

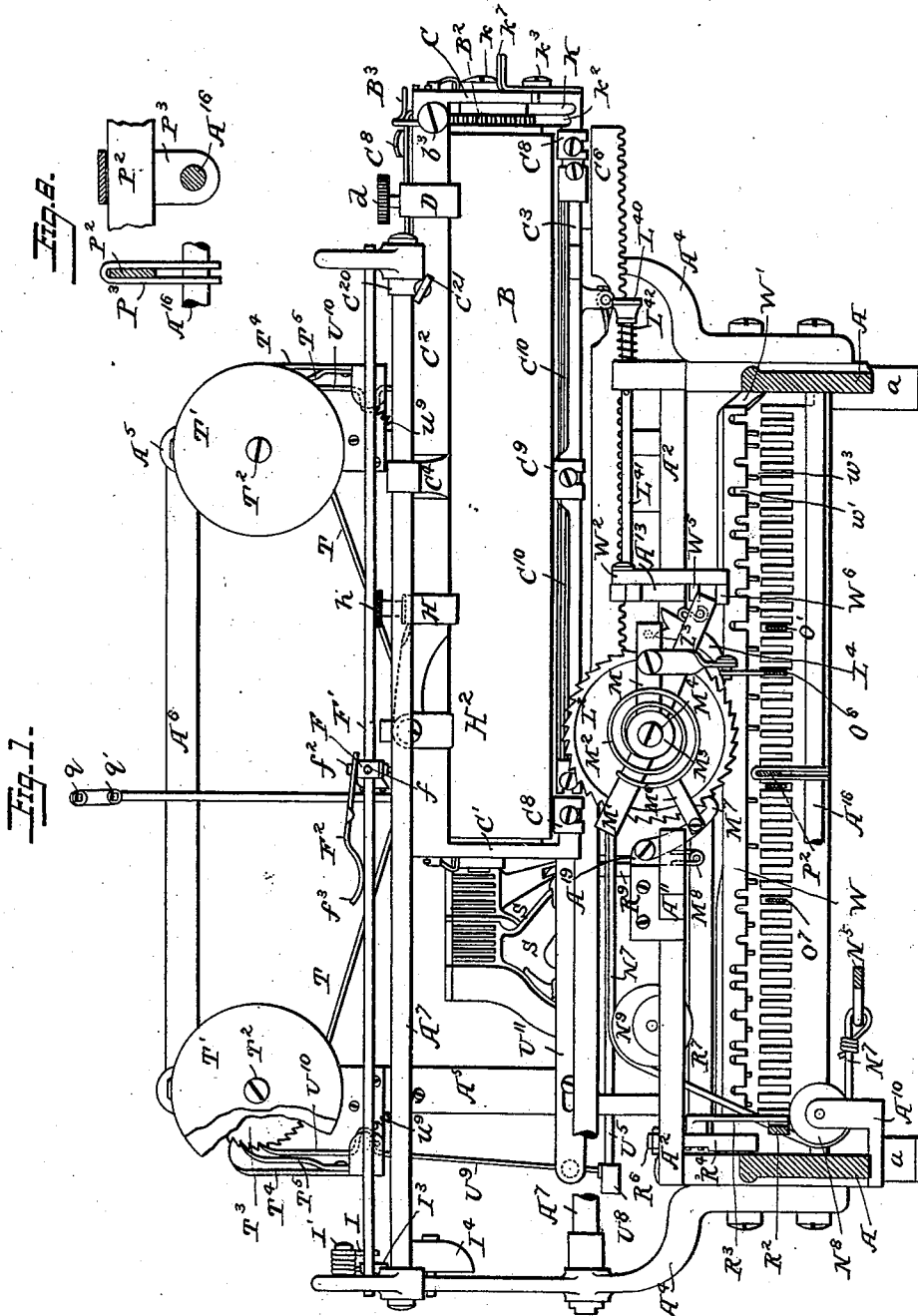
(No Model.)

6 Sheets—Sheet 1.

J. S. COPELAND.
TYPE WRITING MACHINE.

No. 512,365.

Patented Jan. 9, 1894.



Witnesses
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Allen N. Dobson

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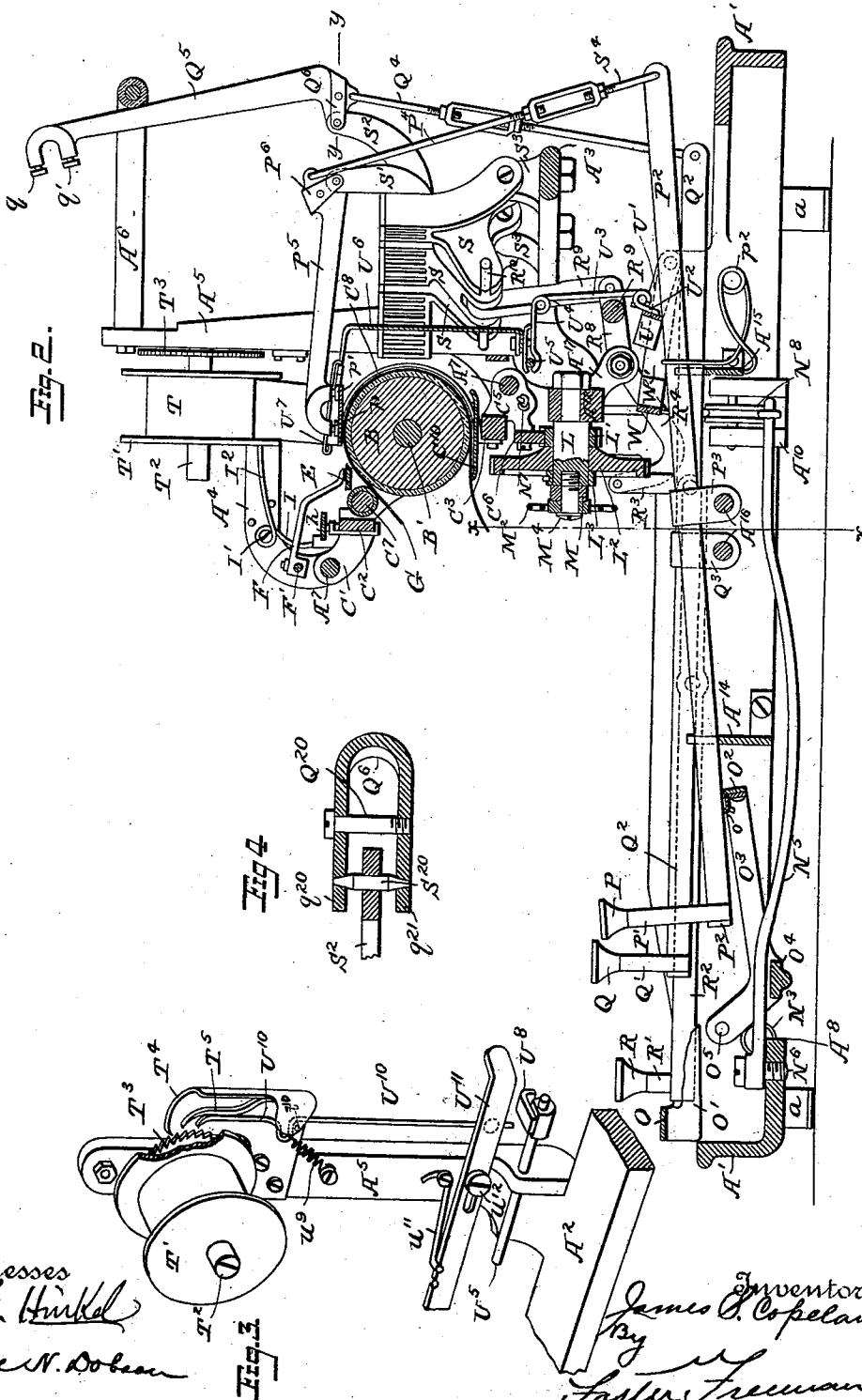
(No Model.)

6 Sheets—Sheet 2

J. S. COPELAND.
TYPE WRITING MACHINE.

No. 512,365.

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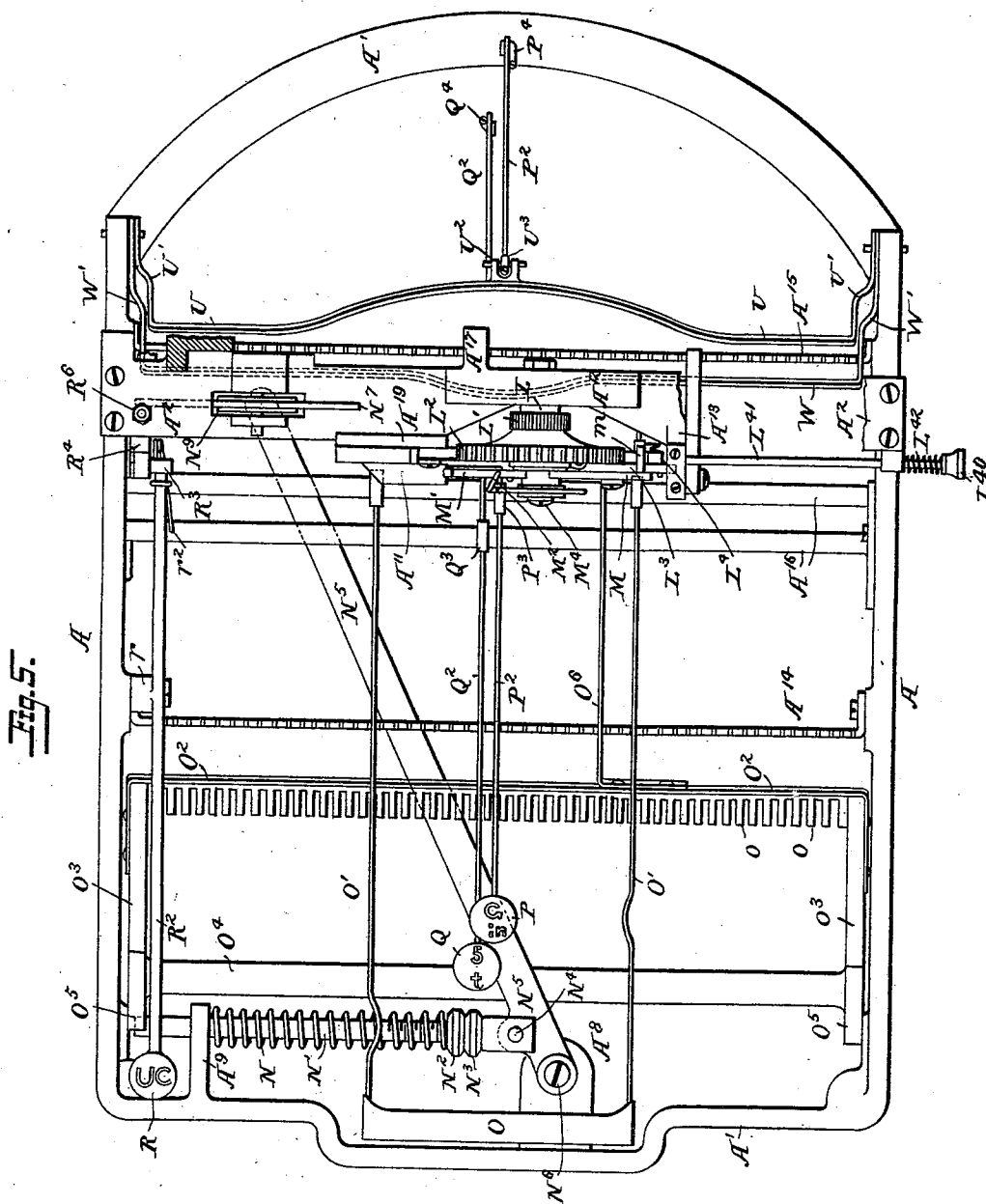
(No Model.)

6 Sheets—Sheet 3.

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6 Sheets—Sheet 4.

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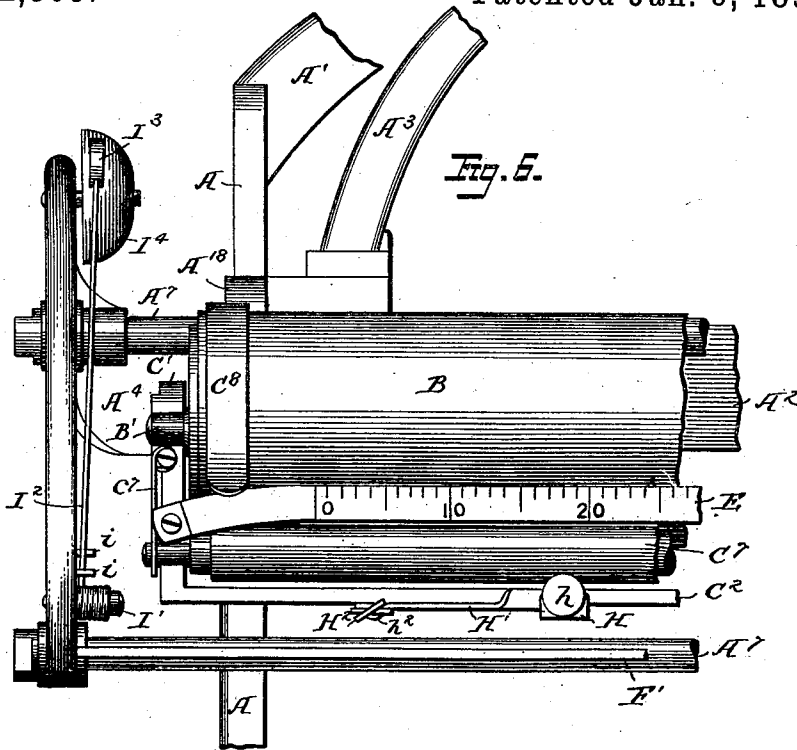


Fig. 5.

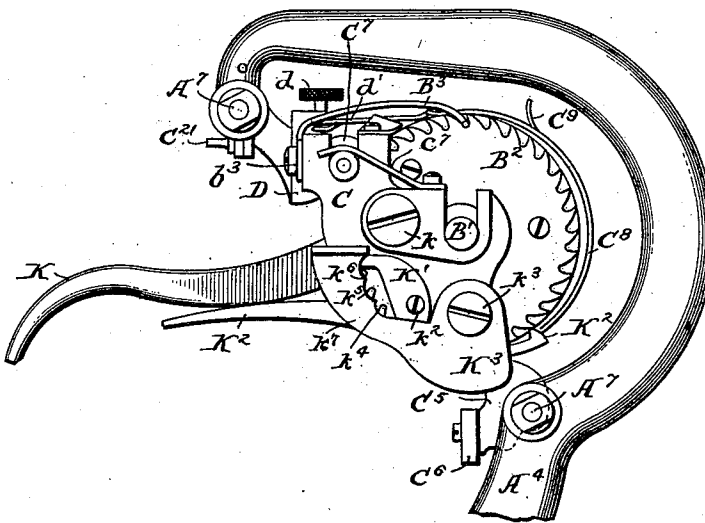


Fig. 7.

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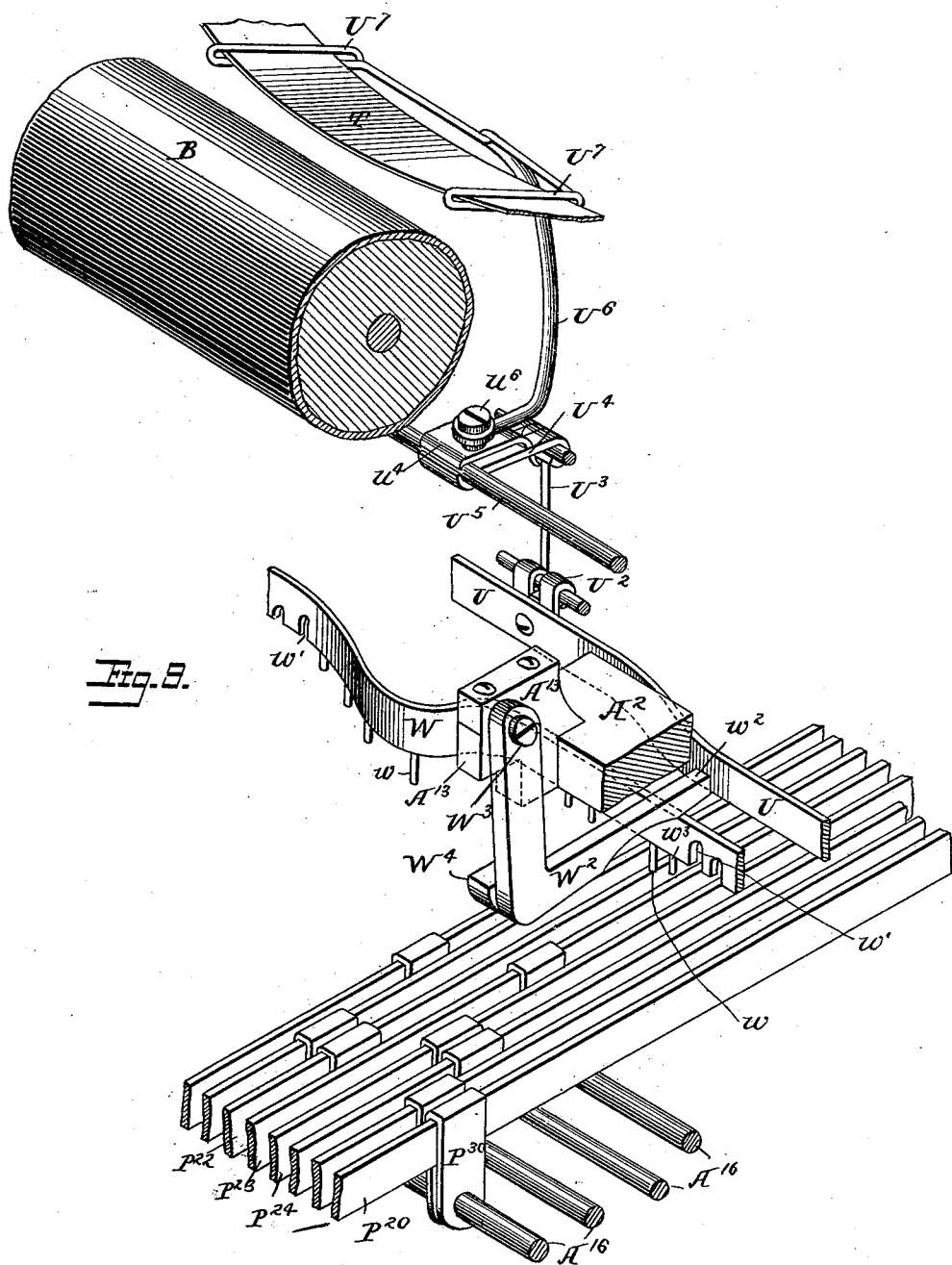
(No Model.)

6 Sheets—Sheet 5.

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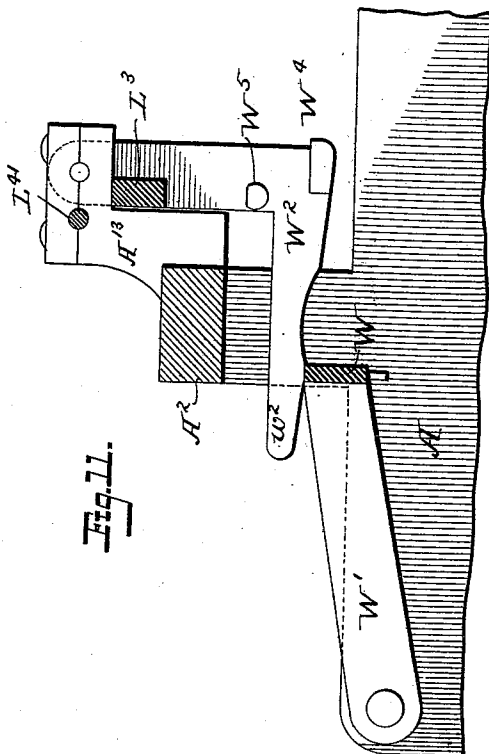
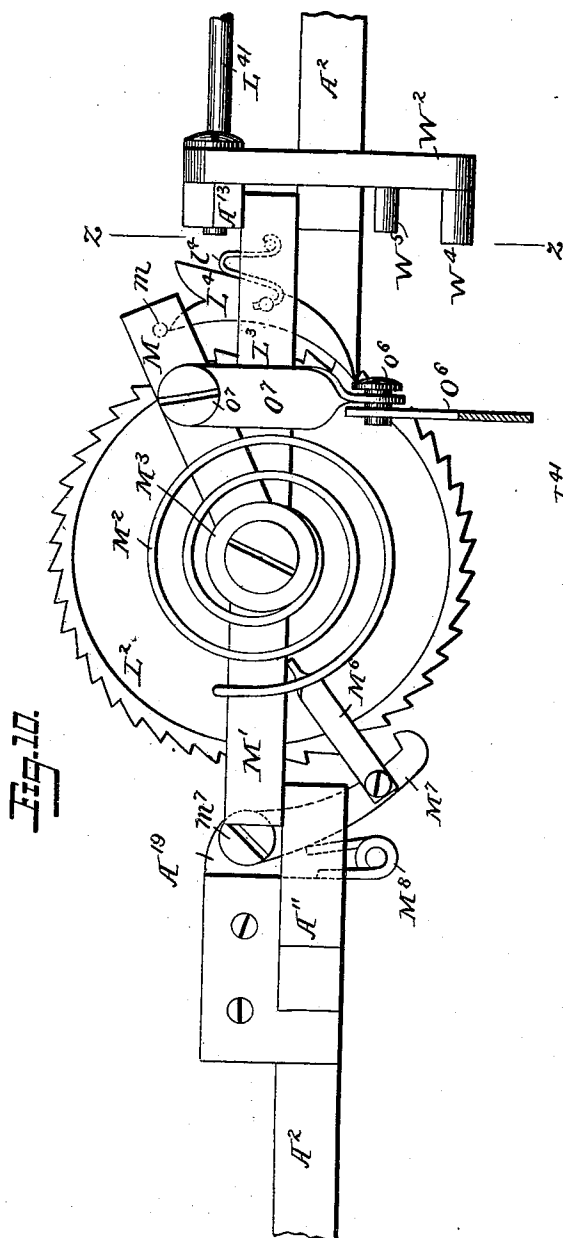
(No Model.)

J. S. COPELAND.
TYPE WRITING MACHINE.

6 Sheets—Sheet 6.

No. 512,365.

Patented Jan. 9, 1894.



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UNITED STATES PATENT OFFICE.

JAMES S. COPELAND, OF HARTFORD, CONNECTICUT, ASSIGNOR TO THE POPE MANUFACTURING COMPANY, OF PORTLAND, MAINE, AND BOSTON, MASSACHUSETTS.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 512,365, dated January 9, 1894.

Application filed May 14, 1892. Serial No. 432,351. (No model.)

To all whom it may concern:

Be it known that I, JAMES S. COPELAND, a citizen of the United States, residing at Hartford, Hartford county, Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My present invention is in the nature of improvements upon the type-writing machine heretofore described and shown by me in my application, Serial No. 224,221, filed January 13, 1887, and patented June 7, 1892, No. 476,251; and in the form in which I have embodied them in the machine which I shall presently describe and which is illustrated in the drawings accompanying this application there are certain parts and combinations which are substantially the same as were shown in my prior application, and which I shall necessarily here describe, but do not claim herein; my intention being to claim herein only such features as are original with me and are not shown or described in my prior application. In this machine, as in that, I use a bank of finger keys and a series of key levers and of thrusts and of type bars, each bearing two types; and I use an oscillating segmental shifting mechanism controlled by a shifting key at the side of the machine; and I use a reciprocating cylindrical platen moving upon ways centrally located across the machine and holding the platen between the keys and the type bars; and I operate the types to move from the rear forward and downward to a printing point on the top of the platen; and I use a ribbon and spools and feeding devices, located above and in the rear of the platen, and a ribbon vibrating mechanism which brings the ribbon forward at the moment of type impression and removes it backward immediately after the impression is made; and I use a rack and pinion connected between the carriage and the escapement, the rack and escapement being located beneath the platen, as in my former machine, and the carriage being connected with a power spring; but in my present machine, instead of a power spring in scroll form inclosed in a drum connected with the escapement ratchet, I use a spiral spring operating the carriage through a lever and cord and constructed with a

compensating mechanism, so that the pull or force operating upon the carriage is practically the same when the carriage has nearly returned to its left hand or unwound position, as it is when pulled to the extreme right or wound up position. By this contrivance I secure a more evenly and more easily working carriage and a more efficient and less noisy working of the parts, as well as a more compact and out of the way arrangement of the escapement devices. Instead of operating the ribbon movements through the escapement mechanism I operate them directly from the key levers through a ribbon movement bar located across them and in the ribbon vibrating mechanism I obtain a different movement so that the ribbon is moved backward more than upward, with a better disposition of the ribbon and with less tendency to slacken it on the spools. While I use a variable space bar as in the former machine, I have also added a secondary variable space bar or stop regulating bar and a variable positive stop mechanism for the escapement. I have also embodied in this machine a different and improved joint for the type bar, and other improvements in respect to adjustable bell trip mechanism, paper finger, carriage stop, line spacing devices, &c.; and the nature and extent of my improvements will be better apparent from the following more detailed description and from the drawings, in which the same reference letters indicate the same parts in all the views, and the connected parts are represented by similar letters with different exponents as much as practicable.

In the drawings—Figure 1, shows in front elevation one type bar at rest, the ribbon mechanism, the carriage drawn considerably toward the right, the carriage ways, escapement mechanism and other parts, some of the lower parts being shown in vertical transverse section on a line $x-x$ of Fig. 2. Fig. 2, shows a middle longitudinal vertical section of the same machine. Fig. 3, shows in perspective one of the pillars of the frame and a ribbon spool and certain other details of the mechanism enlarged, and Fig. 4, shows in horizontal section on the line $y-y$ of Fig. 2, my improved type bar joint. Fig. 5, shows in top

plan the base part of the frame with the main spring, carriage lever and other parts. Fig. 6, shows in top plan enlarged, parts of the platen, carriage, way rods, bell mechanism, &c. Fig. 7, shows in end elevation the right hand end of the platen and carriage with the platen lever and other parts enlarged. Fig. 8, shows in vertical transverse section and in vertical longitudinal section, the middle part of a key lever with its fulcrum piece and fulcrum rod. Fig. 9, shows enlarged in perspective, portions of the key levers, fulcrum rods and the ribbon moving bar and secondary space bar and other connections. Fig. 10, shows in elevation enlarged the escapement mechanism, and Fig. 11, shows in vertical section on the line $z-z$ of Fig. 10, and looking toward the right a portion of the secondary space mechanism enlarged.

The base part of the frame I make of cast iron, having the sides, A, A, and the ends A', A'.

A², is a main beam, its ends resting on the sides A', A', where it is secured by screws or otherwise.

A³, is an arc beam located in the rear of the main beam and serving as a base to which the supports of the type bar brackets are secured.

A⁴, A⁴, are the carriage arms secured to the side pieces of the frame at the bottom, and as I prefer to make them, curved outward, upward, backward, forward and downward, as shown, to allow the free movement of the carriage.

A⁵, A⁵, are main pillars rising above the arc beam to afford points of attachment for the ribbon spools and for the arc rest A⁶.

A⁷, A⁷, are way rods for the carriage, with their ends secured in the carriage arms A⁴, A⁴.

A⁸, is a fulcrum lug for the carriage lever, and A⁹, is a main spring lug, both connected with the front end base of the frame.

A¹¹, is an escapement lug projecting from the main beam, and A¹², is a ratchet lug in which is held the escapement stud, on which are the ratchet wheel and pinion L², L'.

A¹³, is a stop lug on the front side of the main beam at the opposite side of the ratchet wheel from the ratchet lug.

A¹⁴, A¹⁵, are guide bars extending across the base of the frame, with vertical slots in which the key levers freely play and by which the key levers are steadied and guided in position, A¹⁴, being on the front side of the fulcrum and A¹⁵, being in the rear.

A¹⁶, A¹⁶, are fulcrum rods extending about midway across the base of the frame a little way apart, on which the key levers are hinged or fulcrumed, as will be explained hereinafter.

A¹⁷, (Figs. 2 and 5,) and A¹⁸, (Fig. 6) are rocker lugs supporting the ends of a rock shaft R', (Fig. 1 just below the main beam at the left side) in the type shifting mechanism.

A¹⁹, (Figs. 5 and 10) is a catch lug, which may be attached by screws to or be made a part of the escapement stop lug A¹¹.

B, is a cylindrical platen on a metallic shaft B', having at the right hand end a ratchet disk B², secured to it, and in the teeth of which 70
disk a spring catch B³, secured at one end by a screw b³, to the carriage, operates to hold the platen from turning backward and to steady it from jarring forward.

C, C', are carriage end pieces, connected by 75
the carriage bars, C², C³, and on the bar C², is a carriage lug C⁴, running on the front way rod A⁷, and on the bar C³, are two carriage lugs C⁵, C⁵, running on the lower rear way rod A⁷, and these lugs are so placed on the carriage as to allow it a free movement on the way rods for a sufficient distance, either to the left or to the right, to accommodate the width of paper desired.

C⁶, is a rack bar attached to the lower carriage bar C³, having rack teeth on its lower edge. 85

C⁷, is an idle presser roll journaled in the carriage ends and resting against the platen throughout its length to assist the platen in drawing the paper, which passes between the platen and the presser roll, and the presser roll may either be left to its own weight for pressure, or, as I prefer, may have the light wire springs c⁷, c⁷, one at either carriage end, 95
for giving a slight additional pressure to the pressure roll.

C⁸, C⁸, are paper fingers or guides constructed of thin strips of sheet metal secured at one end to the carriage bar, C³, and passing backward and partly about the platen at either end, and C⁹, is a shorter paper guide or finger constructed and attached in a similar way at or near the middle of the carriage bar C³, and C¹⁰, is a nearly flat paper guide or apron also 100
secured to and extending along the top of the carriage bar.

D, is a movable or adjustable paper finger secured by a small thumb screw d, to the upper front carriage bar C², near its right hand end and extending in a thin narrow strip d', backward over the top of the platen to serve as a guide on the right hand margin of the paper when narrower paper is used, and which finger D, may be moved along the platen toward the left to rest upon paper of any width, and in connection with the other paper guides referred to, complete the paper holding mechanism. 115

E, is a scale attached at either end to the carriage end pieces and extending along the front side of the platen. 120

F, is a pointer, freely supported on a pointer rod F', and held at either end in the carriage arms A⁴, A⁴, and this pointer F, extends backward to and just over the scale E. It has a small set screw f, in the front side, and a spring latch F², on the upper side held by a small screw f², pivotally with its outer free end f³, bent to form a groove on the under side and to press upon the rod F'. When the screw f, is loose the pointer is loose and the latch F², swung off from the rod F'. The pointer is adjustable to any position along the 125
130

rod and may be brought exactly opposite the printing point or the point to which all the types are brought for impression. The latch may then be swung and sprung upon the rod and the set screw f , tightened to secure it in place.

G, is the paper or sheet upon which writing is to be made which is inserted right side top edge first immediately under the presser roll and upon the platen, and in operation is passed over on top of the platen under the paper fingers downward on the back side and forward again on the inside between the platen and the paper, the space between the carriage and escapement and the key board being a free pocket for the paper, and I prefer to place a sheet metal cover along above the key levers from one side of the frame to the other and curved upward just back of the keys, and just forward of the escapement to form an additional guide and receptacle for the paper. As this, however, is no necessary part of the working mechanism described I have not shown it in the drawings.

H, is a movable or adjustable bell trip clamp attached to the front upper carriage bar C^2 , having a small set screw h , to secure it in position and an arm of sheet metal H' , extending to the left and an incline or cam H^2 , pivoted thereon, and this incline H^2 , is so arranged that as the carriage moves toward the left it will reach and impinge against the bell trip I, pressing it so as to strike the bell, but when the carriage is pulled to the right the cam H^2 , yields on its pivot h^2 , and passes the trip without action.

I², is a bell wire coiled about a stud I', in the left hand carriage arm A^4 , the end I, serving as a trip, the arm I² being extended backward and terminating in a hammer I³.

I⁴, is a small bell fixed beneath the hammer to the carriage arm.

K, is a platen lever at the right hand end of the carriage, pivoted on a stud k , in the carriage end piece C. This platen lever has an arm extending toward the front of the machine, of convenient length and shape for a handle, and a shorter arm K' , like the short arm of a bell crank lever extending downward from the pivot k , and carrying a stud k^2 , and also a pivoted click K^2 , balanced so as to keep in engagement with the teeth of the ratchet disk B^2 , when the arm of the platen lever K, is raised, and thus to turn the disk and the platen with it through part of a revolution, and when the lever K, is allowed to trip, the click K^2 , rides over one or more teeth of the ratchet disk so as to engage with another tooth. The extent of movement upward of the platen lever K, is limited by the adjustable platen stop K^3 , pivoted by the screw pin k^3 , to the carriage end and extending forward and upward terminating in the finger piece k^7 , and having the notches k^4 , k^5 , k^6 ; as this platen stop K^3 , is swung upward or downward so as to present either of the notches k^4 , k^5 , k^6 , to the impingement of the

stud k^2 , the platen may be caused to turn through an arc of one, two or three teeth respectively, with each upward movement of the platen lever K, and thus making a varied space between the lines printed on the paper. This platen lever K, serves also another purpose, namely, that of a handle for pulling the carriage from the left to the right, and thus the two movements of drawing the carriage and of turning the platen may be combined.

C^{20} , is an adjustable stop or clamp on the upper front way rod A^7 , at or near the right hand end, capable of being set in any position by means of the small thumb screw C^{21} , and the object of it is by using it as a stop to the carriage lug C^4 , to stop or limit the motion of the carriage in drawing it out to the right.

L, is an escapement stud held in the ratchet lug A^{12} , about the center of the machine, and L', is a rack pinion mounted on the stud L, freely and engaging with the rack bar C^6 ; and L², is an escapement ratchet wheel also freely mounted on the stud L, and either formed integrally with or fixed to revolve with the pinion L'. In front of this ratchet wheel and also mounted freely on the stud L, is a pawl carrying bar L³, extending to the right to and under the stop A^{13} , which prevents its swinging upward any farther. On this bar L³, is freely pivoted a pawl L⁴, the lower end of which engages with the teeth on the ratchet wheel L², while the small wire spring I⁴, secured at one end of the pawl carrier L³, and resting at or near the other end against the pawl, tends to keep the pawl in engagement with the teeth of the ratchet wheel. The upper end of the pawl L⁴, is forked and curved with an incline to receive the trip pin m , on the back side of and near the end M, of the escapement trip bar, M, M'. This escapement trip bar is mounted freely at its middle part upon the stud L, or as I prefer to make it and as shown in Fig. 2, upon a screw M⁴, which is set into the stud L, from the front to secure this trip bar and other parts in position. When the end of the trip bar M, is depressed, the trip pin m , engages with the pawl L⁴, and throws it out of engagement with the ratchet wheel L². When the end M', of the trip bar is depressed it rests against the escapement lug A^{11} , as a stop; but at the same time that the end M, is depressed, the end M', is raised, allowing the brace M⁶, to rise and the holding pawl M⁷, to engage with the teeth of the ratchet wheel L². The holding pawl M⁷, is pivoted at m^7 , to the lug A^{19} , and the bent wire spring M⁸, tends to press the pawl M⁷, into engagement with the ratchet wheel as soon as the end M', of the trip bar is raised.

M², is a coiled wire spring held at one end in the washer M³, on the screw M⁴, at the other end pressing upon the arm M', of the trip bar, and tending with the force of the spring to press the end M', of the trip bar toward and against the stop A^{11} .

N, is a main spring of spiral wire about the

power arm N'. This power arm slides freely at or near one end in the main spring lug A³, and at the other end is pivoted at N⁴, near one end of the lever N⁵, and serves not only to guide the spring but to direct the application of the power communicated to it by the spring upon the lever N⁵, and also by its direction and by its connected devices (nuts N², N³) to regulate the amount of power applied to the lever N⁵. Near this pivoted end of the power arm is a screw thread and a nut or two nuts, as N², N³, one of which N³, may operate as a set nut and the nut N², as an adjusting nut. The spiral spring N, rests at one end against the main spring lug A³, and at the other end against the nut N², the tension of the spring being increased but turning up the nut N², along the power arm toward the spring.

N⁵, is a carriage lever pivoted at one end N⁶, to the fulcrum lug A³, and extending along toward the rear of the machine beneath the space bar and fulcrum rods and is connected by a cord N⁷, passing under and upon the guide pulley N⁸, and over the guide pulley N⁹, on the main beam A², to the carriage bar lug C⁵, where it is secured as shown in Fig. 2, and this cord is of such length that when the carriage is in its extreme left hand position and the cord end of the lever N⁵, is swung by the force of the main spring over nearly to the right hand side of the machine, the cord will be taut; then when the carriage is drawn to the right hand side of the machine the cord end of the carriage lever is drawn by the cord nearly to the left hand side of the machine against the force of the main spring. The arrangement of the main spring and power arm and the lever N', and its fulcrum N⁶, is such that the pivot N⁴, where the power of the spring is applied to the lever passing through an arc of a circle about N⁶, the power of the spring is applied with a shorter leverage when the spring is at its highest tension, and with a longer leverage when the spring is at its least tension, and thus a compensation is made by which the pull through the cord on the carriage is the same practically in whatever position the carriage is. This compensatory construction enables a spring to be used of less tension, and therefore gives the carriage an easier movement in drawing it to the right, and also gives both to the carriage and to the escapement mechanism a gentler, even and less noisy action.

O, is a space key, which I make of considerable width and length on the front of the machine and attach at either end to a space lever O'. These space levers O', O', extend toward the rear of the machine across the space bar O², and between the teeth of the guide bar A¹⁴, and are fulcrumed on a fulcrum rod A¹⁶. The space bar O², is suspended by the arms O³, O³, which are connected by the brace or idle bar O⁴, and are hinged at O⁵, O⁵, to the side pieces A, A, of the frame near the front end. Along the front side of this space

bar O², are teeth or lamina of sheet metal o, o, which are bent some upward and some downward so as to present a higher or lower point of contact with each key lever or space lever as it is depressed, and so as to depress the space bar O², through a greater or less arc, according as more or less space for the letters printed or spaces made on the line written on the paper require.

To the space bar O², is secured an escapement pull or rigid arm O⁶, extending to a point beneath the trip bar M, and having at o⁶, a link O⁷, pivoted to it and connecting it with the trip bar M, at the pivot o⁷, and the operation of this escapement pull in connection with the space bar O², is such that as the space bar O², is depressed the link O⁷, is depressed and pulls along with it the trip bar M, engaging the trip pin m, in the pawl L⁴, disengaging the pawl from the ratchet wheel L², and at the same time raising the end M', releasing the brace M⁶, and allowing the holding pawl M⁷, to engage with and hold the ratchet wheel L². The extent to which the trip bar M, is thus pulled down is primarily limited by the motion of the space bar O².

P and Q are type keys, and represent a full series of which the others are omitted in the drawings. Each key operates two types, the characters of which are indicated on the keys, as shown in Fig. 5. The key P, is connected by a stem P', with the key lever P², passing over the space bar O², through the guide bar A¹⁴, and through the guide bars A¹⁴ and A¹⁵, to the rear end of the machine, and it is pivoted or fulcrumed at P³, upon the fulcrum rod A¹⁶. At the rear end this key lever is connected by the thrust P⁴, to the shorter end of the type bar P⁵, which is mounted by a hinge P⁶, upon the bracket S', and which carries on its longer end the two type characters p, p', the character p, being shown as brought to the printing point on the ribbon and paper and platen, by the depression of key P, in Fig. 2. In like manner the key Q, is connected by the stem Q', with the key lever Q², also fulcrumed at Q³, upon a fulcrum rod A¹⁶, and connected at its rear end by a thrust Q⁴ with the shorter end of a type bar Q⁵, hinged at Q⁶, upon a bracket S², and bearing at its longer end two type characters q, q', and in Fig. 2, the key Q, is shown undepressed and the type bar Q⁵, in its position of rest upward against the arc rest A⁶, which extends substantially in the arc of a circle from one pillar A⁵, to the other and which forms a rest for the whole series of type bars when not operated. I form the connection between these key levers as P², and the fulcrum rods as A¹⁶, in a novel manner. I bend a strip of sheet metal as P³, up into U form as shown in Fig. 8, place it on the middle part of the key lever P², and secure it there. In the ends of this fulcrum P³, are holes for the guide rod A¹⁶, on which the fulcrum P³, has a free bearing. Each key and space lever in a series is arranged in line in position or substantially so, and the guide

rod is inserted by putting one end through each fulcrum piece in succession and is then secured in the frame. In this way I get a very steady fulcrum bearing for each lever, and a very simple construction, and am able to strike out the levers in great numbers alike from sheet metal, and to place the fulcrum pieces on where they are required.

In Fig. 4, is shown in detail upon the line *y-y* of Fig. 2 my improved type bar joint. In making this type bar I prefer to strike it out of sheet metal and double over a piece as Q^6 and in the bracket as S^2 , I place a cone-ended trunnion as S^{20} , spring the cone bearing in the joint Q^6 , in place upon the ends of the trunnion, and hold and adjust the bearing together by means of a screw Q^{20} , passing through one side of the joint and threaded into the other side, which gives a simple and easy bearing, readily adjustable for wear or in assembling, and a more steady joint to the bar, which when properly adjusted prevents all side wobbling.

R , is a shifting key near the front left hand corner of the frame, connected by a stem R' , with the shifting lever R^2 which is fulcrumed at r , on one side of the frame and pivoted to a link or thrust R^3 . A bent wire spring r^2 , attached at one end to the frame or a connection with it, and resting at the other end upon the back end of the lever R^2 , tends to bring it down and hold it in normal position. The link thrust R^3 , is also pivoted to a bent rock arm R^4 , connected with a rock shaft R^7 , which is journaled at one end in the lug A^{15} , on the left hand side of the frame just below and in the rear of the main beam, and at the other end in the rocker lug A^{17} , attached to the main beam. On this rock shaft R^7 , is a stop not shown in the drawings, and which may be dispensed with, playing against the rear side of the main beam and limiting the downward motion of the rear end of the shifting lever, R^2 , and R^6 , is a screw or adjustable stop in the main beam limiting the upward motion of the arm R^4 , and hence also the forward position of the supports S .

R^8 , is another rock arm connected with the rock shaft R^7 , at one end, and at the other end is joined to the trunnion link R^9 , which by the trunnion R^{10} , engages with the swinging hinged supports S, S, S , of the type bar brackets S', S^2 , &c. These hinged supports S, S, S , are hinged to studs S^3, S^3 , secured in the arc beam A^3 .

To the rock arm R^8 , is rigidly connected an extension R^9 , shown in section in Fig. 2, which extends a little way to the right and connects by an arm end similar to that of R^8 , with another trunnion link as R^9 , not shown in the drawings, but exactly like R^9 , and connected with a group of hinged bracket supports exactly like S, S, S , to hold the rest of the series of type bar brackets. Now the operation of this shifting mechanism is such, that when the shifting key R , is depressed, the rock arm R^4 , is raised and the other rock arm R^8 , is de-

pressed and thereby the segment support S , is drawn forward, carrying the hinges of the type bar P^5 or Q^5 , nearer toward the platen by the distance between the two type characters p, p' , or q, q' so that when the shifting key is depressed and one of the type keys is struck, the inner type character as p' , will come to the printing point instead of the outer one as p , and as the shifting mechanism is worked before the type key is struck, the type character does not move upon the ribbon, but the right one strikes it and is off again before the shifting mechanism has relaxed.

T , is an ink ribbon wound on spools T', T' , mounted on studs T^2, T^2 , on the pillars A^5, A^5 , above the platen; connected with each ribbon spool is a ratchet wheel T^3 , and connected with each pillar A^5 , and adjacent to the spool and ratchet is a bracket T^4 , which I make of sheet metal, in which is a spring catch T^5 , engaging with the ratchet wheel to prevent backward motion.

U , is a ribbon movement bar (see Fig. 5) extending across the machine above the key levers and in the rear of their fulcrum pieces and hinged by the arms U', U' , to either side of the frame, so as to be lifted a short distance by each key lever when the key is struck.

To the ribbon bar U , is attached a lug U^2 , in which the thrust link U^3 , has a bearing. (See Fig. 9.) I prefer to make this thrust link U^3 , with a trunnion at each end, and I connect the upper end to a clamp arm U^4 , held by means of the nut u^4 , and screw u^5 , rigidly to the ribbon rock shaft U^5 .

U^6 , is a swing arm which may be held to the clamp arm U^4 , by the screw u^6 , extending upward in rear of the platen and carrying at its forked upper end the ribbon guide loops U^7, U^7 ; this part of the mechanism I call the ribbon vibrating mechanism, and it is constructed and arranged to operate as follows: When the keys are raised, the guide loops U^7, U^7 , with the ribbon, are in a plane a little above the platen and in rear of or away from the line of the printing point on the platen, as shown in Fig. 9, but when any key is struck, the rear end of the key lever is raised, raising the ribbon movement bar U , rocking the shaft U^5 , swinging the arm U^6 , through a small arc and vibrating the loops U^7, U^7 , forward over the platen so that one loop shall be either side of the printing point and the ribbon be directly over the printing point and between the type character and the paper at the instant of type impression, and immediately receding when the finger key is released and the type begins to recede; thus an unobstructed view of the line printed and of every letter on it is presented to the operator all the time, and the vibration of the ribbon is secured in the best possible direction, with the least possible slack and with certainty of action.

I connect the ribbon feeding mechanism with the same ribbon movement bar U , and

rock shaft U⁵, as follows: The rock shaft U⁵, extends at either end a little beyond and outside of the pillar A⁵, as shown in Fig. 3, and on or near each end of this rock shaft U⁵, I secure a short arm U⁸. Above the rock shaft and parallel with it across the frame I place a shifting bar U¹¹, held by a slot in it and a screw U¹², to the pillar A⁵, so as to be capable of a short movement to right or left, and by the aid of the small spring detent w¹¹, I hold this bar in either the right hand or the left hand position. A pawl U¹⁰, is held freely in the bracket T⁴, and in the shift bar U¹¹, and is aided to operate by the small spiral spring w⁹ so that when the shift bar U¹¹, is in its left hand position as shown in Fig. 3, the bottom end is not over the rock arm U⁸ and the upper end is not engaged with the teeth of the ratchet T³, but is swung off by action against the fulcrum pin i¹⁰, shown in Fig. 3, from the ratchet and against the spring catch T⁵, also out of engagement with the ratchet T³, so that when the shift bar is in this position the shaft U⁵, does not operate the right hand pawl and ribbon spool, and the right hand ribbon spool is not prevented from turning toward the right or unwinding; and now, on the left side of the machine the corresponding mechanism being constructed and arranged exactly the same as has just been described for the right hand side, the lower end of the pawl U⁹, rests over the rock arm U⁸, as shown at the left hand in Fig. 1, and the upper end of the pawl U⁹, is free from the catch T⁵, and both it and the catch are in engagement with the teeth of the ratchet T³, so that when the rock shaft U⁵, is operated by the upward movement of the ribbon movement bar U, the rock arm or pawl pusher U⁸, communicates an upward push to the pawl U⁹, rotates the ratchet T³, and the spool T⁷, connected therewith through a small arc, the spring catch T⁵, riding over the teeth of the ratchet and thus preventing its backward motion, and the right hand spool being free to unwind the ribbon T, is drawn for a slight distance toward the left from the printing point and a fresh surface offered to the type as it strikes. It will now be obvious that when the shift bar U¹¹, is drawn to its right hand position the right hand ribbon spool will be operated in a similar manner and the left hand spool is left to unwind and the ribbon be moved in the opposite direction.

W, is a secondary space bar, or an escapement stop trip bar, hinged by the arms W', W', to the sides of the frame and extending across and above all the key levers in the rear of their fulcrum pieces and of the escapement mechanism; the lower edge of this bar is constructed with depressions and projections, some of which projections rest upon some of the key levers when those levers, and therefore the bar, are advanced. Some of these projections on the bar W, (Fig. 9) are shorter and some longer; when a short one is struck by a key lever which is situated beneath it the bar is raised less, and when a

long one is struck the bar is raised more, as their respective keys are operated, and the bar may have notches or depressions as w', over some of the key levers so that when these key levers are operated the bar W, will not be raised at all. With such construction there may be more than two such stops as W⁴, W⁵, for variable spacing than I have shown here.

W², is a stop carrier pivoted at W³, to the stop lug A¹³, (as shown best in Fig. 9) and having a trip arm w², extending backward over and upon the bar W. On this stop carrier W², are movable stops as W⁴, W⁵, (shown in Fig. 11) of which I only show these two although another one or more may be added if desired, in case of different spacing being required (as will be readily understood by any one familiar with the art and with this description) and the lower stop W⁴, is placed a little nearer the front of the machine or farther from the bar W, and the upper stop is placed a little in the rear out of the vertical line through the stop W⁴, and both are arranged so that the stop W⁵, being the upper one or short stop, is directly beneath the end of the escapement click bar L³, when the bar W, is at rest at its lowest point and the arm w², dropped upon it. When now a key lever as P²⁴, (Fig. 9) is operated, it will move in the depression w', in the bar W, and not stir the bar W, and through the other mechanism heretofore described the click bar L³, will be arrested by the short stop W⁵, and a short letter spacing be effected by the escapement mechanism. But when a key lever as P²², (Fig. 9) is operated it will raise the projection w, resting upon it, and so raise the bar W, and the arm w², swinging the stop carrier W², and bringing the short stop W⁵, out of position and the long stop W⁴, into position beneath the click bar L³, so that the click bar will not be stopped until it strikes the long stop W⁴, and the long letter space will be effected by the escapement mechanism. It is obvious now how, if a shorter projection as w³, (Fig. 9) be used on the bar W, above the key lever as P²³, a less motion of the bar W, will be secured, and if an intermediate stop were placed between W⁴ and W⁵, an intermediate degree of space movement would be effected by the same escapement mechanism.

L⁴⁰, is a carriage release key at the right side of the machine on the rod L⁴¹, mounted in a lug on the main beam A², and in the stop lug A¹³, and which has a spiral spring L⁴², between the key L⁴⁰, and the lug, tending to keep the key L⁴⁰, to the right, and its rod L⁴¹, out of contact with the click L⁴. When the key L⁴⁰, is pressed toward the left, the left end of the rod L⁴¹, is thereby pushed against the forked end of the click L⁴, holding it out of engagement with the ratchet wheel and allowing the carriage to slide back to the left.

It is obvious that modifications may be made in the form and arrangement of the

parts herein shown and described without departing from the substance of my invention, and I do not mean to limit myself precisely to the construction shown in this machine.

5 What I claim is—

1. In a typewriter, the combination of the adjustable pointer F, the rod F', attached to the main frame, and the spring locking arm F², substantially as described.

10 2. In a typewriter, the combination of the bell and pivoted striker fixed upon the frame, with the carriage and an adjustable clamp mounted upon the carriage and provided with an arm H' carrying a pivoted cam H², arranged to engage the striker as the carriage moves, substantially as described.

15 3. The combination with the carriage, its rack, and a pinion meshing with the rack, of a ratchet wheel, a stud supporting the pinion and ratchet wheel, a pawl carrying arm pivoted on the stud, a pawl on the arm engaging with the ratchet teeth, a trip bar arranged to disengage the pawl from the ratchet, and movable stops operated from the key levers for
25 limiting the movement of the pawl carrier, substantially as described.

4. The combination with a series of key levers and a variable spacing mechanism having a movable pawl and pawl carrier, of a
30 variable space bar, as O², constructed to give a variable movement to the pawl carrier, and a variable space stop bar, as W, and movable stops connected therewith whereby the movement of the pawl carrier may be variably
35 limited, substantially as described.

5. The combination with the spacing mechanism including a ratchet wheel, a pawl carrier, and a pawl pivoted to said carrier, of a space bar O², connected to the pawl carrier
40 said bar having projections of unequal length whereby a variable movement is given to the pawl carrier, and a secondary space bar W,

movable stops for variably moving the limit of the pawl carrier, and a connection between said stops and the secondary space bar, substantially as described.

6. The combination with the ribbon spools and their ratchet wheels, of holding pawls for the ratchet wheels, moving pawls therefor, a rock shaft having rocker arms and means
50 for swinging the moving pawls to bring them alternately into engagement with the rocker arms, substantially as described.

7. The combination with the ribbon spool and its ratchet wheel, of a spring holding
55 pawl, and a moving pawl constructed to slide longitudinally and to vibrate toward and away from the ratchet wheel, said moving pawl being arranged between the holding pawl and the ratchet wheel whereby when the
60 moving pawl is disengaged from the wheel the holding pawl will be held out of engagement, substantially as described.

8. The combination with a carriage, of a pivoted lever connected thereto, a power arm
65 pivoted at one end to the lever and sliding at the other end in a perforation in the main frame, and a main spring upon the power arm between the main frame and an abutment upon said arm, substantially as described.

9. The combination with the carriage, of a lever connected to the carriage, a power arm pivoted to the lever at one end and guided in the perforation of the main frame at the
70 other, a main spring upon said power arm and means for adjusting the tension of said main spring, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JAMES S. COPELAND.

Witnesses:

ALBERT P. DAY,
C. F. SEELEY.