitudinal sectional view of the type-carriage, the line of section including the letter-spacing mechanism and  
25 the view illustrating the line-lock in its normal unlocked position. Fig. 6 is a detail view showing the line-lock in the locked position, which it automatically assumes at the end of the line. Fig. 7 is a plan view of the  
30 main supporting-frame carrying the track-rails for the type-carriage. Fig. 8 is a longitudinal sectional view on the line 8 8 of Fig. 7, showing the slidable connection of the bearing-block with the supporting-rod and also  
35 illustrating more plainly the pivotal support of the frame on said bearing-block. Fig. 9 is a bottom plan view of the entire type-action removed from the casing of the carriage. Fig. 10 is an enlarged detail view of a portion of the hanger-ring for the type-bars,  
40 showing more plainly the mounting of the type-bar hangers and the relative positioning of the type-bar bell-cranks. Fig. 11 is a detail in perspective of a pair of the type-bar hangers, showing the reverse relation thereof to permit of compact grouping and providing  
45 for a wide bearing for the type-bars. Fig. 12 is a detail sectional view on the line 12 12 of Fig. 10, showing the adjusting device for the type-bar hangers to provide for adjusting the bearings. Fig. 13 is a top plan view of the  
50 type-carriage, with the type-action removed, exposing the operating devices for the line-spacing mechanism and also exposing the connections for transmitting motion to the letter-spacing mechanism, the ribbon-feed, and the ribbon-shifting devices. Fig. 14 is a bottom  
55 plan view of the carriage. Fig. 15 is a detail cross-sectional view of the carriage on the line 15 15 of Fig. 13, illustrating more plainly the operating device for the line-spacing mechanism. Fig. 16 is a detail in perspective of a portion of the operating device on the carriage  
60 for operating the line-spacing mechanism. Fig. 17 is a detail in perspective of one of the

track-slides, showing the fixed trip-plate preferably associated therewith. Fig. 18 is a detail sectional view showing the mounting of  
70 the line-spacing pawls. Fig. 19 is a detail sectional view of the letter-spacing mechanism, the line of section being taken on the line 19 19 of Fig. 13. Fig. 20 is a vertical sectional view of the letter-spacing mechanism on the line 20 20 of Fig. 19, showing the  
75 mechanism in the "at-rest" position. Fig. 21 is a view similar to Fig. 20, showing the spacing or feed dog disengaged from the star-wheel. Fig. 22 is a detail sectional view on the line 22 22 of Fig. 13, showing the release-lever connection with the letter-spacing mechanism. Fig. 23 is a detail sectional view on  
80 the line 23 23 of Fig. 4, showing the mounting of the spindle for the reversing-key of the type-bar-shifting mechanism. Fig. 24 is a detail in perspective of the lock-lever forming a part of the line-stop device. Fig. 25 is a rear elevation of the carriage, showing the  
85 mounting of the ribbon-spools, the actuating-pawls constituting a part of the ribbon-feed movement, and the reversing mechanism for the ribbon-feed. Fig. 26 is a similar view showing a different position of the same parts. Fig. 27 is a detail in perspective of  
90 the reciprocatory reversing-bar, constituting a part of the ribbon-feed-reversing mechanism. Figs. 28 and 29 are detail views illustrating the different positions of portions of the ribbon-feed-reversing mechanism to show  
95 the automatic action thereof. Fig. 30 is a detail sectional view on the line 30 30 of Fig. 29. Fig. 31 is a detail in perspective of one of the actuating-pawls forming a part of the ribbon-feed movement. Figs. 32 and 33 are  
100 detail views showing more plainly the mounting of the pivotal trip-latches on the ratchet-disks of the ribbon-spools. Fig. 34 is a detail in perspective of one of the trip-latches for the ribbon-spools. Fig. 35 is a skeleton  
105 perspective view of the type-action-supporting frame, the vertically-movable type-bar carrier, and the adjusting connections for said type-bar carrier. Fig. 36 is a perspective view showing the construction and arrangement of the swinging yoke-levers which  
110 are associated with the universal key-connection bar and the motion-transmitting rock-shaft. Fig. 37 is a detail in perspective of the universal key-connection bar cooperating with the swinging yoke-levers and the motion-transmitting rock-shaft. Fig. 38 is a  
115 detail in perspective of the reversing device or mechanism for the ribbon-feed. Fig. 39 is a detail sectional view on the line  $x x$  of Fig. 7. Fig. 40 is a similar view on the line  $y y$  of Fig. 7. Fig. 41 is a detail sectional view showing a portion of the line-lock device, the line of section being indicated by the line  $z z$  in Fig. 6. Fig. 42 is a detail view  
120 showing a modified arrangement of the keyboard. Fig. 43 is a sectional view on the line 43 43 of Fig. 42.

Like numerals of reference designate cor-



responding parts in the several figures of the drawings.

Referring to the accompanying drawings, the numeral 1 designates a work-table, which 5 is preferably in the form of a base-board, constructed of wood or other suitable material and of a sufficient size to provide for the support thereon of the book or other piece of work to be printed upon; but as the inven- 10 tion is especially designed to provide for printing upon the pages of a book there is preferably associated with the work-table or base-board 1 suitable rests 2, which are loosely placed upon the table and beneath the book- 15 covers, said rests being spaced apart at their contiguous edges to provide proper clearance for the "hub" of the book, and thereby permitting of the same being held in a properly spread-out condition to admit of print- 20 ing on the pages thereof. The said book-rests 2 may be in the form of plain blocks, and are not only readily removable and replaceable, but may also be made of different sizes, according to the requirements of the 25 work.

In connection with the support of the book in the proper position for being printed upon, it is necessary to provide a proper backing for the sheet or page over which the type- 30 carriage is worked, and to provide for this there is preferably employed a flat platen 3, which is provided with the usual rubber writing-surface and is unobstructed throughout its entire area, so that the leaf or sheet may 35 be held firmly and in a perfectly flat condition thereon, and thereby insure neat and properly-aligned printing. The platen 3 is entirely separate from the machine or the table and can be readily removed and inserted 40 in place without affecting or disturbing any part of the machine or its support.

In carrying out the present invention it is not only necessary to provide for the traveling movement of the type-carriage both lon- 45 gitudinally and transversely of the page or sheet being written upon, but also to permit of the vertical adjustment of the carriage to suit different thicknesses of books and the swinging thereof in a vertical direction to 50 admit of the placing in position or removal of a book. These necessary and desirable adjustments and improvements are accomplished through the medium of the construction of the supporting-frame in connection 55 with the pivotal support and the track appurtenances which are associated therewith. In carrying out these objects the invention involves the employment of a vertically-swinging main supporting or track-carrying frame 60 4, which is not only capable of vertical adjustment, but also of horizontal or transverse adjustment across the page or sheet. The said main supporting-frame 4 essentially consists of a pair of parallel longitudinal guides 65 or guide-bars 5, which are disposed longitudinally of the page or sheet being printed upon, and also serve, when lowered, as clamps

for holding the page or sheet in a flat or spread-out condition upon the flat platen 3, as plainly shown in Fig. 8 of the drawings. 70 In addition to the parallel longitudinal guides 5 the main supporting-frame 4 includes the oppositely-located parallel front and rear end bars 6 and 7, respectively, which connect the opposite end portions of the longitudinal 75 guides 5 and form the complete frame. The rear end bar 7 of the main supporting-frame 4 has projected from the under side thereof a pair of oppositely-arranged rearwardly-extending bearing-lugs 8, which loosely turn 80 upon the opposite extremities of a pivot-rod 9, which is fitted in the oppositely-arranged supporting-ears 10, arranged at the inner sides of the bearing-lugs 8 and projecting from the front side of a sliding bearing-block 11. The 85 bearing-block 11 is of a sufficient length to provide for the proper pivotal support of the main frame 4 and is provided therein with a cross-sectionally-polygonal opening 12, which slidably receives a correspondingly-shaped 90 non-rotatable vertically-adjustable supporting-rod 13. The said rod 13 simply provides a support for the pivotal support of the main frame 4; but at the same time admits of not 95 only the vertical adjustment of said pivotal support, but also the transverse or horizontal adjustment thereof to provide for the transverse shifting of the main frame 4 and the parts arranged thereon. The sliding bearing-block 11 is held stationary at any point 100 of adjustment on the rod 13 by means of a clamp or set screw 14, mounted therein and adapted to impinge upon the rod 13, which is further provided at or near the opposite extremities thereof with the vertically-disposed 105 openings 15, adapted to slidably receive the stationary standards 16, having base plates 17 at their lower ends, which are screwed or otherwise suitably fastened to the upper side 110 of the work-table or base-board 1 contiguous to the rear corners thereof. By reason of the construction described the supporting-rod 13 is capable of a vertical adjustment upon the standards 16 and is held fixed upon the same 115 at any point of adjustment through the medium of set-screws 18, passing through the said rod 13 and adapted to impinge upon the standards 16. The supporting-rod 13 not only 120 accommodates for adjustment thereon the pivotal support for the main frame 4, but also carries the oppositely-arranged marginal stops 19. These marginal stops 19 are preferably in the form of collars slidably fitting upon the rod 13 and held at any point of ad- 125 justment thereon by means of the set-screws 20, it being understood by those familiar with the art that the said stops 19 subserve the usual function of marginal stops to arrest the frame at either limit of movement in a trans- 130 verse direction. In connection with the mounting of the main frame 4 of the machine, which supports the track-rails as well as the type-carriage, it may be noted at this point that the pivotal support, essentially consist-



ing of the bearing-block 11 and the pivot-rod 9, is separate and apart from the vertically-adjustable main supporting-rod 13, and inasmuch as the latter is held stationary in its vertically-adjusted position the entire pivotal support is capable of horizontal adjustment upon the rod 13.

There are several distinct advantages in the present type of machine, arising from the employment of a pivotal support for the track-carrying frame, which is separate and apart from the main support, which in the present invention is the supporting-rod 13. In the first place the construction described involves the bearing-block 11, which is capable of horizontal movement upon the stationary supporting-rod 13 to permit of the horizontal adjustment of the track-carrying frame at any time without disturbing the vertical adjustment of the supporting-rod 13. Furthermore, the separate bearing-block 11 permits of the use of the separate pivot-rod 9, which is readily removable to permit of detaching the entire track-carrying frame. Hence the construction provides what may be properly termed a "detachable" pivot connection between the track-carrying frame and its support, and this connection permits of the interchangeability of different frames without disturbing the main support. Furthermore, the separate support 11 for the track-carrying frame provides for an exceptionally rigid pivotal support of the rear cross or end bars 7, to which the longitudinal bars or guides 5 are connected. Consequently means may be provided for adjusting the transverse width of the track-carrying frame by the adjustment of one or both of the guides 5 without disturbing the pivotal connection between the frame and its support. Also another advantage of the construction described resides in the fact that the elements 11 and 13, providing, respectively, for the horizontal and vertical adjustment of the track-carrying frame, are entirely independent of the latter and of the means which permit of the width adjustment of the frame itself.

Inasmuch as the left-hand guide or guide-bar 5 of the frame 4 is designed to rest upon the page or sheet adjacent to the left-hand edge thereof it is unnecessary for the said guide or guide-bar to be transversely adjustable, and therefore the same is rigidly connected at its opposite ends respectively to the front and rear end bars 6 and 7 by means of angle-plates 21 or equivalent connections; but as the frame 4 must be adjusted to the width of the page or sheet being printed upon provision is made whereby the right-hand guide 5 is capable of transverse adjustment upon the end bars 6 and 7 of the frame. To secure this adjustable mounting of the right-hand guide or guide-bar 5, the latter has rigidly fastened thereto, at or near the front and rear ends thereof, the front and rear supporting-blocks 22 and 23, respectively, both of which blocks are preferably in the form of

angle-irons, and the rear one of said blocks (designated by the numeral 23) is adapted to receive in the transversely-disposed arm thereof of the T-shaped clamping-bolt 24, which slidably works within a correspondingly-shaped slot 25, formed longitudinally in the rear end or cross-bar 7 of the frame, and upon its front threaded extremity the T-shaped clamping-bolt 24 has mounted the binding-nut 26, which when tightened binds the bolt 24 within the slot 25, and thereby holds the rear end of the right-hand guide fast to the rear end bar 7. A corresponding adjustment and clamping of the front end of the transversely-adjustable right-hand guide 5 is provided for through the medium of a clamping-bolt 27, passing through the transversely-disposed arm of the front-angled supporting-block 22 and also through the longitudinally-disposed slot 28, formed in the front end or cross-bar 7 of the frame, and the said clamping-bolt 27 has mounted on the front threaded extremity thereof the binding-nut 29, which when loosened permits of the sliding movement of the bolt 27 in the slot 28 and when tightened provides for holding the front end portion of the right-hand guide fast to the front end bar 6 in its properly-adjusted position. To prevent the dropping or twisting of the angled supporting-blocks 22 and 23 when the nuts of the clamping-bolts 24 and 27 are loosened, the said supporting-blocks are provided at their sides next to the adjacent end bars with the retaining-ribs 30, slidably fitting in the rabbets 31, formed at the edges of the slots in both the front and rear end bars 6 and 7. (See Figs. 39 and 40.) At this point it is to be noted that both the front and rear end bars 6 and 7 of the vertically-swinging supporting-frame 4 are provided with scales which facilitate the accurate adjustment of the transversely-adjustable right-hand guide 5, while the scale on the rear end bar 7 also serves the usual function of the operating-scale, which will be readily understood by those skilled in the art.

The vertically-swinging supporting-frame 4 is designed to support for longitudinal adjustment thereon a pair of parallel front and rear track-rails 32 33, respectively, which track-rails are arranged transversely of the frame 4 and project at their ends beyond the longitudinal guides 5 thereof, whereby their projecting ends will serve to hold down the opposite page of the book from that being written upon. To provide for a proper support of the track-rails 32 33, the parallel longitudinal guides 5 of the supporting-frame 4 are formed at their upper sides with longitudinal dovetailed ribs or ways 34, extending from end to end thereof and slidably receiving the correspondingly-shaped grooves 35 of the track-slides 36 and 37, longitudinally movable upon said guides 5. The oppositely-located track-slides 36 37 are arranged in parallel relation, and the said slides are provided at their opposite ends with widened front and rear rail-chairs 38 and 39, which



are adapted to receive therein and provide for the proper support and positioning of the parallel transversely-disposed track-rails 32 33. The transversely-aligned rear chairs 39 5 of the opposite track-slides 36 37 are provided therein with the dovetailed seats 40, adapted to receive therein the correspondingly-shaped base-flange 41 of the rear track-rail 33, thereby providing an interlocking connection between the said rear track-rail and the rear 10 chairs of the track-slides, which positively prevents upward displacement of the rail, while at the same time permitting of the proper seating or adjustment thereof. In 15 addition to the dovetailed seats 40 the rear rail-chairs 39 have fitted therein at one side of the said seats 40 the beveled wear-blocks 42, which are adapted to fit against one side of the rear track-rail 32 at the base thereof, and 20 are held thereagainst by adjusting-screws 43, mounted in the sides of the chairs 39 and having their inner ends impinging against the adjustable beveled blocks 42. The adjustment of the blocks 42 serves to take up 25 the wear of the parts, and the block 42 carried by the rear chair 39 of the left-hand track-slide 36 is adapted to be adjusted sufficiently tight to serve as a clamp for holding fast the rear rail to the left-hand track-slide, 30 while the wear-block 42 carried by the rear chair of the right-hand track-slide 37 is left sufficiently loose so as not to interfere with the transverse sliding adjustment of the right-hand guide 5.

35 The front track-rail 32 is held in the same relation to the right and left hand track-slides as the rear track-rail, but in a slightly different manner. To provide for this mounting of the front track-rail 32, the front chairs 38 40 of the rail-slides 36 37 are provided with the rail-grooves 44, receiving therein the front rail 32, and one of said front chairs, preferably the right-hand one, is further provided with an inwardly-projecting retaining-lip 45, 47 which slidably engages in the groove 46, formed in one side and longitudinally of the front rail 32. The other front-rail chair 38, preferably the left-hand one, has mounted therein the clamping-screw 47, which is adapted 50 to impinge upon the rail 32 and hold the same fast to the left-hand slide 36, while the rib-and-groove connection 45 46 between the other front chair and the said front rail 32 permits of the free transverse adjustment 55 of the right-hand guide 5 without permitting of the upward displacement of the front rail 32. It will be observed that the connections between the track-slides and the guides 5 and between the rails and the track-slides are 60 such as to permit of the free adjustment of the parts, while positively preventing upward displacement of the track-rails with the type-carriage, which has a traveling movement on such rails in the manner to be presently explained.

65

In carrying out the present invention the line spacing mechanism is adapted to be car-

ried with the track-rails and is associated directly with the main vertically - swinging frame 4, but is designed to be operated by an 70 actuating or operating device on the traveling type-carriage.

Referring first to the mechanism associated with the main frame 4 and the track-rails, slidably supported thereon, it is to be noted 75 that in order to secure the necessary line-spacing it is necessary to provide means for adjusting the transversely-disposed rails 32 33 longitudinally upon the guides 5. To provide for this, the said guides 5 are provided 80 along their inner longitudinal edges with a longitudinal series of ratchet-teeth 48, adapted to be engaged by the bell-crank spacing-pawls 49. Each of the bell-crank spacing-pawls 49 is adapted to have the point 50 there- 85 of normally engaged with the teeth of the adjacent guide 5 and is pivotally mounted at its angle, as at 51, in the bifurcated head 52 at the inner end of the reciprocatory plunger-stem 53, which is slidably mounted in the per- 90 forated guide-lugs 54, projecting from the inner side of the adjacent front-rail chair 38, as plainly shown in detail Fig. 17 of the drawings. A coiled retracting-spring 55 is mount- 95 ed upon each reciprocatory plunger-stem 53 and is interposed between the inwardly-projecting guide-lugs 54, receiving the said stem, said spring 55 being connected at one end with the stem 53 and bearing at its free end 100 against the rear one of the guide-lugs 54 to provide for normally projecting the plunger-stem 53 in a forward direction. To provide for the normal engagement of the point 50 of each pawl 49 with the ratchet-teeth of the ad- 105 jacent guide, the transversely-disposed arm of the pawl has arranged to bear thereagainst a pressure-spring 56, seated within the bifurcated plunger-head 52 and normally exerting a pressure against the bell-crank pawl 49, it being noted at this point that the ratchet- 110 teeth 48 of the guides 5 are disposed in such a direction that the points of the pawls may freely trip over the teeth in the forward movement of the parts, but normally check any backward movement, as may be plainly seen 115 by reference to Figs. 7 and 18 of the drawings.

Each of the track-slides 36 37 carries one of the reciprocatory plunger-stems and the spacing-pawl associated therewith, and the said plunger-stems are disposed beneath the 120 front track-rail and are provided at their front extremities beyond such rail with the upstanding notched keepers 57, adapted to be detachably engaged by the vertically-de- 125 pending flange 58 of the horizontally-movable spacing-bar 59. The said horizontally-movable spacing-bar 59 is arranged transversely of the bottom portion of the casing 60 of the traveling type-carriage 61, which type-carriage is supported for traveling movement 130 upon the track-rails 32 33. The transversely-arranged horizontal spacing-bar 59 extends entirely across the carriage-casing contiguous to the front side thereof, so as to have a



uniform engagement with the keepers 57 at the front ends of both of the reciprocatory plunger-stems 53, and is also necessarily of a greater length than the width of the carriage, so as relatively to be as long as the line of writing, thereby providing means for maintaining its engagement with the notched keepers of the plunger-stems in all positions of the type-carriage. The spacing-bar 59 is supported by a pair of angle-levers 62 63, arranged within the carriage-casing adjacent to the front side thereof. The said angle-levers 62 63 are mounted at their angles to the fixed bearing-brackets 64 65, secured, respectively, to the front and one side of the carriage-casing, as shown in Figs. 13 and 15 of the drawings, the bracket 64 providing for the bearing-support of the angle-lever 62 and the bracket 65 for the bearing-support of the angle-lever 63. These levers are spaced a distance apart, and one arm of each of said levers has a pivotal connection 66 with the upper side of the horizontal spacing-bar 59, while both of the same are pivotally connected by a coupling-rod 67, pivotally connected at opposite ends, respectively, to an arm of each of the levers 62 63 and providing means for the synchronous movement of the levers to effect a steady and uniform movement of the spacing-bar.

The angle-lever 63, supported contiguous to one side of the carriage-casing 60, is provided with a third arm 68, having a link connection 69 with the lower end of the pendent arm of the bell-crank operating-lever 71. This bell-crank operating-lever 71 is pivotally mounted at its angle, as at 72, on the front of the carriage at the inner side thereof and has the upper arm thereof extending through a slot 73 in one side of the carriage-casing and is provided exterior to the latter with a finger-grip 74, disposed in the vertical plane of and above the stationary grip 76, arranged on the outside of the carriage-casing. The stationary grip 76, with which coöperates the finger-grip 74 of the operating-lever 71, is provided at its inner end with a flange 77, abutting against the adjacent side of the carriage-casing and receiving an adjusting-screw 78, which is vertically adjustable in the slot 79 in the side of the carriage-casing to provide means for adjusting the movement of the line-spacing mechanism. It will be observed that the vertical adjustment of the stationary grip 76 necessarily changes or varies the throw of the operating-lever 71, and hence regulates the movement of the mechanism proper, which coöperates with the slides for the tracks and the guides of the supporting-frame. A resetting-spring 80 is secured fast at one end to the front side of the carriage-casing and has the other end thereof bearing in the upper end of the operating-lever 71 to provide means for normally resetting the operating device carried by the type-carriage after the track-rails have been advanced through the action of the line-spacing mechanism.

The construction just described constitutes the preferred arrangement of the parts of the line-spacing mechanism and the actuating or operating device therefor; but it will of course be understood that these parts may be arranged in different locations or in any convenient manner without affecting the principle of operation involved.

In explanation of the action of the line-spacing mechanism it is to be noted that the bell-crank spacing-pawls 49 are normally in engagement with the ratchet-teeth 48 of the longitudinal guides, so that to provide for advancing the track-rails, with the type-carriage thereon, a distance equal to the space between the lines being printed it is simply necessary for the operator to grasp the grips 74 76 and to depress the grip 74 toward the stationary grip 76. This action oscillates the bell-crank operating-lever 71 upon its fulcrum 72, thereby moving the depending arm 70 of this lever in a direction which provides for the oscillation of the angle-levers 62 63 and the consequent movement of the horizontal or transverse spacing-bar 59 in a rearward direction or away from the operator. This rearward movement of the spacing-bar necessarily tends to thrust the plunger-stems 53 of the line-spacing mechanism in a rearward direction; but inasmuch as the spacing-pawls are already engaged with the ratchet-teeth 48 this movement of the spacing-bar only causes the said pawls to become still more tightly engaged with the teeth, and therefore a continued downward pressure on the grip of the operating-lever will necessarily cause the track-rails, with the type-carriage thereon, to advance forward and effect the necessary spacing of the lines, and, as already explained, this movement is regulated by the adjustment of the stationary grip 76. When the pressure of the fingers is released from the bell-crank operating-lever 71, the spring 80 resets the said lever and the parts associated therewith to normal positions, and at the same time the springs 55, forming a part of the line-spacing mechanism, thrust the stems 53 forward, and thereby carry the spacing-pawls to a different position along the ratchet-teeth.

There is associated with the line-spacing mechanism carried by the slides of the track-rails a releasing device, which provides for disengaging the spacing-pawls from the ratchet-teeth, whereby the tracks and the carriage thereon may be freely slid backward upon the guides. This releasing device includes the pins 81, projecting upwardly from the point ends of the spacing-pawls 49, with which pins coöperate release bell-cranks 82, pivotally mounted at their angles, as at 83, on the track-slides, so as to be carried therewith. Each of the release bell-cranks has one arm thereof disposed at one side of the pin 81 of the adjacent spacing-pawl 49, and the other arm of each bell-crank 82 extends transversely across and beyond the track-slide on



which it is mounted and is provided at its outer end with an upwardly-opening hook 84, having a loose interlocking connection with the pendent flange 85 of a horizontally-movable release-bar 86. The release-bar 86 extends transversely across and above the track-slides carrying the release bell-cranks 82 and has suitably connected to the opposite end portions thereof the rear ends of the sliding stems 87, working through suitable guide-openings 88 in the front track-rail 32 contiguous to the opposite extremities of such rail, and the front ends of the sliding stems 87 beyond the front side of the front track-rail 32 are provided with the finger-buttons 89, between which and the adjacent side of the track-rail are interposed the springs 90, which normally hold the release-bar 86 in a position to maintain the bell-cranks 82 out of operative engagement with the pins 81 of the spacing-dogs. Whenever it is desired to release the line-spacing mechanism, it is simply necessary for the operator to take hold of the ends of the front rail and press upon the finger-buttons 89 with the thumbs. An inward pressure upon the said buttons serves to move the release-bar 86 in a rearward direction, thereby swinging the release bell-cranks 82, connected therewith, in such a direction as to provide for moving the longitudinally-disposed arms of said bell-cranks inwardly against the upstanding pins 81 of the spacing-pawls 49, with a consequent disengagement of the points of these pawls from the adjacent ratchet-teeth. A continued inward pressure upon the finger-buttons 89 of the releasing device enables the operator to readily slide the track-rails, with the type-carriage thereon, backward upon the guides to the position desired.

The traveling type-carriage 61 not only carries therein the entire type-action, but also the letter-spacing mechanism, together with the line-lock, the ribbon feeding and reversing devices, and the ribbon-shifting device, which will be hereinafter fully described. To provide for the proper traveling support of the carriage 61 upon the track-rails 32 33, the carriage-casing 60 has mounted, at opposite sides thereof, the opposite pairs of traveler-wheels 91 and 92, the traveler-wheels 91 of the front pair being plain wheels, with a flat tread riding directly upon the upper edge of the front track-rail 32, while the wheels 92 of the rear pair are peripherally grooved to engage over the upper edge of the rear track-rail 33 and provide for the firm seating of the carriage and prevent accidental displacement thereof from the rails.

In carrying out the invention one of the objects thereof is to detachably mount the entire type-action, including the type-bars, the keyboard, and key connections and all operating parts associated therewith, within the carriage-casing 60, and this is preferably accomplished by supporting the entire type-action, including the parts referred to, from a common

type-action-supporting frame 93. This type-action-supporting frame 93 is preferably of a skeleton rectangular shape and is of a size so as to fit inside of the carriage-casing 60, and to provide for the proper support of the said rectangular type-action frame 93 the opposite parallel end bars 94 thereof are adapted to rest upon fixed supporting-lugs 95, projecting inwardly within the carriage-casing from opposite sides thereof. The said supporting-lugs 95 are suitably spaced apart to provide for an even support of the type-action frame, while at the same time permitting of the said frame being readily lifted out of the casing when not secured therein; but when the parts of the machine are assembled and the type-action frame inserted within the carriage-casing and resting upon the lugs 95 the said frame is detachably fastened in place by any suitable fastenings, preferably through the medium of a screw 96, passing through one side of the carriage-casing and engaging a threaded opening in one of the end bars 94 of the type-action frame, and the detachable screw-stem 97, forming a part of the reversing device associated with the type-bar-shifting mechanism hereinafter explained, said screw-stem 97 being shown in its function of a fastening-screw for the type-action frame in detail Fig. 23 of the drawings. It will thus be seen that by removing the screw-stem 97, as well as the fastening-screw 96, the type-action frame, with all of the parts carried thereby, may be readily lifted out of the carriage-casing for purposes of repair or adjustment.

As shown in Fig. 2 of the drawings, the type-basket is in the form of an arch and projects inwardly within the carriage at the rear side thereof, so as to entirely expose the writing. In other words, the arrangement of the type-basket is such that the carriage advances away from the writing instead of over it, as is the case in some types of machines, and to provide for the support of the group of type-bars constituting the arched type-basket there is employed a vertically-movable type-bar carrier 98. (Shown in detail in Fig. 35 of the drawings.) The vertically-movable type-bar carrier 98 is arranged for movement in rear of the transverse brace or frame-bar 99, constituting a part of the type-action frame and connecting the end bars 94 thereof at or contiguous to their rear extremities, as may be plainly seen from Figs. 2, 3, 4, 5, 9, and 35 of the drawings, and upon the rear extremities of the end bars 94 of the type-action frame are mounted the blocks 100, carrying the stationary vertically-disposed guide-posts 101. The stationary vertically-disposed guide-posts 101 may therefore be properly said to be mounted at the rear corners of the type-action-supporting frame 93, and the said posts project above and below the horizontal plane of the said frame and cooperate with the vertically-movable type-bar carrier in the manner to be presently explained. The said vertically-movable type-bar carrier 98 essen-



tially consists of a hanger-ring 102 and a type-bar rest-ring 103, arranged above the hanger-ring 102 and held in spaced relation thereto. The said hanger and rest rings 102 and 103 are of the usual arched or segmental form and are rigidly connected together by the frame-standards 104. The said frame-standards 104 are arranged at diametrically opposite points adjacent to the sides of the type-action-supporting frame and are screwed or otherwise rigidly fastened at their upper and lower ends, respectively, to the type-bar rest-ring 103 and the lower type-bar hanger-ring 102, said standards 104 being therefore interposed between the two rings to maintain the same in their proper spaced relation under all conditions. To provide for properly guiding the vertically-movable type-bar carrier in its up-and-down movement, so as to effect the necessary shifting of the type, the said upright frame-standards 104 have projected outwardly from the upper and lower end portions thereof the slide-collars 105, which slidably embrace the stationary guide-posts 101 respectively above and below the connection of these posts with the type-action-supporting frame, as may be plainly seen from Figs. 3, 4, 9, and 35 of the drawings. The said slide-collars 105, which are projected from the frame-standards 104, and therefore constitute a part of the vertically-movable type-carrier frame, are preferably in the form of split collars, carrying suitable adjusting-screws 106 to provide simple and convenient means for taking up the wear incident to the sliding movement of the parts. The formation of the split collars may be best seen in Figs. 9 and 35 of the drawings. By reason of the construction described it will be seen that the type-bar carrier 98 is held to a fixed movement or reciprocation in a perpendicular or vertical plane, thereby insuring perfect accuracy of alinement, as will be further explained. In this connection it may be further observed that the upper and lower slide-collars 105 also act in the capacity of limiting-stops for the vertically-movable type-bar carrier. In the extreme lower position of the type-bar carrier the upper slide-collars 105 rest directly upon the blocks 100, carrying the guide-posts 101, while in the extreme elevated position of the type-bar carrier the lower slide-collars 105 engage the said blocks 100 and limit or arrest the said upward movement.

Within the arch of the hanger and rest rings 102 and 103 are grouped the segmental series of type-bars 107. The type-bars 107 are grouped in an arched or segmental form in close relation, and each is designed to carry a pair of type characters, such as are commonly termed "upper" and "lower" case characters, and to provide for the support of the type in proper relation each of the type-bars 107 is provided in its free swinging end with a pair of offstanding divergently-arranged type-carrying arms 108, to which

are suitably fitted the type or type-heads 109. While the type or type-heads may be detachably fitted to the type-carrying arms in any suitable manner which permits of the ready removal and replacing thereof, the preferred construction is shown in the drawings and consists in constructing the type-carrying arms 108 with sockets in their outer ends to tightly receive therein the stems of the type or type-heads, thereby permitting of the removal and replacing thereof whenever necessary. Another important feature of the type-bar is to have the type-carrying arms 108 thereof formed of bendable metal, whereby the same may be readily bent by means of pliers or an equivalent tool. This expedient is utilized to provide simple and practical means for securing the proper alinement of the type, and at this point it may be further observed that by reason of the divergent relation of the type-carrying arms 108 of the type-bars the upper and lower case type characters supported thereby necessarily have their printing-faces disposed at an angle to each other, which are caused to strike the same printing-point by reason of the vertical movement of the type-bar carrier, which movement raises or lowers the fulcrum of the type-bars, according to whether an upper or lower case character is to be brought into play.

The circular grouping of the type-bars provides for the movement of all of the type-bars to a common printing position, and to provide for the proper pivotal support of the type-bars 107 each of the same is provided contiguous to the angled heel 110, at the lower extremity thereof, with the oppositely-projecting cone-pointed journals 111, turning in the bearings 112, formed in the opposite sides of the type-bar hangers 113, there of course being the same number of such hangers as there are type-bars to provide individual bearing-supports for each vibratory type-bar.

The type-bar hangers 113 are grouped or arranged in a circular series at the under side of the hanger-ring 102, as plainly shown in Figs. 3, 9, and 10 of the drawings, and each of the hangers 113 is formed of a single strip of metal folded into an approximate U shape, with a narrowed eye 114 at the fold or bight thereof to receive the fastening-screw 115, passing through the eye and screwed into a threaded opening formed in the hanger-ring 102. In advance of the narrow screw-eye 104, at the fold or bight thereof, each type-bar hanger 113 has the side portions thereof spread apart much wider than the eyes 114 to provide a wide bearing for the type-bar, and the said side portions of each type-bar hanger therefore constitute bearing-cheeks 116, in which are formed the bearings 112 for the cone-pointed journals 111 of the vibratory type-bar. By reason of the contracted or narrowed screw-eyes 114, formed at one end of the type-bar hangers 113, these portions of all of the hangers may be grouped



very closely together at the lower side of the hanger - ring, so as to occupy a minimum amount of space, and by reason of the close side-by-side arrangement of the narrow eyes 5 114 of the type-bar hangers the widened bearing portions of the hangers must overlap to admit of the close grouping. To accomplish this result, the adjacent type-bar hangers 113 are alternately cut away upon reverse edges, 10 as indicated at 117 in Fig. 11 of the drawings, said reversely-cut-away portions 117 of adjacent hangers partly matching, and thereby permitting of the overlapping of the widened bearing portions of the hangers. This construction also disposes the widened bearing 15 portions of the hangers in staggered relation, as shown in Fig. 9 of the drawings.

In order to provide for taking up the wear of the type-bar journals in the type-bar hangers 113, each of the latter has associated therewith an adjusting-plate 118. This adjusting-plate 118 extends transversely beneath the bearing - cheeks or side portions 116 of the hanger and is provided upon its upper side 25 and at opposite ends with the wedge portions 119, engaging against the adjacent lower edges of the bearing - cheeks 116 of the hanger and held thereagainst by the adjusting-screw 120, the threaded portion of which screw engages 30 in a threaded opening 121, formed in the hanger-ring 102. Any looseness in the bearing can be readily taken up by simply tightening the screw 120, which causes the wedge portions 119 of the adjusting - plate 118 to 35 draw the cheeks or side portions 116 of the hanger in a direction toward each other and upon the cone - pointed journals mounted therein.

The type-bars 107 normally stand in an upright position, resting against a cushion 122, suitably fitted upon the upper rest-ring 103, forming a part of the vertically-movable type-bar carrier, and to provide for normally holding the type-bars in their upright position 45 and returning the same to such position after having been actuated to thrust the type downward there is associated with each type-bar a retracting-spring 123. The upper end of the retracting-spring 123 for each type-bar is connected to an adjustable spring-support 124, 50 which may be of any suitable construction, but is conveniently in the form of an angled bolt 125, adjustably connected with the rest-ring 103, it being understood that the essential feature of this part of the machine is to provide a support for the upper end of each retracting-spring 123, whereby the tension thereof may be properly regulated. The lower end of the retracting-spring 123 for 60 each vibratory type-bar 107 has a pivotal or loose connection, as at 126, with the type-bar above and slightly forward of its pivotal point 111, as plainly shown in Fig. 3 of the drawings. By reason of this manner of connecting each retracting-spring to its type-bar 65 there will be just sufficient leverage exerted by the spring upon the type-bar to hold the

same in its normally upright position, thereby making the type-action easy, so that the type-bar will quickly respond to the touch on 70 the key; but as each type-bar is swung downward under the influence of the key connection therewith the leverage exerted by the retracting-spring thereon necessarily increases; so that when the key is released the type-bar 75 is quickly and sharply drawn up to its normal position.

With each vibratory or pivotal type-bar 107 there is associated an upright type-bar bell-crank lever 127, pivotally supported at 80 its angle on a bearing-block 128, fastened to the upper side of the hanger-ring 102 in rear of the type-bars, and the lower horizontal arm of each vertically-disposed type-bar bell-crank lever 127 has a pivotal link connection 85 129 with the angled heel 110 of the type-bar associated therewith. The several type-bar bell-crank levers 127 are grouped in a circular series in rear of the series of type-bars and are very compactly arranged by being 90 disposed in parallel vertical planes, as illustrated in Fig. 10 of the drawings. The parallel disposition of the circular series of type-bar bell - crank levers 127 provides means whereby the key-action for all of said bell- 95 crank levers will be perfectly uniform, and the lower arms of all of said bell-cranks will also exert a uniform upward pull through the medium of their link connections 129 on the heel ends 110 of the type-bars. Since 100 it is only necessary for the lower arms of the bell-cranks 127 to exert an upward pull upon their links 129, the close parallel position of the bell-cranks 127 is made possible, and to provide for transmitting motion to the type-bar 105 bell-crank levers 127 by means of a horizontal pull upon the upstanding arms of such levers there is associated therewith a series of keyboard bell-cranks 130, pivotally mounted at 110 their angles in the bearing-brackets 131, secured to and depending from the under side of the key-stem platform 132, carried by the main type-action-supporting frame 93. Each type-bar bell-crank lever 127 has a pull or 115 connecting rod connection 133 with the depending arm of one of the keyboard bell-cranks 130, as plainly shown in the sectional view, Fig. 3, of the drawings, and to provide for taking up looseness of the connections ordinary turnbuckles may be employed for 120 this purpose, or any other equivalent expedient, such as shown in the drawings, such expedient consisting in providing the front end of each connecting-rod 133 with threads to receive adjusting - nuts 134, disposed, 125 respectively, at opposite sides of a coupling-plate 135, swiveled to the keyboard bell-crank 130, said swiveled connection permitting of the proper freedom of movement of the parts without strain thereof, while at the 130 same time admitting of adjustment through the medium of the take-up nuts 134.

The keyboard bell-cranks 130, pivotally suspended from the under side of the plat-



form 132, are hung in pendent positions, which is the reverse of the upstanding positions of the type-bar bell-crank levers 127 with which they are associated, and by reference to Fig. 9 of the drawings it will be seen that the keyboard bell-cranks 130 are arranged in transverse rows corresponding to the arrangement of the keys and the bell-cranks in adjacent rows are disposed in alternate or staggered relation to permit of compact arrangement, while at the same time providing for the proper clearance of the connecting-rods 133. The upper or approximately horizontal arm of each keyboard bell-crank 130 has pivotally connected thereto, as at 136, the lower end of a vertically-movable key-stem 137, working through vertically-alined openings in the platform 132 and an inclined keyboard-cover 138 and carrying at the upper end the usual key 139. By depressing any of the keys 139, forming a part of the keyboard, the bell-cranks 130 and 127 will provide for the downward throw or swing of the type-bar associated therewith in the manner already explained, it of course being understood that the keys and their connections are returned immediately to normal position by the action of the retracting-spring connected with the type-bar, assisted by the main tension-spring, hereinafter referred to. In this connection it may be observed that the motion described from a key to a type-bar will be the same, whether the type-bar carrier is in its lowered or elevated position.

The shifting mechanism for the vertically-movable type-bar carrier 98 includes a main transverse rock-shaft 140, arranged transversely of the type-carriage and journaled at its opposite ends in the bearings 141, depending from the end bars 94 of the type-action-supporting frame 93, and the said main transverse rock-shaft 140 of the type-bar-shifting mechanism has fixedly mounted thereon a pair of oppositely-located swinging lifting-arms 142 143, located, respectively, at or adjacent to opposite ends of the shaft and projecting rearwardly therefrom. The swinging lifting-arms 142 143 have a pivotal connection at their free ends with the vertically-movable type-bar carrier 98 to provide for the necessary vertical movement of said carrier for changing the fulcrum of the type-bars, whereby upper or lower case characters may be printed on a horizontal plane, and while any suitable pivotal connection may be provided between the lifting-arms 142 143 and the vertically-movable type-bar carrier 98, still the preferred connection consists of a link-bar 144, pivotally connected at its lower end with the swinging end of each of said lifting-arms 142 143, and also pivotally connected at its upper end, as at 145, to the adjacent frame-standard 104 of the type-bar carrier, the said link-bar connections 144 for the swinging lifting-arms 142 143 being respectively shown in Figs. 3, 5, and 35 of the drawings. The interposition of the links 144 between the swing-

ing lifting-arms 142 143 and the vertically-movable type-bar carrier provides for transmitting the movement of the lifting-arms to the said carrier with a minimum amount of friction.

At one side of the main transverse rock-shaft 140 of the type-bar-shifting mechanism the swinging lifting-arms 142 143 have connected therewith the lower ends of the counterbalance-springs 146 and 147, the upper ends of which springs have a suitable connection with a fixed point of attachment to provide for normally exerting an upward tension upon the lifting-arms with which they are connected. In the normal adjustment of parts, with both springs 146 147 connected with their respective lifting-arms 142 143 directly at one side of the rock-shaft carrying the same, the said springs simply counterbalance the weight of the vertically-movable type-carrier and the parts attached thereto, thereby permitting the type-carrier to rest in its lowermost position with the upper slide-collars 105 resting upon the supporting-blocks 100 for the posts 101, (see Fig. 3,) and inasmuch as the springs in the position referred to serve to counterbalance the said weight of the type-carrier and the parts attached thereto a minimum effort is required on the part of the operator to move the type-bar carrier vertically to provide for elevating the fulcrums of the type-bars, and thereby permit of printing an upper-case character.

The spring 146, associated with one of the swinging lifting-arms, (designated by the number 142,) has a fixed connection at its lower end with such lifting-arm; but the other spring 147, associated with the lifting-arm 143, has a shiftable connection at its lower end with said arm. Said spring 147 has a loop 148, slidably embracing the arm and adapted to be shifted into either of two spaced notches 149 150, the notch 149 being disposed in proximity to the rock-shaft 140 to hold the loop 148 of the spring 147 in the position which it occupies when acting in connection the other spring 146 as a counterbalance for the type-bar carrier and the attached parts. The shifting of the lower end of the spring 147 from one notch to the other in the lower edge of the lifting-arm 143 is accomplished through the medium of a shifting-lever 151, pivotally suspended at its upper end, as at 152, from the type-action-supporting frame. The swinging pendent shifting-lever 151 has pivoted to the lower end thereof one end of a coupling-arm 153, the other end of which is pivotally connected to the slidable loop 148 at the lower end of the spring. Movement is transmitted to the swinging shifting-lever 151 through the medium of a link 154. This link 154 is pivoted at one end to the shifting-lever 151 and at its other end to one arm of a reversing bell-crank 155, which bell-crank is mounted on the inner end of an adjusting-spindle 156, which is mounted to turn in a bearing-sleeve 157, fastened to the inner side



of one of the end bars 94 of the type-action-supporting frame 93. The said adjusting-spindle 156 has detachably fitted therein the threaded end of the aforesaid screw-stem 97, extending through the adjacent end bar 94 of the type-action-supporting frame, and having mounted on the outer end thereof, exterior to the type-carriage, the reversing-key 158, which is preferably in the form of a small hand-lever which can be readily turned by the operator to provide for rocking the reversing bell-crank 155. The said reversing bell-crank 155 has the arms thereof disposed reversely to secure the necessary action of the parts, and besides having connection with the link 154, which connects with the swinging shifting-lever 151, the said reversing bell-crank 155 also has pivotally connected thereto the upper end of a link 159, the lower end of which link is pivotally connected to a shiftable pull-rod 160. The shiftable pull-rod 160 carries at its rear end, contiguous to the connection of the link 159 therewith, a slide-pin 161, working in a vertically-arranged slotted reverse-head 162, preferably, though not necessarily, formed at the front end of the swinging lifting-arm 143 and disposed at the front side of the main transverse rock-shaft 140 of the shifting mechanism. The front end of the shiftable pull-rod 160 has a pivotal connection with one arm of the bell-crank lever 163, the other arm of which has pivotally connected thereto, as at 164, the lower end of the vertically-movable stem 165 of the shift-key 166, exposed on the keyboard. The arm of the bell-crank 163, to which the stem of the shift-key is connected, has also connected therewith one end of the retractile spring 167, the other end of which is attached to a fixed point of attachment, preferably on the key-stem platform 132, said spring 167 providing means for returning the shift-key and the connections directly associated therewith to the normal position after being actuated.

With the springs 146 147 both connected with their respective lifting-arms 142 143, contiguous to the rock-shaft, whereby the same simply serve as counterbalance-springs for the purpose already explained, it will be understood that the type-bar carrier normally rests in its lowered position, and is thereby set for permitting the lower-case characters to be printed in the ordinary operation of the machine. With this adjustment of parts (see Fig. 3) the slide-pin 161, carried by the shiftable pull-rod 160, is disposed at the upper end of the slotted reverse-head 162, so that when it is necessary to print an upper-case character the operator depresses the shift-key 166, thereby causing the pull-rod 160 to pull in a forward direction upon the upper end of the vertically-disposed reverse-head 162. This movement necessarily turns the rock-shaft 140 to provide for swinging the lifting-arms 142 143 in an upward direction with a consequent elevation of the type-bar carrier, so as

to raise the fulcrums of the type-bars to permit of the striking of the desired upper-case character. Upon releasing the shift-key the parts resume their original positions, which positions are illustrated in Fig. 3 of the drawings.

Should the operator desire to set the shift mechanism whereby the type-bars will print upper-case characters in the ordinary operation of the machine, it is simply necessary to turn the reversing-key 158 to provide for oscillating the reversing bell-crank 159 in a direction for moving the slide-pin 161 of the pull-rod 160 to the lower end of the slot in the reversing-head 162. (See Fig. 4.) At the same time the reversing bell-crank 159 will push the link 154 in a direction to swing the shifting-lever 151 backward, thereby drawing the slide-loop 148 of the spring 147 rearward into the notch 150, which is farthest from the rock-shaft 140. This shifting of the spring 147 everbalances the weight of the type-bar carrier and its attached parts, thereby causing the same to be normally at rest in its elevated position, whereby upper-case characters will be printed. Therefore with the parts thus positioned if it is desired to strike a lower-case character the depression of the shift-key 166 will cause the pull-rod 160 to pull upon the lower end of the slotted reverse-head 162, whereby the swinging arms 142 143 will be swung in a downward direction to depress the vertically-movable type-carrier, so as to lower the fulcrums of the type-bars and admit of the striking of a lower-case character. When the shift-key is released, the overbalancing action of the springs 147 lifts the type-carrier to the normal position. (Shown in Fig. 4.)

The letter-spacing mechanism of the machine is associated with the rear transverse track-rail 33, which track-rail is provided at one side thereof with a longitudinal rack-bar 169 of a sufficient length to accommodate the full movement of the traveling type-carriage 61, and to provide for the proper support of the letter-spacing mechanism and other mechanism within the carriage-casing the latter is provided therein with a horizontally-arranged supporting-plate 170, lying parallel to and in front of the longitudinal rack-bar 169 of the rear track-rail 33 and having mounted on the upper side thereof a pair of aligned bearing-boxes 171, in which is journaled a rotatable feed-shaft 172. The said rotatable feed-shaft 172 has fixedly mounted on the rear extremity thereof a spacing-pinion 173, which is in mesh with the teeth of the longitudinal rack-bar 169 and is disposed at one side of one of the bearing-boxes 171, while at the opposite side of said bearing-box is arranged a shaft-collar 174, secured fast to the feed-shaft 172 and serving, in connection with the hub of the spacing-pinion 173, to prevent longitudinal displacement of the feed-shaft. At a point between the bearing-boxes 171 therefor the feed-shaft 172 has loosely mounted thereon a rotatable ratchet star-



wheel 175, provided at one side thereof with a circular clutch-face 176, the teeth of which are arranged in opposition to the teeth of a sliding clutch-collar 177, feathered on the shaft 172 at one side of the star-wheel 175 and provided with an annularly-grooved hub 178, which is loosely engaged by the inner end 179 of the carriage-release lever 180. The carriage-release lever 180 is arranged at one side of the feed-shaft 172 and is pivotally mounted intermediate its ends, as at 181, upon a fixed support on the supporting-plate 170 and is provided at its outer end with a finger-piece 182, exposed outside of the carriage-casing, so as to be capable of convenient manipulation by the fingers to provide for moving the sliding clutch-collar 177 out of engagement with the clutch-face 176 of the star-wheel 175. The said sliding clutch-collar is normally held in active engagement with the teeth of the clutch-face by means of the clutch-spring 183, arranged upon the feed-shaft 172 and interposed between the shaft-collar 174 and the hub 178 of the sliding clutch-collar.

The rotatable feed-shaft 172 of the letter-spacing mechanism is normally strained to turn in one direction through the medium of the carriage-actuating device 184, which may be conveniently mounted upon the work-table or base-board 1 and may consist of the usual spring-actuated drum 185 and the pull-tape 186, connecting said drum with the adjacent side of the carriage-casing, so as to provide for normally drawing the carriage in one direction upon the track-rails. The carriage-actuating device therefore subserves the usual function of normally tending to advance the type-carriage upon the track-rails, and to provide for the necessary step-by-step escapement of the ratchet star-wheel 175 there is associated with the said wheel an upright swinging dog-lever 187. The said dog-lever 187 is formed at its lower end and at opposite sides thereof with the oppositely-extending pivot-arms 188, which receive the adjustable pivot-screws 189, which are mounted in the opposite ends of an open lever-boxing 190, fitted within an opening formed in the supporting-plate 170 and disposed in a longitudinal direction in said plate to provide for the proper positioning of said dog-lever. By reason of mounting the dog-lever as described the same is sustained in an upright position and is permitted to oscillate or swing in a forward and backward direction transversely of the ratchet star-wheel 175, and to permit of the mounting of the dog-lever over the star-wheel the said lever is formed with an intermediate circular yoke portion 191, which encircles the star-wheel and freely works thereover, and at the upper side of its circular yoke portion the said lever 187 is provided with an upper straight arm 192, having a channeled seat 193 at one side thereof to receive therein the pivotal feed-dog 194. This pivotal feed-dog 194 is pivoted at its upper end, as at 195, within the channeled seat 193 of the lever-arm 192

and is provided at its lower swinging end with a beveled engaging point 196, adapted to work transversely between the peripheral teeth of the star-wheel 175, and said pivotal feed-pawl 194 is normally pressed in one direction by the pawl-adjusting spring 197<sup>a</sup>, which spring serves the usual function of throwing the engaging point of the pawl to a new position for catching the next tooth of the star-wheel after having been disengaged therefrom, and to provide for checking rotation of the star-wheel when the feed-pawl 194 is being thrown into a new position the upper lever-arm 192 is provided with a fixed check-dog 197, projecting inwardly within the upper side of the circular yoke 191 and arranged at one side of and in a parallel plane to the pivotal pawl 194. In the at-rest position of the letter-spacing mechanism, as shown in Fig. 20 of the drawings, the engaging point 196 of the feed-pawl 194 is engaged with one of the teeth of the star-wheel and is held, under the pulling strain of the carriage-actuating spring or device 184, against the tension of its adjusting-spring 197<sup>a</sup> and in the same transverse plane as the fixed check-dog 197, which check-dog is then out of engagement with the teeth of the star-wheel, as shown in Fig. 19 of the drawings. To provide for advancing the carriage a letter-space, it is simply necessary to provide means for swinging the dog-lever 187 in a forward direction. Such a movement of the dog-lever carries the engaging point 196 of the feed-dog out of engagement with the star-wheel and simultaneously brings the fixed check-dog 197 into engagement between the teeth previously engaged by the feed-dog, thus preventing rotation of the star-wheel or the feed-shaft on the forward pull or movement of the dog-lever. When the dog-lever has thus been drawn inward to disengage the pivotal feed-dog, the adjusting-spring 197<sup>a</sup> throws the said dog out of transverse alinement with the fixed check-dog 197 into the position shown in Fig. 21 of the drawings, so that when the dog-lever is again thrown backward the point of the feed-dog is carried into engagement with the succeeding tooth of the star-wheel, and the fixed check-dog 197 is simultaneously carried out of engagement with the star-wheel, thus permitting the latter, together with the feed-shaft and the spacing-pinion 173, to rotate under the impelling influence of the carriage-actuating device 184 until the point of the feed-pawl is again carried into transverse alinement with the fixed check-dog, such position of the parts being shown in Fig. 20 of the drawings.

By reason of the clutch connection between the star-wheel 175 and the feed-shaft 172, through the medium of the clutch-collar 177 and the clutch-face 176, the carriage may be freely run back upon the track-rails without disengaging the feed or check dogs from the star-wheel, it being noted that on the return movement of the carriage the feathered



clutch-collar 177 will freely trip over the teeth of the clutch-face 176, thus permitting the spacing or feeding pinion and the shaft 172 to turn freely, while the star-wheel is held stationary by the dog engaging therewith.

Should it be desired to release the carriage, so that the same may be freely run upon the track-rails in either direction, it is simply necessary to press the carriage-release lever 180 in a direction to carry the sliding clutch-collar 177 out of engagement with the clutch-face of the ratchet star-wheel 175, thereby permitting the spacing-pinion and the shaft 172 to freely rotate in either direction without affecting the star-wheel or the parts coöperating therewith. In other words, the sliding clutch-collar and the release-lever connected therewith permit of the complete release of the carriage from its letter-spacing mechanism without disengaging the dogs from the star-wheel or the pinion from the rack-bar.

Motion is directly transmitted to the swinging dog-lever 187 of the letter-spacing mechanism through the medium of a single transverse motion-transmitting element, preferably in the form of a rock-shaft 198. This rock-shaft 198 extends transversely across the carriage-casing 60 and is journaled at its opposite ends in suitable bearings provided at opposite sides of the casing, and said rock-shaft is provided at a suitable point thereon with an upstanding swinging rock-arm 199, having a link connection 200 with the upper arm 192 of the swinging dog-lever 187. The link 200, connecting the rock-arm 199 with the swinging dog-lever, may be provided with an adjustable connection 201 to provide for taking up looseness of parts, and thereby insuring a quick and positive movement thereof, and at a point between its ends the motion-transmitting rock-shaft 198 is provided with a main upstanding rock-arm 202, to which is pivotally connected the rear end of a horizontally-arranged universal key-connection bar 203, the front end of which key-connection bar is pivotally connected to the upper end of a supporting-link 204. The lower end of the upright supporting-link 204 is pivotally mounted in a fixed bearing-bracket 205, attached to the inner front side of the carriage-casing 60, and between the front edge of the upright supporting-link 204 and the contiguous front side of the carriage-casing is interposed a tension-spring 206. The tension-spring 206 is secured fast at one end, as at 207, to the front side of the carriage-casing, and the other end thereof is arranged to normally bear against the front edge of the link 204 to place a tension upon the said link to resist the forward movement thereof. To provide for regulating the tension of the spring 206 there is employed a tension-adjusting screw 208, mounted in a threaded opening in the front side of the carriage-casing and having its inner end impinging against the spring 206, at a point intermediate its ends, whereby a turning of the said

screw 208 will provide for increasing or decreasing the tension or pressure of the spring upon the supporting-link 204 for the universal key-connection bar 203. It will thus be seen that the spring 206 and the parts associated therewith provide simple and positive means for regulating the tension of the key-operated connections, or, in other words, regulating the "key tension" of the machine, as it is commonly termed.

The front end of the horizontally-arranged universal key-connection bar 203 is provided with a laterally-offset upstanding ear 209, adapted to be engaged by the front end of a plunger 210, working through the front side of the type-action-supporting frame 93 and pivotally connected at its rear end to an upstanding rock-arm 211, mounted on a transverse rock-shaft 212, arranged transversely within the type-action-supporting frame 93 and journaled at its ends in suitable bearings provided on the end bars 94 of the said frame. The transversely-arranged rock-shaft 212 is further provided at or near the opposite ends thereof with the oppositely-located swinging arms 213, which are pivotally connected to the lower ends of the vertically-movable stems 214, working through the key-stem platform 132 and the keyboard-cover 134 and supporting upon their upper ends the usual keyboard space-bar 215. The said vertically-movable space-bar stems 214 and the elements connected therewith are normally held in their inactive positions through the medium of an adjusting-spring 216, suitably connected at one end with the type-action-supporting frame 93 and at its other end with one of the swinging arms 213 of the rock-shaft 212, as plainly shown in Figs. 5 and 9 of the drawings. A depression of the keyboard space-bar 214 causes the rock-shaft 212 to rotate in a direction which carries the plunger 210 forward and against the upstanding ear 209 at the front end of the universal key-connection bar 203, thereby moving this bar in a forward direction and through the medium of its connection with the rock-shaft 212 providing for causing the letter-spacing mechanism to operate in the manner already fully described. It may be observed in this connection that the tension-spring 206 also acts in the capacity of a resetting-spring for the letter-spacing mechanism, as well as all of the other devices hereinafter referred to which are associated with the single motion-transmitting element.

The horizontal reciprocatory universal key-connection bar 203 is provided at the upper side or edge thereof with a longitudinal series of spaced shoulders 217, with each of which shoulders is designed to coöperate a swinging yoke-lever 218. The number of swinging yoke-levers 218 mounted within the carriage-casing corresponds to the number of rows of keyboard bell-cranks 130 which are connected to the stems of the keys of the keyboard, and the said several swinging yoke-levers 218 are arranged in a substantially upright posi-



tion and approximately in parallelism, so that each of said levers will have precisely the same action in connection with the universal bar 203. Each of the upstanding yoke-levers 5 218 is preferably of a U shape and consists of an upper horizontal portion 219 and the end legs 220, which are made fast at their lower ends to a horizontal pivot-rod 221, arranged transversely within the carriage-casing and 10 journaled at its ends in suitable bearings provided on opposite sides of the casing. The several pivot-rods 221, which provide pivotal supports for the series of swinging yoke-levers 218, are arranged in parallelism, and the up- 15 per horizontal bar portion 219 of each of the swinging yoke-levers is provided with a pendent engaging flange 222, adapted to engage against the contiguous shoulder 217 on the universal bar 203, and said upper horizontal 20 bar portion 219 of each yoke-lever is further provided with a series of regularly-spaced upstanding tappet projections 223, which are adapted to be engaged by the pendent arms of the row of keyboard bell-cranks 130 asso- 25 ciated therewith, as plainly shown in Figs. 3 and 36 of the drawings. Inasmuch as there is one of the swinging yoke-levers 218 associated with each row of keyboard bell-cranks 130 when one of the keys of the keyboard is 30 depressed the bell-crank 130 for said key will press against the upstanding tappet projection 223 of the adjacent yoke-lever 218, thereby swinging said yoke-lever in a forward direction and carrying its engaging flange 222 35 against the adjacent shoulder 217 of the universal key-connection bar 203. This action causes the universal key-connection bar 203 to move in a forward direction, thus imparting motion to the motion-transmitting rock- 40 shaft 98, and thence to the letter-spacing mechanism in the manner already set forth.

In connection with the specific construction of the swinging yoke-levers 218 it may be observed at this point that these levers not only 45 provide for transmitting motion from each key to the letter-spacing mechanism, but by reason of the spaced relation of the upstanding tappet projections 223 of the said levers the intervals between said tappet projections 50 of the yoke-levers provide clearance-spaces for the keyboard bell-cranks in front of said levers and their connecting-rods. This may be plainly seen from Figs. 3, 13, and 36 of the drawings.

55 In carrying out the present invention one of the objects thereof is to provide an improved line-stop device which when the end of a line is reached automatically comes into play and locks every part of the machine, 60 thereby preventing the piling up of letters and preventing the type from striking the right-hand guide of the main supporting-frame 4. The displacement of the type-carriage from the track-rails at the left hand 65 thereof is prevented by a permanent upstanding stop 224, suitably connected with one of the track-rails and arranged a fixed distance

from the left-hand guide 5 of the main supporting-frame 4; but the line-stop referred to only comes into play when the carriage nearly 70 reaches its extreme limit of movement at the right-hand end of the line being written. The said line-stop device includes a stationary member which is arranged to maintain a fixed relation to the right-hand guide of the frame, 75 said fixed member of the line-stop device essentially consisting of a trip-plate 225, provided with a supporting-arm 226, suitably connected with the track-slide upon the right-hand guide 5 of the main supporting-frame 4, 80 said supporting-arm 226 therefore providing means for maintaining the trip-plate 225 at a fixed distance from the said right-hand guide of the said main supporting-frame. Of course 85 other expedients may be utilized for holding the trip-plate in its fixed position, it only being essential to provide for supporting said plate in some suitable manner, whereby it may be maintained at a fixed distance from the right-hand guide. The said fixed trip-plate 225 of 90 the line-stop device is provided with an upstanding trip-flange 227, having formed in the edge thereof a pair of stop-shoulders 228 229, the inner one of which, (designated by the number 228,) is necessarily inclined or beveled 95 on the side next to the second shoulder to permit of the action hereinafter referred to, said inclined or beveled side of the shoulder 228 being indicated at 228<sup>a</sup> in Fig. 17. In addition to the shouldered trip-flange 227 the 100 said trip-plate 225 has offset from one side thereof an inclined cam-piece 230.

In connection with the fixed trip-plate 225, supported beyond the right-hand guide of the main supporting-frame, there is employed 105 a horizontally-swinging and vertically-movable trip-lever 231. This trip-lever 231 is arranged upon the upper side of the supporting-plate 170 for the letter-spacing mechanism contiguous to one side of the carriage- 110 casing, and the said lever has a pivotal connection 232 at one end with the said supporting-plate 170, the said pivotal connection 232 being sufficiently loose not only to permit of the horizontally-swinging movement of the 115 trip-lever, but also to permit of a slight vertical play thereof for a purpose to be presently referred to. The said horizontally-swinging vertically-movable trip-lever 231 has the free end thereof projecting rear- 120 wardly beyond the rear edge of the supporting-plate 170, and said free end of the trip-lever is normally pressed toward the adjacent side of the carriage through the medium of an adjusting-spring 233, secured fast at one 125 end to the supporting-plate 170 within the carriage and having its other end engaged with the trip-lever 231, at one side thereof. (See Fig. 13.) The said spring 233 also serves to normally hold the trip-lever 231 in engage- 130 ment with a notch 234, formed in one edge of the pendent foot 235, formed at the rear end of the pivotal lock-lever 236, pivoted at its front end, as at 237, to one side of the car-



riage-casing 60 and extending across the motion-transmitting rock-shaft 98, the position of said pivotal lock-lever 136 being plainly shown in Figs. 5, 6, and 13 of the drawings.

5 By reason of pivotally supporting the lock-lever 236 at its front end the rear end of said lever is free to swing in a vertical direction, and at an intermediate point between its ends the lock-lever 236 is provided with an up-  
 10 standing angled stop projection 238, having a laterally-extending top flange 239, adapted to cooperate with the upper end portion of an upstanding lock-arm 240, fast upon and projecting upwardly from the main transverse  
 15 motion-transmitting rock-shaft 198, hereinbefore referred to. The said lock-lever 236 is held to a proper movement at the inside of the carriage-casing by the open guide-keeper 241, projecting inwardly from one side of the  
 20 carriage-casing and receiving the swinging rear end portion of the lever, and at this point it is to be observed that the pendent foot 235 at the rear extremity of the locking-lever 236 is formed with a lifting-finger extension 242,  
 25 which also forms the lower side of the engaging notch 234 for the trip-lever 231, and the said lifting-finger extension 242 is sufficiently long to always be disposed beneath the said trip-lever 231 in all positions of the latter.  
 30 There is associated with the said locking-lever 236 a releasing device 243, preferably in the form of a straight lever pivotally mounted intermediate its ends, as at 244, upon one side of the carriage-casing contiguous to the  
 35 locking-lever 236, and provided at one end with a finger-piece 245, extending through a slot 246 in the side of the carriage-casing, so as to be exposed outside of the casing for convenient manipulation, and at its other or in-  
 40 ner end the said releasing device or lever 243 is provided with a lateral engaging arm 247, projecting beneath the locking-lever 236 and adapted to engage against and elevate the swinging end of said lever when the finger-  
 45 piece 245 is depressed, as will be hereinafter more fully explained. This lever 243, while being shown and described as arranged for manipulation at one side of the carriage-casing, may be operated from the keyboard or in  
 50 any other well-known manner familiar to those skilled in the art.

In the normal position of the parts of the line-lock device the trip-lever 231 is held under the influence of its adjusting-spring 233  
 55 in engagement with the notch 234 at the rear swinging end of the locking-lever 236, thereby sustaining the said locking-lever in a sufficiently-elevated position whereby the locking-arm 240 on the rock-shaft 198 will have  
 60 a clearance beneath the top flange 239 of the upstanding stop projection 238 of the lock-lever. With the parts thus positioned the rock-shaft 198 is therefore permitted to have a free movement, so as to actuate the mech-  
 65 anisms and devices associated therewith; but when the type-carriage approaches the end of a line the free end of the horizontally-swinging

and vertically-movable trip-lever 231 comes into engagement with the abutting portion of the inner shoulder 228 of the fixed trip-plate 225. When the trip-lever 231 is thus carried  
 70 into engagement with the inner stop-shoulder 228 of the fixed trip-plate 225, the said trip-lever is thrown out of the notch 234 at the swinging end of the locking-lever 236, thus  
 75 permitting the said swinging end of the locking-lever to automatically drop by gravity to its lower limit of movement, which movement is arrested by the keeper 241. When the lock-  
 80 ing-lever gravitates to its lower position, the angled stop projection 238 thereof falls to an interfering position with reference to the locking-arm 240 on the motion-transmitting rock-  
 85 shaft 198, whereby the said rock-shaft is positively locked against movement, and is thus prevented from transmitting motion to any one of the mechanisms or devices operated therefrom, and inasmuch as the type-action is associated with the rock-shaft the locking ac-  
 90 tion described also serves to lock the type-action by preventing the depression of the keys. After the action described occurs should it be desired to add a few letters to the line it is simply necessary for the operator to de-  
 95 press the finger-piece 245 of the release or resetting lever 243, thereby causing the lateral arm 247 of this lever to engage against the under side of the locking-lever 236, thereby  
 100 raising the rear swinging end of the locking-lever, so that the lifting-finger 242 will engage with the trip-lever 231 and elevate the same sufficiently to disengage it from the inner stop-shoulder 228 of the fixed plate 225.  
 105 When the said trip-lever 231 has been lifted sufficiently to clear the inner or first stop-shoulder 228 of the fixed trip-plate, the same is immediately thrown into reengagement with the notch 234 of the locking-lever under the influence of its adjusting-spring 233, thereby resetting the parts of the line-lock  
 110 device in their normal positions. When thus reset, the carriage can advance until the trip-lever 231 engages with the second or outer stop-shoulder 229, when the automatic locking action previously described repeats itself  
 115 and finally locks the operating parts against further movement.

After either the first or final locking action of the line-lock device when the carriage is started on its return movement, the lower end  
 120 of the foot 235 at the swinging end of the locking-lever 236 comes into engagement with the inclined offset cam-piece 230 of the fixed trip-plate 225 and riding upwardly on said cam-  
 125 piece moves to a position where the trip-lever 231 may be sprung into engagement with the notch 234, and thereby secure the parts in their normal positions. After the final locking action, as above described, the trip-lever 231 will ride over the beveled edge of the  
 130 shoulder 228 on the return movement of the carriage.

The type carried by the type-bars strike through the rear open side 248 of the carriage-



casing and upon an inking-ribbon 249, arranged to work transversely of the carriage, at the rear side thereof, and the said ribbon is adapted to be alternately wound upon the oppositely-located ribbon-spools 250, which are detachably journaled upon the spindles 251, projecting from the rear side of the carriage-casing, and each of said spools is provided at its inner side with a ratchet-disk 252, the teeth of which are adapted to be engaged by the point of an actuating-pawl 253, pivotally mounted at the terminal of one end of a vibratory bell-crank lever 254, pivotally mounted at its angle, as at 255, within the rear portion of the carriage-casing and having the inner arm thereof connected with one end of an operating-rod 256, the other end of which operating-rod has a pivotal connection 257 with a rock-arm 258 on the main motion-transmitting rock-shaft 198, whereby this shaft not only transmits motion to the letter-spacing mechanism, but also to the ribbon-feeding mechanism, through the medium of the said operating-rods 256 for the oppositely-located vibratory bell-cranks 254. The actuating-pawls 253, which coöperate with the ratchet-disks 252 of the oppositely-located ribbon-spools 250, are provided with enlarged weighted portions 259 at one side of their pivots, which weighted portions are preferably rounded and adapted to be engaged by the lifting-heads 260, formed at opposite ends of an oscillatory pawl-adjusting lever 261, which is pivotally connected intermediate its ends, as at 262, to the rear cross-bar connecting the opposite end portions of the carriage-casing, at the rear open end thereof. The said oscillatory pawl-adjusting lever 261 is common to both of the oppositely-located actuating-pawls 253 for the separate ribbon-spools 250, and the said lever is weighted at one end, as at 266, to provide for normally depressing that end of the lever and correspondingly elevating the opposite end. In other words, the weighted end 266 of the oscillatory pawl-adjusting lever 261 normally drops to a depressed position below the plane of the adjacent actuating-pawl 253, whereby the weighted portion 259 of this pawl will gravitate below the pivot thereof and permit the point of the pawl to engage with the ratchet-disk of the adjacent ribbon-spool to provide means for rotating this spool with a step-by-step movement as the vibratory bell-crank carrying the pawl is operated from the motion-transmitting rock-shaft 198 through the medium of the rod connection 256. With the weighted end 266 of the oscillatory pawl-adjusting lever 261 depressed in its normal position to permit of the adjacent actuating-pawl 253 engaging with the ratchet-disk of the ribbon-spool with which it is associated the opposite end of the said lever 261 is correspondingly elevated, thereby causing the lifting-head 260 at that end of the lever to bear against the weighted portion 259 of the adjacent pawl 253, and thus cause the said pawl to be rocked upon its pivot to carry the point thereof out of operative relation to the ratchet-disk of the adjacent ribbon-spool, such position of parts being plainly shown in Fig. 25 of the drawings, and providing means for causing the ribbon to be wound upon the spool whose ratchet-disk is engaged by the actuating-pawl. To provide for the automatic reversing of the relative positions of the opposite actuating-pawls, the oscillatory pawl-adjusting lever 260 is provided at one side of its pivotal point 262 with a beveled cam projection 267, which is adapted to be engaged and disengaged by the pivotal setting-arm 268, pivotally supported at one end on the rear cross-bar 265 of the carriage-casing and adapted to extend rearwardly over the oscillatory pawl-adjusting lever 261, with the free swinging end thereof normally engaging in the open yoke 269 of the reciprocatory reversing-bar 270, supported for movement exterior to and at the rear side of the carriage-casing. As will hereinafter appear, when the said setting-arm 268 is thrown laterally into engagement with the upstanding cam projection 267 of the pawl-adjusting lever 261 the weighted end 266 of the said lever is elevated to move the lifting-head 260 at such end into lifting engagement with the weighted portion of the adjacent pawl, and when the said setting-arm is moved away from and out of engagement with the said cam projection 267 the lever 261 is permitted to assume its normal position under the influence of its weighted portion 266.

The opposite extremities of the reciprocatory reversing-bar 270 are pivotally connected to the lower ends of the swinging weighted reverse-levers 271, pivotally mounted intermediate their ends, as at 272, upon the rear side of the carriage-casing. The oppositely-located swinging reverse-levers 272, by reason of their connection with the common reciprocatory reversing-bar 270, maintain a parallel disposition and move in unison or synchronism; but the said levers maintain a reverse relation, so that when one lies in an operative position with relation to the spool upon which the ribbon is being wound the other is disposed in an opposite position—that is, in a position for being actuated by the trip device carried by the spool from which the ribbon is unwinding until such spool becomes empty. Each of the swinging reverse-levers 271 is interposed between one of the ribbon-spools and the adjacent rear side of the carriage-casing and each of the same is provided at its upper end with a weight 273 and at an intermediate point with a lateral inwardly-extending trip-arm 274, which is preferably of an arched form, so that the same will move to a position close to and extending partly around the spindle of the spool with which it is associated. The said inwardly-extending trip-arm 274 of the reverse-lever has extended therefrom an inclined shouldered finger 275, which is adapted to be engaged by



the tappet-lug 276, projected from one edge of the pivotal latch 277. Each of the ribbon-spools has one of the latches 277 associated therewith, and the said latch for each spool is pivoted at one end, as at 278, to the inner side of the spool contiguous to the periphery of the ratchet-disk, and in addition to the tappet-lug 276 each latch is further provided with an inwardly-extending ribbon-engaging pin 279, projecting through an arcuate slot 280, formed in the adjacent side of the spool and adapted to swing toward and away from the hub of the spool during the action of the latch, as will presently appear.

Assuming the parts of the ribbon feed and shifting mechanisms to be in the position shown in Fig. 25 of the drawings, the weighted end 266 of the oscillatory pawl-adjusting lever 261 will be depressed to permit the adjacent actuating-pawl 253 to engage with the ratchet-disks of the adjacent spool, whereby, as the motion-transmitting rock-shaft 198 is operated under the influence of the key action, said spool will be rotated with a step-by-step movement in a direction to provide for winding up the ribbon thereon. The opposite actuating-pawl 253 is held in an inactive position by reason of the elevated unweighted end of said lever 261 bearing upward against the weighted portion of said pawl, so as to throw the point thereof out of operative engagement with the ratchet-disk of the adjacent spool. In the said position of parts the ribbon continues to wind upon the spool having the actuating-pawl in operative relation thereto until the opposite spool is about empty. At this point the ribbon uncovers the ribbon-engaging pin 279 of the pivotal latch 277, associated with the said depleted spool, thereby permitting the free end of the latch to swing by gravity in a direction away from the hub of the spool and toward the periphery thereof. When the pivotal latch of the depleted spool thus swings outward, it carries the tappet-lug 276 thereof to an interfering position with reference to the inclined shouldered finger 275 of the adjacent reverse-lever 271, so that a continued rotation of the spool, which is about depleted of the ribbon, carries the tappet-lug 276 into direct engagement with the said shouldered finger 275, thus causing the weighted end of the adjacent reverse-lever to swing in an outward direction and simultaneously causing the weighted upper end of the opposite reverse-lever to swing in an inward direction until both levers have reached a position just past the perpendicular, when the combined weight thereof will complete the movement, causing one lever to swing to its outward limit of movement and the opposite lever to its inward limit of movement, such positions of the levers being shown in Fig. 26 of the drawings. This movement of the weighted swinging reverse-levers simultaneously reciprocates the reversing-bar 270 in a direction to carry one of the shoulders of the open yoke 269 against the piv-

otal setting-arm 268, this engagement only occurring when the weighted reverse-levers reach a perpendicular plane, but when the swinging movement of these levers is completed by gravity in the manner described the continued movement of the reversing-bar 270 in the same direction quickly carries the pivotal setting-arm 268 onto the beveled upstanding cam projection 267 of the oscillatory pawl-adjusting lever, which engagement of the setting-arm with the cam projection of the pawl-adjusting lever oscillates said lever upon its pivot, causing the weighted end 266 thereof to be elevated and the opposite end to be depressed. This reverse movement of the pawl-adjusting lever 261 carries the lifting-head 260 at the weighted end of the lever against the weighted portion of the adjacent actuating-pawl, so as to turn said pawl to the inactive position, while the opposite pawl is permitted to swing under the influence of its weighted portion to an operative position for engagement with the ratchet-disk of the nearly empty or depleted spool, which spool therefore at once becomes the active spool and is rotated by the action of the pawl with a step-by-step movement to provide for winding back the ribbon thereon. This action automatically repeats itself when the ribbon has been almost completely unwound from each spool, and as the ribbon commences to wind upon the previously inactive spool the pivotal latch of said spool is caught by the convolutions of the ribbon and held close to the hub of the spool until the spool is again nearly depleted. The intermediate portion of the inking-ribbon 249, between the oppositely-located ribbon-spools 250, engages with the shiftable ribbon-guide 281, which is arranged at the rear side of the carriage and is adapted to normally hold the inking-ribbon in front of the line of writing, whereby all of the writing is absolutely visible, and the line being written is only covered by the ribbon when the character is being struck, provision being made for retracting the shiftable ribbon-guide with the portion of the ribbon therein to a normal position in front of the line of writing whenever the type return from the printing-point. In the present invention the said shiftable ribbon-guide is preferably in the form of an open-ring frame 282, which is of a sufficient width to permit the type-bar to work inside of the plane thereof without striking the same. The said open-ring guide-frame 282 is provided at the outer side thereof with an inwardly-projecting indicator finger or point 283, which indicates the printing-point of the character, and at diametrically opposite sides thereof with the aligned line-finding guides 284, which are normally in precise alinement with the line of writing, so that the carriage can be quickly adjusted to the line for the purpose of inserting a letter or word or to facilitate writing on ruled paper. In addition to the transversely-aligned line-finding guides 284 the open-ring frame 282 is provided at dia-



metrically opposite sides thereof with the upwardly-projecting inclined flaring guiding-sleeves 285, which are open at one edge or side for the insertion of the ribbon, and which  
5 freely receive the latter to provide for guiding the same transversely beneath and across the open-ring guide-frame 282.

The necessary reciprocation is imparted to the ribbon-guide 281 for the purpose of shifting the position of the ribbon to and from the line of writing through the medium of the reciprocatory frame 286, essentially consisting of a pair of rods 287, slidably working through the rear cross-bar 265 of the carriage-casing and connected at any suitable point to the ribbon-guide 281 or any of the attached parts thereof. The front ends of the frame-rods 287 are connected, respectively, to opposite extremities of the cross-bar 288, which constitutes a part of the reciprocatory frame 286, and the said cross-bar for the front ends of the frame-rods 287 is provided with an arm 289, having a pivotal connection with the lower end of an oscillatory lever 290, pivoted  
25 intermediate its ends upon a standard 291, mounted upon the supporting-plate 170 within the type-carriage, and the upper end of said lever 290 has a link connection 292 with the rock-arm 202 of the motion-transmitting shaft 198, whereby the movement of this shaft may be directly transmitted to the reciprocatory frame 286 for the purpose of imparting the necessary shifting movement to the guide 281 and the inking-ribbon carried thereby. The reciprocatory frame 286 for the ribbon-guide 281 is preferably guided in its reciprocation by means of the guide-plate 293, secured upon the supporting-plate 170 within the carriage and provided at its extremities with the short upstanding arms 294, engaging at the inner sides of the rods 287, constituting a part of the reciprocatory frame.

By reason of the connections described it will be obvious that whenever a key of the type-action is depressed and communicates movement to the motion-transmitting rock-shaft 198 this shaft will in turn transmit motion to the reciprocatory frame 286 and provide for thrusting the ribbon-guide 281 rearwardly, thereby carrying the portion of the ribbon within the guide over the printing-point. When the key is released, the tension-spring of the machine returns the motion-transmitting rock-shaft to normal position, and consequently retracts the ribbon-guide, and thereby draws the ribbon back from the line of writing, so as to completely expose the sentence.

From the foregoing it will be seen that the motion-transmitting rock-shaft 198 simultaneously performs several important functions. By reason of the several connections therewith the said rock-shaft not only transmits motion to the letter-spacing mechanism, but also simultaneously actuates the ribbon-feeding mechanism and the ribbon-shifting device just described, besides cooperating

with the automatic line-lock device, whereby the said device, when it comes into play, serves to lock all of the operating parts of the machine.

To complete the machine, the same is provided with the usual alarm-bell 295, which may be conveniently mounted upon one side of the type-carriage and is adapted to be struck by the trip-hammer 296, carried by one arm of the bell-crank lever 297, pivotally mounted at its angle, as at 298, inside of the carriage-casing and having the upstanding arm thereof, which carries the hammer 296, extending through the top of the carriage-casing and angled at its upper end to permit of the hammer 296 freely vibrating at one side of the bell. The lower arm of the bell-crank 297 within the carriage-casing has pivotally mounted on the extremity thereof the trip-dog 299, working at one side of the stop projection 300 on the lower arm of the said bell-crank 297 and adapted to engage with the upstanding stop-arm 301 of the bell trip-plate 302, adjustably mounted on one of the track-rails, preferably the rear one 33, as plainly shown in Fig. 7 of the drawings. When the type-carriage advances up to the bell trip-plate 302, the trip-dog 299 strikes the upstanding stop-arm 301 of said trip-plate and is thrown backward against the stop projection 300 of the bell-crank 297, thereby causing the said bell-crank to swing as the trip-dog passes over the stop-arm 301 of the trip-plate, and when the bell-crank lever 297 gravitates to its normal position the hammer 296 will strike the bell and give the usual alarm. On the return movement of the carriage the pivotal trip-dog 299 freely swings upon its pivot as it passes back over the stop-arm 301 without affecting the position of the bell-crank hammer-lever 297.

In carrying out the invention various modifications may be resorted to without departing from the fundamental features thereof, and one modification involving a rear arrangement of the keyboard is shown in Figs. 42 and 43 of the drawings. In this modification the key-lever bell-cranks are turned in the opposite direction from those previously described, but connected with the type-action in the same manner. It will be seen by reference to said Figs. 42 and 43 of the drawings that in the modified arrangement instead of having the keys mounted on stems extending upwardly through the platform at the top of the casing the key-lever bell-cranks are projected at the front of the carriage, and thereby provide a very low keyboard, which is desired by some operators. The construction referred to involves the mounting of the keys upon the outer extremities of vertically-arranged bell-crank key-levers 303, adapted to extend through slots in the front side of the carriage-casing and pivotally mounted at their angles, as at 304, on bearing blocks or brackets 305, attached to a slotted bearing-plate 306, arranged at the front of the



type-action-supporting frame, said supporting-plate 306 being necessarily slotted to accommodate the vertical movement of the inwardly-extending portions of the bell-crank key-levers 303. There are several rows of the bell-crank key-levers 303, according to the number of rows of keys of the keyboard, and said levers are of progressively different sizes to provide for the stepped arrangement of the keys of the keyboard, and also to permit the inner upstanding arms 307 of the levers to project to a common horizontal plane in rear of or upon the side of a single transverse universal key-connection bar 308. This single transverse universal bar 308 is mounted at its outer extremities on the upstanding rock-arms 309, made fast to and projecting upward from the transverse motion-transmitting rock-shaft 198, hereinbefore referred to. It will therefore be seen that by a depression of the key on any of the bell-crank key-levers 303 the inner upstanding arm 307 of such key-lever will move forwardly against the universal bar 308 and provide for a rocking of the motion-transmitting shaft 198 to secure the simultaneous operation of the letter-spacing mechanism, the ribbon-feeding mechanism, and the ribbon-shifting device in the same manner as already set forth.

To complete the connections for the bell-crank key-levers 303, each of the same has a direct pull-rod connection with the type-bar bell-crank lever 127 associated therewith, such connection being the same as the connection already described between the said type-bar bell-crank levers 127 and the keyboard bell-cranks 130.

From the foregoing it will be seen that in the modification shown in Figs. 42 and 43 of the drawings the keyboard bell-cranks and the parts associated therewith are mounted upon the type-action-supporting frame, so that the construction for moving the entire type-action from the carriage-casing will be the same as already described, it being only necessary to also remove the universal bar 308 from the rock-arms 309. The modification is really in effect only a modified method of transmitting motion from the keys to the motion-transmitting element or rock-shaft.

The specific ribbon mechanism herein described is not claimed in the present application, but forms the subject-matter of a separate divisional application, filed March 23, 1900, Serial No. 9,937.

Changes in the form, proportion, and minor details of construction may be resorted to without departing from the principle or sacrificing any of the advantages of this invention.

Having thus described the invention, what is claimed as new, and desired to be secured by Letters Patent, is—

1. In a type-writing machine, a horizontal main support, a non-rotatable bearing-sup-

port carried by the main support and shiftable horizontally thereon to different adjusted positions, means for holding the bearing-support fixed in its adjusted position, the type-carriage, and a vertically-swinging track-carrying frame having a direct pivotal connection with said non-rotatable bearing-support, substantially as set forth.

2. In a type-writing machine, the combination of a vertically-adjustable horizontal main support, a non-rotatable bearing-support movable vertically with the main support and shiftable horizontally thereon to different adjusted positions, means for holding the bearing-support fixed in its adjusted position, the type-carriage, and a vertically-swinging track-carrying frame having a pivotal connection with said non-rotatable bearing-support, substantially as set forth.

3. In a type-writing machine, the combination of a non-rotatable vertically-adjustable supporting-rod, a non-rotatable bearing-support movable vertically with said rod and having an independent horizontal adjustment thereon, the type-carriage, and the vertically-swinging track-carrying frame having a pivotal connection with said bearing-support, substantially as set forth.

4. In a type-writing machine, the combination of a vertically-adjustable non-rotatable supporting-rod, a bearing-support movable vertically with said rod and having an independent sliding movement thereon, means for holding the bearing-support in a fixed position with relation to the rod, the type-carriage, and the vertically-swinging track-carrying frame having a pivotal connection with said bearing-support, substantially as set forth.

5. In a type-writing machine, the combination of a vertically-adjustable non-rotatable supporting-rod, a non-rotatable bearing-block slidably mounted upon the rod and longitudinally adjustable thereon, means for holding the bearing-block fixed in an adjusted position upon the rod, the type-carriage, and the vertically-swinging track-carrying frame having a pivotal connection with said bearing-block.

6. In a type-writing machine, the combination of a vertically-adjustable horizontal non-rotatable supporting-rod, a non-rotatable bearing-slide longitudinally movable upon said rod and carrying at one side of the latter an offset pivot-rod, the type-carriage, and the vertically-swinging track-carrying frame hung upon the said pivot-rod, substantially as set forth.

7. In a type-writing machine, a vertically-adjustable cross-sectionally angular non-rotatable supporting-rod, a bearing-slide mounted for longitudinal adjustment upon the rod, and having an opening of a corresponding shape, said bearing-slide having projected from one side thereof supporting-ears, a pivot-rod mounted in said ears, a vertically-swinging



track-carrying frame having bearing-lugs pivotally swung upon said rod, and a type-carriage, substantially as set forth.

8. In a type-writing machine, a transversely-adjustable track-carrying frame comprising connected side and cross bars, track-rails for the type-carriage separate from said frame and carried thereby, and means for adjusting the transverse width of the frame without disturbing the track-rails carried thereby, substantially as set forth.

9. In a type-writing machine, a transversely-adjustable track-carrying frame comprising a pair of parallel guides and front and rear cross-bars connected with said guides, the track-rails for the type-carriage movable independently of the guides and carried thereby, and means for transversely adjusting one of the frame-guides to vary the distance between both guides without disturbing the positions of the track-rails, substantially as set forth.

10. In a type-writing machine, a transversely-adjustable track-carrying frame comprising parallel longitudinal guides, and transverse end bars connected with the guides, track-rails for the type-carriage extending transversely of the guides and carried thereby, one of said guides being transversely adjustable upon the end bars of the frame to vary the distance between both guides without disturbing the positions of the track-rails, substantially as set forth.

11. In a type-writing machine, the track-carrying frame comprising a pair of parallel front and rear end or cross bars, and a pair of parallel longitudinal guides, the left-hand guide being permanently or rigidly connected with the end bars and having no lateral movement independent thereof, and the other guide having an adjustable connection with both end bars to vary the distance between both guides, and the track-rails arranged transversely of the guides and having an operative connection with the adjustable guide, to permit of its adjustment with the rails thereon, substantially as set forth.

12. In a type-writing machine, the main supporting or track-carrying frame comprising a pair of parallel longitudinal guides and cross-bars connected with said guides, track-slides movable upon the guides and having a slidable interlocking connection therewith to obviate upward displacement, and the track-rails extending transversely across the longitudinal guides and having adjustable interlocking connections with the slides, substantially as set forth.

13. In a type-writing machine, the track-carrying frame comprising a pair of connected cross-bars and parallel longitudinal guides, one of which guides is transversely adjustable, track-slides movable upon the guides, and track-rails having a fixed connection with one track-slide and a slidable connection with the other, to permit of the adjustment of the adjustable guide without disturbing the posi-

tions of the track-rails, substantially as set forth.

14. In a type-writing machine, the main supporting or track-carrying frame comprising connected cross-bars, parallel longitudinal guides, track-slides movable upon the guides, and the transverse track-rails having adjustable interlocking connections with the slides, said rails also having a fixed connection with one slide and a slidable connection with the other, substantially as set forth.

15. In a type-writing machine, the main supporting or track-carrying frame having a pair of parallel longitudinal guides, one of which is fixed and the other transversely adjustable, track-slides movable upon the guides, and the track-rails arranged transversely of the guides and having a fixed connection with the slide on the fixed guide, and a slidable connection with the slide on the adjustable guide, substantially as set forth.

16. In a type-writing machine, the main supporting or track-carrying frame having a pair of parallel longitudinal guides provided with dovetailed ribs, track-slides mounted upon the guides and having dovetailed grooves receiving the correspondingly-shaped ribs, and the transversely-arranged track-rails for the type-carriage having adjustable interlocking connections with the track-slides, substantially as set forth.

17. In a type-writing machine, the track-carrying frame, the track-rails slidably mounted upon the same, line-spacing mechanism carried with the track-rails and held in a fixed relation to the track-frame, the type-carriage, and an operating device for the line-spacing mechanism supported and carried by the carriage, and having an operative traveling engagement with the line-spacing mechanism in all positions of the carriage, substantially as set forth.

18. In a type-writing machine, the track-carrying frame having longitudinal guides, the track-rails slidably mounted upon the guides, line-spacing mechanism carried with the track-rails and held in a fixed relation to the guides of the frame, the type-carriage, and an operating device for the line-spacing mechanism, supported and carried by the carriage and having an operative traveling engagement with the line-spacing mechanism in all positions of the carriage, substantially as set forth.

19. In a type-writing machine, the track-carrying frame having longitudinal guides, track-slides mounted upon the guides and supporting the track-rails, line-spacing mechanism supported by the track-slides and held thereby in a fixed relation to the guides of the frame, the type-carriage, and an operating device for the said mechanism supported and carried by the carriage and having a separable traveling operative engagement with the line-spacing mechanism in all positions of the carriage, substantially as set forth.

20. In a type-writing machine, the main



frame having longitudinal guides provided with ratchet-teeth, the track-rails mounted upon the guides, line-spacing mechanism movable with the track-rails and held therewith  
 5 in a fixed relation to the guides, said mechanism having reciprocatory spacing-pawls, the type-carriage, and an operating device for the line-spacing mechanism mounted in the carriage and movable therewith, said device having an operative traveling engagement with  
 10 the line-spacing mechanism, substantially as set forth.

21. In a type-writing machine, the main frame having parallel longitudinal guides  
 15 provided with ratchet-teeth, the track-carrying slides longitudinally movable upon the guides, the line-spacing mechanism, supported by the track-slides and having reciprocatory pawls cooperating with said ratchet-teeth, the  
 20 type-carriage, and a suitably-operated spacing-bar carried by the carriage, and cooperating with said pawls, substantially as set forth.

22. In a type-writing machine, the main frame having parallel guides provided with  
 25 ratchet-teeth, the track-carrying slides longitudinally movable upon the guides, reciprocatory plunger-stems mounted upon the track-slides and carrying spacing-pawls engaging with said ratchet-teeth, the type-carriage, and  
 30 an operating device carried by the type-carriage and having a spacing-bar having a slidable interlocking connection with said plunger-stems, substantially as set forth.

23. In a type-writing machine, the main  
 35 frame having parallel guides provided with ratchet-teeth, the track-carrying slides mounted upon the guides, spring-projected plunger-stems supported by the track-slides and carrying at their inner ends spacing-pawls engag-  
 40 ing with the ratchet-teeth, the type-carriage, and an operating device mounted within the carriage and having a transverse horizontally-movable spacing-bar having a slidable interlocking connection with one end of said  
 45 plunger-stems, substantially as described.

24. In a type-writing machine, the main frame having guides provided with ratchet-teeth, the track-carrying slides mounted upon  
 50 the guides, the spring-projected plunger-stems supported by the track-slides and carrying at the rear ends thereof pivotal spacing-pawls engaging with the ratchet-teeth, said plunger-stems being provided at their front  
 55 ends with notched keepers, the type-carriage, and the operating device for the line-spacing mechanism carried by the carriage, said operating device having a transverse horizontally-movable spacing-bar having a slid-  
 60 able interlocking connection with the notched keepers of said plunger-stems, substantially as set forth.

25. In a type-writing machine, the main frame having longitudinal guides provided with ratchet-teeth, the track-carrying slides  
 65 mounted upon the guides, spring-projected reciprocatory plungers supported by the track-slides and carrying pivotal spacing-pawls en-

gaging with the ratchet-teeth, the type-carriage, the operating device for the line-spacing mechanism carried by the type-carriage, 70  
 said operating device including a transverse horizontally-movable spacing-bar having a slidable interlocking connection with the plungers, a bell-crank operating-lever having  
 operating connection with the spacing-bar, 75  
 and a fixed grip cooperating with the gripping end of the operating-lever, substantially as set forth.

26. In a type-writing machine, the main frame having longitudinal guides provided 80  
 with ratchet-teeth, the track-carrying slides mounted upon the guides, spring-projected reciprocatory plungers supported by the track-slides and carrying pivotal spacing-pawls en-  
 85 gaging with the ratchet-teeth, the type-carriage, the operating device for the line-spacing mechanism carried by the type-carriage, said operating device including a transverse horizontally-movable spacing-bar having a  
 90 slidable interlocking connection with the plungers, a bell-crank operating-lever having operative connection with the spacing-bar, and a stationary grip cooperating with the  
 gripping end of the operating-lever, said stationary grip being adjustable to regulate the  
 95 throw of the lever, substantially as set forth.

27. In a type-writing machine, the main frame having parallel guides provided with  
 100 ratchet-teeth, the track-carrying slides working upon said guides, reciprocatory spring-projected plunger-stems supported by the track-slides and carrying pivotal spacing-pawls en-  
 105 gaging with the ratchet-teeth, the traveling type-carriage, a horizontally-movable spacing-bar arranged transversely of the type-carriage and having a slidable interlocking con-  
 110 nection with the plunger-stems, angle-levers supported within the carriage-casing and having pivotal connection with the spacing-bar at spaced points thereon, a coupling connec-  
 115 tion between the angle-levers to secure the synchronous movement thereof, and an operating-lever having an operative connection with one of said angle-levers to provide for the movement of the spacing-bar, substan-

28. In a type-writing machine, the main frame having parallel guides provided with  
 120 ratchet-teeth, track-carrying slides mounted upon the guides, rails for the type-carriage fitted to said slides, line-spacing mechanism carried with the slides and having pivotal  
 125 pawls engaging with the ratchet-teeth of the guides, an operating device for the line-spacing mechanism carried by the carriage and having an operative engagement with the line-spacing mechanism in all positions of the car-  
 130 riage, and a separate release device also carried with the slides and having releasing members arranged to move the points of the pawls out of engagement with the ratchet-teeth, said  
 releasing device having its actuating means exposed in front of the front track-rail.

29. In a type-writing machine, the main



frame having parallel guides provided with ratchet-teeth, the track-carrying slides mounted upon the guides, line-spacing mechanism having pivotal pawls engaging with said ratchet-teeth, and a releasing device carried with the track-slides and having a pair of release bell-cranks cooperating with the pawls to move the same out of engagement with the ratchet-teeth, substantially as set forth.

30. In a type-writing machine, the main frame having parallel guides provided with ratchet-teeth, the track-carrying slides mounted upon the guides, line-spacing mechanism having pivotal spacing-dogs engaging with the ratchet-teeth, a releasing device carried with the track-slides, said releasing device including release bell-cranks cooperating with the spacing-pawls, and the horizontally-movable release-bar having a similar connection with both bell-cranks, substantially as set forth.

31. In a type-writing machine, the main frame having parallel guides provided with ratchet-teeth, the track-carrying slides mounted upon the guides, the transverse track-rails supported by and movable with the slides, the line-spacing mechanism having pivotal pawls engaging with the ratchet-teeth and provided with upstanding pins, bell-crank levers pivotally mounted on the track-slides and adapted to have one arm thereof engaged with said pins to move the pawls out of engagement with the ratchet-teeth, a horizontally-movable release-bar arranged transversely of the track-slides and having a similar interlocking connection with both bell-cranks, and spring-projected stems mounted on the front track-rail, said stems being connected at one end to the release-bar, and provided at their front ends with finger-buttons exposed at the front side of the front track-rail, substantially as set forth.

32. In a type-writing machine, the main frame having longitudinal guides provided with ratchet-teeth, the track-carrying slides mounted upon the guides, the transversely-arranged track-rails supported by and movable with the slides, line-spacing mechanism having spacing-pawls engaging with the ratchet-teeth, a releasing device carried with the track-slides and having members cooperating with the pawls to disengage them from the ratchet-teeth, said releasing device also including actuating or finger buttons, exposed at the front side of the front track-rails, substantially as set forth.

33. In a type-writing machine, the combination with the type-action comprising the type-bars, the keyboard, key connections, and directly-cooperating devices, of track-rails, the carriage having a casing traveling upon the rails, and a single supporting-frame carrying the said entire type-action and detachably fitted to the casing to permit of its removal with the type-action independently of the cooperating parts within the casing, substantially as set forth.

34. In a type-writing machine, the combi-

nation with the type-action comprising the type-bars, the keyboard, key connections, and directly-cooperating devices, of track-rails, the carriage having a casing traveling upon the rails, and a single supporting-frame carrying the said entire type-action and detachably mounted inside of the casing to permit of its removal with the type-action, independently of the cooperating parts within the casing, substantially as set forth.

35. In a type-writing machine, the combination of the track-rails, the carriage having a casing traveling upon the rails, the type-action, and a single supporting-frame carrying the entire type-action, and removable with said action through the top of the casing, independently of the cooperating parts within the casing, substantially as set forth.

36. In a type-writing machine, the combination of the track-rails, the carriage having a casing traveling upon the rails and provided with interior rests, the type-action, a single supporting-frame carrying the entire type-action and detachably resting upon said interior rests, said frame, with the entire type-action being removable through the top of the casing, and fastenings for detachably holding the type-action-supporting frame within the casing, substantially as set forth.

37. In a type-writing machine, a vibratory type-bar provided with a pair of bendable arms, each of said arms carrying at its terminal an individual type.

38. In a type-writing machine, a vibratory type-bar provided with a pair of divergently-disposed arms, said divergently-disposed arms each carrying at its terminal an individual type and being bendable to permit of alignment of the type.

39. In a type-writing machine, the type-action-supporting frame having stationary guides, and a vertically-movable type-bar carrier essentially comprising spaced parallel type-bar hanger and rest rings, and frame-standards connecting the two rings to hold them in a rigid spaced relation, said frame-standards having a slidable connection with the stationary guides of the supporting-frame, substantially as set forth.

40. In a type-writing machine, the type-action-supporting frame having vertically-disposed guide-posts, a vertically-movable type-bar carrier having a slidable connection with said guide-posts and essentially consisting of horizontal parallel hanger and rest rings held in rigid spaced relation, the type-bars supported by the hanger-ring, the operating connections for the type-bars, and the shifting mechanism for said carrier, substantially as set forth.

41. In a type-writing machine, the type-action-supporting frame having stationary vertically-disposed guide-posts projecting above and below the plane of the same, the vertically-movable type-bar carrier carrying slide-collars engaging the upwardly and downwardly projecting portions of the guide-posts,



the type-bars mounted on the type-bar carrier, the operating connections for the type-bars, and the shifting mechanism for the carrier, substantially as set forth.

5 42. In a type-writing machine, the type-action-supporting frame provided at or near the rear corners thereof with the vertically-disposed stationary guide-posts projecting above and below the horizontal plane thereof, a vertically-movable type-bar carrier consisting of  
10 a hanger-ring and a type-bar rest-ring arranged in horizontal parallel planes, and upright frame-standards interposed between and rigidly connecting the two rings, said  
15 frame-standards being provided with off-standing slide-collars spaced apart to respectively engage the upwardly and downwardly projecting portions of the stationary guide-posts, the type-bars supported by the hanger-ring, the operating connections for the type-bars, and the shifting mechanism for the  
20 type-bar carrier, substantially as specified.

43. In a type-writing machine, the type-action-supporting frame provided at or near the  
25 rear corners thereof with supporting-blocks having vertically-disposed stationary guide-posts projecting above and below the plane thereof, a vertically-movable type-bar carrier provided at opposite sides thereof with pairs  
30 of vertically-alined adjustable split slide-collars spaced apart to respectively engage the upwardly and downwardly projecting portions of the stationary guide-posts, and adapted to engage against the said supporting-  
35 blocks to limit the upward-and-downward movement of the carrier, the type-bars supported by the vertically-movable carrier, the operating connections for the type-bars, and the shifting mechanism for the carrier, sub-  
40 stantially as set forth.

44. In a type-writing machine, the type-bar hanger-ring, a series of type-bar hangers arranged upon the same side of the said ring and provided with bearing portions cut away  
45 at one edge, the cut-away portions of adjacent hangers being respectively upon reverse edges and partly matching to permit of the overlapping of adjacent bearing portions and the disposition thereof in parallel planes, and  
50 the type-bars having journals mounted in said bearing portions of the hangers, substantially as set forth.

45. In a type-writing machine, the hanger-ring, a circular series of type-bar hangers applied to the same side of the said ring and provided with narrow attaching portions, the narrow attaching portions of the hangers being arranged side by side, and adjacent hangers being cut away respectively upon reverse  
60 edges and having such cut-away portions partly matching so as to permit of the overlapping of the bearing portions of adjacent hangers, and the disposition thereof in parallel horizontal planes, and type-bars having  
65 journals mounted in the widened bearing portions of the hangers, substantially as set forth.

46. In a type-writing machine, the combination with the type-bar hanger-ring and the type-bars, of the type-bar hangers applied to  
70 said hanger-ring, and each having parallel bearing cheeks to receive the journals of the type-bars, an adjusting-plate associated with each type-bar hanger and arranged to extend transversely beneath the bearing cheeks  
75 thereof, said adjusting-plate being provided at its opposite ends with wedge portions engaging with the contiguous edges of the bearing cheeks, and an adjusting-screw passing  
80 through the adjusting-plate and engaging the hanger-ring, substantially as set forth.

47. In a type-writing machine, the combination with the type-bar hangers, of the type-bars journaled in said hangers and normally arranged in an upright position, and retract-  
85 ing-springs arranged longitudinally and alongside of the type-bars and having a fixed support at one end, said springs being connected at their other ends with the type-bars above and slightly forward of the pivotal  
90 points of the latter, the lower end of each retracting-spring being adapted to move with its type-bar so as to swing the spring from its normal plane and thereby increase its leverage, substantially as set forth.  
95

48. In a type-writing machine, the type-bar carrier having a horizontal hanger-ring, a series of type-bar hangers fitted to one side of the hanger-ring, the type-bars journaled in said hangers, a circular series of type-bar-operating levers supported on the directly opposite side of the hanger-ring, all of said operating-levers being disposed in parallel vertical planes, vertically-disposed pull connections between the said type-bar-operating levers and the heel ends of the type-bars therebelow, and straightaway key-operated connections with said type-bar-operating levers, substantially as set forth.  
100

49. In a type-writing machine, the type-bar carrier having a horizontal hanger-ring, a series of type-bar hangers fitted to the under side of the hanger-ring, the type-bars pivotally supported by said hangers, a series of upright bell-crank levers supported upon the upper  
115 side of the hanger-ring and arranged in a circular series in rear of the type-bars, all of the said bell-crank levers being disposed in vertical parallel planes, vertical pull connections between the said bell-crank levers and the  
120 heel ends of the type-bars therebelow, and straightaway key-operated connections with said bell-crank levers, substantially as set forth.

50. In a type-writing machine, the type-bar carrier having a horizontal hanger-ring, type-bar hangers mounted on one side of said ring, the type-bars pivotally supported by said hangers, a circular series of upright parallel bell-crank levers pivotally supported on the  
125 other side of the hanger-ring in rear of the type-bars, the lower arms of said levers having vertical link connections with the heel ends of the type-bars, and key-operated bell-  
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cranks having connections with the upstanding arms of the bell-crank levers on the hanger-ring for exerting a horizontal pull thereon, substantially as set forth.

5 51. In a type-writing machine, the type-action-supporting frame, the type-bar carrier having a hanger-ring provided with a series of type-bar hangers, the type-bars pivotally supported by the hangers, a circular series of  
10 upright parallel bell-crank levers pivotally mounted on the hanger-ring and having vertical link connections between their lower arms and the heel ends of the type-bars, a series of keyboard bell-cranks carried by the  
15 type-action-supporting frame, key-stems connected with one arm of the said keyboard bell-cranks, and pull-rod connections between the other arms of said keyboard bell-cranks and the type-bar bell-crank levers associated  
20 therewith, substantially as set forth.

52. In a type-writing machine, the type-action-supporting frame having a key-stem platform, the type-bar carrier having a hanger-ring provided with a series of type-bar hangers, the type-bars pivotally supported by the  
25 said hangers, a circular series of upright parallel bell-crank levers supported on the hanger-ring and having vertical link connections with the heel ends of the type-bars, a series of keyboard bell-cranks pivotally suspended from the under side of the key-stem  
30 platform, said keyboard bell-cranks being arranged in rows with the bell-cranks of adjacent rows disposed in alternate or staggered relation, key-stems working through the key-stem platform, and connected with one arm of the bell-cranks suspended therefrom, and a connecting-rod extending from each of the  
35 keyboard bell-cranks to the type-bar bell-crank lever associated therewith, substantially as set forth.

53. In a type-writing machine, the type-action-supporting frame, having a stationary keyboard, a vertically-movable type-bar carrier mounted upon the type-action-supporting frame, and having a hanger-ring, type-bar hangers fitted to the hanger-ring, type-bars pivotally supported by said hangers, type-bar operating levers mounted upon and movable  
45 with the type-bar carrier, vertical pull connections between said levers and the heel ends of the type-bars, permanently-arranged key-operated connections with said levers, and mechanism for raising and lowering said type-bar carrier without affecting the key-operated  
50 connections of said operating-levers upon the carrier.

54. In a type-writing machine, the type-action-supporting frame, a vertically-movable  
60 type-bar carrier carrying type-bars having type disposed at an angle to each other, type-bar-shifting mechanism having operative connections with the carrier to provide for raising and lowering the same, a device for  
65 yieldingly counterbalancing or overbalancing the type-bar carrier, and adjusting means for said device to set the carrier in a normally

elevated or depressed position, substantially as set forth.

55. In a type-writing machine, the type-action-supporting frame, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, shifting mechanism having a single shift-key, and also having operative connections with the  
70 type-bar carrier to provide for raising and lowering the same, a device for counterbalancing or overbalancing the type-bar carrier, and adjusting means for said device to set the carrier in a normally elevated or depressed  
80 position, substantially as set forth.

56. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, shifting mechanism for moving the  
85 type-bar carrier from its normal position, a device for yieldingly counterbalancing or overbalancing the type-bar carrier, and common means for simultaneously setting the operating connections for the shifting mechanism, and also adjusting the said device to set the carrier in a normally elevated or depressed  
90 position, substantially as set forth.

57. In a type-writing machine, a vertically-movable type-bar carrier carrying type-bars  
95 having type disposed at an angle to each other, springs having operative connections with the type-bar carrier to provide for counterbalancing the weight thereof to permit it to normally rest in a depressed position, one of  
100 said springs being shiftable to a position for overbalancing the weight of the type-bar carrier and its attached parts to provide for normally holding the same in an elevated position, means for moving the type-bar carrier  
105 from its normal at-rest position, and means for adjusting the shiftable spring from a counterbalancing to an overbalancing position and vice versa, substantially as set forth.

58. In a type-writing machine, a vertically-movable type-bar carrier carrying type-bars  
110 having type disposed at an angle to each other, a rock-shaft carrying swinging arms having an operative connection with the vertically-movable type-bar carrier, means for oscillating  
115 said shaft in either direction, counterbalancing-springs connected with said swinging arms, and means for shifting one of said springs to a position for overbalancing the type-bar carrier and its attached parts, substantially as set forth.  
120

59. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, a rock-shaft having swinging arms operatively connected with the type-bar carrier to provide for moving the same in a vertical direction, means for oscillating the rock-shaft in either direction, counterbalancing-springs having connection at one end with said swinging arms of the rock-shaft, one of said springs being shiftable to either of the two positions upon the swinging arm with which it is associated to provide, in connection with the  
125  
130



other spring, for counterbalancing or overbalancing the weight of the type-bar carrier and its attached parts, and means for adjusting the shiftable spring upon the swinging arm with which it is connected, substantially as set forth.

60. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, a rock-shaft having swinging arms operatively connected with the type-bar carrier to provide for moving the same in a vertical direction, means for oscillating the rock-shaft in either direction, counterbalancing-springs having connection at one end with said swinging arms of the rock-shaft, one of said springs being shiftable to either of the two positions upon the swinging arm with which it is associated to provide, in connection with the other spring, for counterbalancing or overbalancing the weight of the type-bar carrier and its attached parts, and means for adjusting the shiftable spring upon the swinging arm with which it is connected, and simultaneously reversing the position of the operating connections for turning the rock-shaft, substantially as set forth.

61. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, a rock-shaft carrying swinging arms having an operative connection with the vertically-movable type-bar carrier, a single shift-key having operating connections for oscillating the rock-shaft, springs connected at one end with a fixed point of attachment and at their other ends with the swinging arms of the rock-shaft, one of said springs being shiftable upon one of the swinging arms to either a counterbalancing or overbalancing position, and means for simultaneously adjusting the shiftable spring and reversing the action of the operating connections with the shift-key, substantially as set forth.

62. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, a rock-shaft carrying swinging arms operatively connected with the type-bar carrier, one of said arms being provided with a pair of notches spaced a distance apart, a single shift-key having operating connections for oscillating the rock-shaft, springs connected at one end with a fixed point of attachment and at their other end with the swinging arms of the rock-shaft, one of said springs having a loop shiftable upon the notched swinging arm and adapted to engage in either of the notches thereof, a shifting lever having an operative connection with the sliding loop of the shiftable spring, and a reversing device for simultaneously adjusting the position of the shifting lever and reversing the operating connections with the shift-key, substantially as set forth.

63. In a type-writing machine, the vertically-movable type-bar carrier carrying type-

bars having type disposed at an angle to each other, a rock-shaft carrying swinging arms operatively connected with the type-bar carrier, and also carrying a slotted head, a single shift-key having a shiftable pull-rod connection with said slotted head, means for yieldingly holding the type-bar carrier normally in an elevated or depressed position, and means for reversing the relation of the shiftable pull-rod to said slotted head, substantially as set forth.

64. In a type-writing machine, the vertically-movable type-bar carrier carrying type-bars having type disposed at an angle to each other, a rock-shaft carrying swinging arms operatively connected with the type-bar carrier, one of said swinging arms being provided at one end with an upright slotted reverse-head, springs connected with said swinging arms, one of said springs having a shiftable engagement with the arm associated therewith, a swinging shifting lever having an operative connection with one end of the shiftable spring to provide for adjusting the same to its different positions, a shiftable pull-rod provided at one end with a slide-pin engaging in the slot of said reverse-head, a single shift-key having a bell-crank connection with the opposite end of said shiftable pull-rod, said bell-crank having an operative connection with the opposite end of said shiftable pull-rod, a reversing-lever having separate link connections respectively with said shifting lever and with the shiftable pull-rod, and the operating key or lever, and an exteriorly-arranged operating-key or equivalent device for said reversing-lever, substantially as set forth.

65. In a type-writing machine, the combination of the track having the rack-bar, the traveling type-carriage, and the letter-spacing mechanism comprising a rotary feed-shaft mounted within the carriage and carrying a spacing-pinion meshing with the rack, and also carrying a ratchet star-wheel, an upright swinging dog-lever encircling the star-wheel and carrying fixed and pivotal dogs co-operating therewith, and key-actuated connections for operating said lever, substantially as set forth.

66. In a type-writing machine, the track having a rack, the traveling type-carriage, and the letter-spacing mechanism comprising a rotary feed-shaft carrying the pinion meshing with the rack and also carrying a ratchet star-wheel, an upright swinging dog-lever pivotally supported at its lower end below the plane of the feed-shaft and having its upper end extended above the plane of the shaft, said lever also encircling the star-wheel and carrying the fixed and movable dogs co-operating with the teeth thereof, and key-actuated connections for operating the lever of said spacing mechanism, substantially as set forth.

67. In a type-writing machine, the track having a rack, the traveling type-carriage,



the letter-spacing mechanism mounted within the carriage and comprising a feed-shaft carrying a pinion meshing with the rack and also carrying the ratchet star-wheel, an up-  
 5 right swinging dog-lever pivotally supported at its lower end below the plane of the feed-shaft, said dog-lever carrying fixed and piv-  
 otal dogs and provided with a circular yoke portion surrounding the feed-shaft and the  
 10 star-wheel thereon, and key-actuated connections for swinging said lever, substantially as set forth.

68. In a type-writing machine, the track having a rack, the traveling type-carriage  
 15 having an interior supporting-plate, the letter-spacing mechanism supported by said plate, and comprising a feed-shaft carrying a pinion meshing with the rack and also carrying a ratchet star-wheel, and a swinging  
 20 dog-lever pivotally supported at its lower end at the under side of the supporting-plate and having its upper end or arm projected above the plane of the supporting-plate, said lever carrying fixed and movable dogs and provided  
 25 with a yoke portion surrounding the feed-shaft and the star-wheel thereon, and the key-actuated connections for operating said lever of the letter-spacing mechanism, substantially as set forth.

69. In a type-writing machine, the track having a rack, the traveling type-carriage having an interior supporting-plate, the letter-spacing mechanism supported by said  
 30 plate and comprising a rotary feed-shaft carrying a pinion meshing with the rack, and also carrying a ratchet star-wheel, the boxing fitted to the supporting-plate and projecting above the plane thereof, and a swing-  
 35 ing dog-lever pivotally mounted at its lower end within the boxing, and having its upper end or arm projecting above the plane of the feed-shaft, said dog-lever carrying the fixed and movable dogs and provided with a circular yoke portion surrounding the feed-shaft  
 40 and the star-wheel thereon, and key-actuated connections for operating said dog-lever, substantially as set forth.

70. In a type-writing machine, the combination with the type-action comprising the type-  
 50 bars, the keyboard, the key connections, and the directly-coöperating devices, of the carriage having a casing, and a single supporting-frame carrying said entire type-action and detachably fitted to the casing to permit of its removal with the type-action inde-  
 55 pendently of the coöperating parts within the casing, substantially as set forth.

71. In a type-writing machine, the traveling type-carriage casing, a single motion-trans-  
 60 mitting rock-shaft permanently mounted within the carriage-casing and having an operative connection with the letter-spacing mechanism, a single universal key-connection bar also permanently located within the  
 65 carriage-casing and having an operative connection with the rock-shaft, and a type-action comprising the type-bars, the key connec-

tions, and directly-coöperating devices, and a supporting-frame for said type-action detachably fitted to the casing, whereby the  
 70 said type-action as an entirety may be removed from the casing, independent of the coöperating parts therein.

72. In a type-writing machine, the traveling type-carriage, the letter-spacing mechanism  
 75 mounted within the carriage, a single motion-transmitting rock-shaft journaled within the carriage and having operative connection with the letter-spacing mechanism, a single longitudinally-movable universal key-  
 80 connection bar supported within the carriage and having an operative connection with the rock-shaft, a plurality of upstanding, swinging yoke-levers intersecting the working plane of said bar and individually coacting  
 85 therewith, and the key connections for moving the yoke-levers into operative engagement with the universal bar, substantially as set forth.

73. In a type-writing machine, the traveling  
 90 type-carriage, the letter-spacing mechanism mounted within the carriage, a single longitudinally-movable universal key-connection bar supported within the carriage and having an operative connection with the letter-  
 95 spacing mechanism, a plurality of upstanding, swinging separate and independent yoke-levers arched across the single universal bar and individually coacting therewith, and the key connections coöperating with the said  
 100 yoke-levers for swinging the same into operative engagement with said bar, substantially as set forth.

74. In a type-writing machine, the traveling type-carriage, the letter-spacing mechanism,  
 105 mounted within the carriage, a single longitudinally-movable universal key-connection bar supported within the carriage and having an operative connection with the letter-spacing mechanism, a plurality of separate  
 110 and independent yoke-levers arched across and individually coacting with the single universal bar, and the removable type-action including key-actuated connections entirely disconnected from the yoke-levers, but having  
 115 an operative engagement therewith, substantially as set forth.

75. In a type-writing machine, the traveling type-carriage, the letter-spacing mechanism  
 120 mounted within the carriage, a single universal key-connection bar having an operative connection with the letter-spacing mechanism, and a removable type-action having key-actuated connections entirely disconnected from the universal bar, but individually  
 125 coöperating therewith to effect the movement of the same, said entire type-action being removable from the carriage-casing without affecting the universal key-connection bar and the parts associated therewith, substantially  
 130 as set forth.

76. In a type-writing machine, the traveling type-carriage, the letter-spacing mechanism mounted within the type-carriage, a univer-



sal key-connection bar supported within the carriage and having an operative connection with the letter-spacing mechanism, a plurality of separate and independent yoke-levers 5 pivotally supported within the type-carriage and spanning the universal bar, each of said yoke-levers individually coacting with the universal bar, and the type-action having key-actuated connections disconnected from 10 but having an operative engagement with the yoke-levers, substantially as set forth.

77. In a type-writing machine, the traveling type-carriage, the letter-spacing mechanism mounted within the carriage, a single longitudinally-movable universal key-connection 15 bar supported within the carriage and having an operative connection with the letter-spacing mechanism, a series of separate and independent yoke-levers pivotally supported 20 within the carriage, and spanning the universal bar, each of said levers individually coacting with the universal bar and provided with a plurality of tappet projections, and the type-action having key-actuated connections 25 engaging with said tappet projections, substantially as set forth.

78. In a type-writing machine, the type-carriage, the letter-spacing mechanism mounted within the carriage, a horizontally-movable, universal key-connection bar, supported within the carriage and operatively 30 connected with the letter-spacing mechanism, said universal bar being provided with a series of spaced shoulders, a series of yoke-levers pivotally supported within the carriage, each of said yoke-levers coöperating with the shoulders of the universal bar and provided with a series of tappet projections, and the 40 type-action having key-actuated connections engaged with the tappet projections of the yoke-levers, substantially as set forth.

79. In a type-writing machine, the type-carriage, the letter-spacing mechanism, a longitudinally-movable universal bar supported 45 within the carriage and provided with a series of spaced shoulders, said bar being operatively connected with the letter-spacing mechanism, a series of separate and independent yoke-levers pivotally supported with- 50 in the carriage and spanning the universal bar, each of said yoke-levers having an upper horizontal bar portion provided with a pendent engaging flange coöperating with a shoulder of the universal bar, and also being 55 provided with a series of upstanding spaced tappet projections, and the type-action having key-actuated levers engaging with the tappet projections of the yoke-levers, each row of the key-actuated levers of the type-action being associated with one of the yoke- 60 levers, substantially as set forth.

80. In a type-writing machine, the type-carriage, the letter-spacing mechanism mounted within the carriage, a universal bar supported within the carriage and having an operative connection with the letter-spacing 65 mechanism, a series of yoke-levers coöperat-

ing with the universal bar and individually actuated by the key-operated connections of the type-action, and a key-actuated plunger 70 carried by the type-action-supporting frame and arranged to engage with a portion of the universal bar, substantially as set forth.

81. In a type-writing machine, the type-carriage, the letter-spacing mechanism, a universal bar supported within the carriage and 75 having an operative connection with the letter-spacing mechanism, said universal bar being provided with an ear, the type-action having key connections for individually transmitting motion to the universal bar, and a key- 80 actuated plunger supported by the type-action frame and adapted to engage against the ear of the universal bar, substantially as set forth. 85

82. In a type-writing machine, the type-carriage, the letter-spacing mechanism mounted within the carriage, the universal bar supported within the carriage and having an operative connection with the letter-spacing 90 mechanism, said bar being provided with an ear, the type-action having key connections for individually actuating the universal bar, a rock-shaft mounted within the type-action-supporting frame, and provided with a rock- 95 arm, a reciprocatory plunger connected with said rock-arm and adapted to engage against the ear of the universal bar, and a keyboard spacing-bar having operative connections with the said rock-shaft, substantially as set 100 forth.

83. In a type-writing machine, the type-carriage, the letter-spacing mechanism mounted within the carriage, the universal bar supported within the carriage and having an operative connection with the letter-spacing 105 mechanism, a pivotal link-support for one end of the universal bar, an adjustable tension-spring interposed between the said link-support and the adjacent side of the carriage-casing, and the type-action having key-operated connections for individually actuating 110 the universal bar, substantially as set forth.

84. In a type-writing machine, the traveling type-carriage, a single motion-transmitting 115 element carried by the carriage and having an operative connection with the letter-spacing mechanism and with the type-action, said motion-transmitting element having a single locking member, a line-lock device carried 120 by the traveling carriage and independently movable into and out of an interfering position with relation to said single locking member of the motion-transmitting element, means for setting said lock into action when the carriage reaches a predetermined position, and 125 means for automatically resetting the parts upon the return movement of the carriage.

85. In a type-writing machine, the combination with the traveling type-carriage, the letter-spacing mechanism, the type-action, and 130 the ribbon-feed mechanism, of a single motion-transmitting element having a single locking member, said element also having op-



erative connections with the said letter-spacing mechanism, the type-action, and the ribbon-feed mechanism, and an automatically-operating line-lock carried by the traveling carriage and independently movable into and out of an interfering position with relation to the single locking member of the motion-transmitting element, substantially as set forth.

86. In a type-writing machine, the combination with the traveling type-carriage, the letter-spacing mechanism, the type-action, the ribbon-feed mechanism, and the ribbon-shifting device, of a single motion-transmitting element having a single locking member offset therefrom, said motion-transmitting element also being operatively connected with the letter-spacing mechanism, the type-action, the ribbon-feed mechanism, and with the ribbon-shifting device, and an automatically-operating line-lock carried by the traveling carriage and independently movable into and out of an interfering position with relation to the single locking member of the motion-transmitting element, substantially as set forth.

87. In a type-writing machine, the combination with the carriage, and the motion-transmitting element actuated by the key-action and carrying a locking-arm, of a movable lock carried by the carriage and adapted to move into and out of an interfering position with relation to said locking-arm, a fixedly-positioned stop member supported independently of the carriage, and a trip carried by the carriage and adapted to engage with said stop member, said trip being arranged to normally hold the lock in an inoperative position, substantially as set forth.

88. In a type-writing machine, the combination with the carriage, and the motion-transmitting element actuated by the key-action and having a single locking member, of a line-lock device having a gravity locking element carried by the carriage and movable independently of the motion-transmitting element into and out of an interfering position with reference to the locking member thereof, a stop supported independently of the carriage, and a trip carried by the carriage and adapted to engage with the stop and arranged to normally hold the gravity locking element in an inoperative position, substantially as set forth.

89. In a type-writing machine, the combination with the carriage, and the motion-transmitting element actuated by the key-action and carrying a single locking-arm, of a gravity locking-lever movable into and out of an interfering position with reference to the locking-arm of the motion-transmitting element, means for normally sustaining the locking-lever in an inoperative position, and means for releasing said lever to permit of its gravitating to an operative position, substantially as set forth.

90. In a type-writing machine, the combina-

tion with the carriage, and the motion-transmitting element actuated by the key-action, of a gravity locking-lever movable to an interfering position with reference to said motion-transmitting element, a fixedly-positioned stop, a trip adapted to engage with said stop and arranged to normally sustain the locking-lever in an inoperative position, and means for automatically resetting the parts upon the return movement of the carriage, substantially as set forth.

91. In a type-writing machine, the combination with the carriage and the motion-transmitting element actuated by the key-action, and carrying a locking-arm, of a pivotally-supported gravity locking-lever having a stop projection cooperating with said locking-arm, a fixedly-positioned stop, and a trip adapted to engage with said stop, and arranged to normally sustain the locking-lever in an inoperative position.

92. In a type-writing machine, the combination with the carriage, and the motion-transmitting element actuated by the key-action and having a locking-arm, of a pivotally-supported locking-lever provided with a stop projection adapted to cooperate with the locking-arm, a fixedly-positioned stop, a trip-lever adapted to engage with the stop and arranged to normally sustain the locking-lever in an inoperative position, and means for automatically resetting the parts upon the return movement of the carriage, substantially as set forth.

93. In a type-writing machine, the combination with the carriage and the motion-transmitting element actuated by the key-action, and having a stop-arm, an automatically-operating gravity locking-lever adapted to assume an interfering position with reference to said stop-arm, means for normally holding the locking-lever in an operative position, and means for automatically resetting the parts of the locking device upon the return movement of the carriage, substantially as described.

94. In a type-writing machine, the combination with the carriage and the motion-transmitting element actuated by the key-action and having a locking-arm, of a locking-lever pivotally supported at one end and provided at its opposite end with a notch and an extended lifting-finger at the lower side of the notch, said locking-lever being further provided at an intermediate point with a stop projection cooperating with said locking-arm of the motion-transmitting element, a fixedly-positioned stop, and a horizontally-swinging and vertically-movable trip-lever adapted to engage with said fixedly-positioned stop, and also adapted to normally engage in the notch of the locking-lever, substantially as set forth.

95. In a type-writing machine, the combination with the carriage and the motion-transmitting element actuated by the key-action and having a locking-arm, of a locking-lever



pivotally supported at one end and provided at its opposite end with a notch and an extended lifting-finger at the lower side of the notch, said locking-lever being further provided at an intermediate point with a stop projection coöperating with said locking-arm of the motion-transmitting element, a fixedly-positioned stop, a horizontally-swinging and vertically-movable trip-lever adapted to engage with said fixedly-positioned stop, and also adapted to normally engage in the notch of the locking-lever, and a fixedly-positioned resetting-cam adapted to be engaged by the swinging notched end of the locking-lever upon the return movement of the carriage, substantially as set forth.

96. In a type-writing machine, the combination with the carriage and the motion-transmitting element having a locking-arm, of a locking-lever pivotally supported at one end and provided at its opposite swinging end with a notch, said locking-lever being further provided intermediate its ends with a stop projection coöperating with said locking-arm, a fixedly-positioned trip-plate provided with a pair of spaced stop-shoulders and also having offset from one side thereof an inclined cam-piece, a horizontally-swinging and vertically-movable spring-pressed trip-lever normally engaging in the notch of the locking-lever and adapted to strike the abutting portions of either of said stop-shoulders of the trip-plate, and a resetting or release lever ar-

ranged to engage with the locking-lever, substantially as set forth.

97. In a type-writing machine, the combination with the traveling type-carriage, the letter-spacing mechanism, the type-action, and the ribbon-feeding mechanism, of a single motion-transmitting element having an operative connection with the said letter-spacing mechanism, the type-action, and the ribbon-feeding mechanism, substantially as set forth.

98. In a type-writing machine, the combination with the carriage, the letter-spacing mechanism, the ribbon-feeding mechanism, and the ribbon-shifting device, of a single motion-transmitting element having an operative connection with the letter-spacing mechanism, the type-action, the ribbon-feeding mechanism, and the ribbon-shifting device, substantially as set forth.

99. In a type-writing machine, the transversely-adjustable track-carrying frame comprising connected side and cross bars, and means for adjusting the transverse width of the frame without disconnection of the side and cross bars constituting the same.

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

HARRY S. DUKES.

Witnesses:

JOHN H. SIGGERS,  
EDWIN E. VROOMAN.