(No Model.) 5 Sheets—Sheet 1.

J. A. HAMILTON.

TYPE WRITING MACHINE.

No. 505,521. Patented Sept. 26, 1893.

FIG. 1.

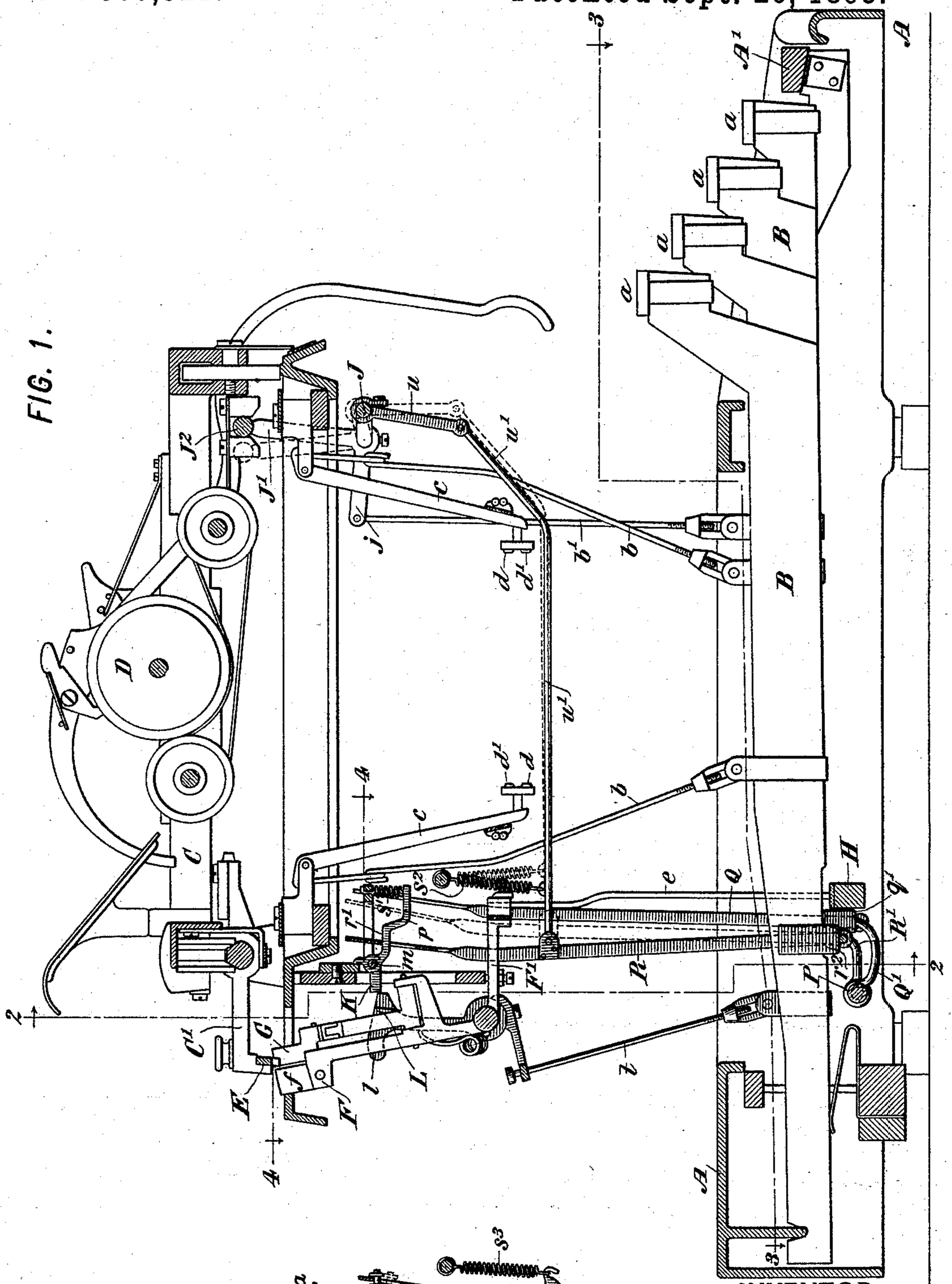
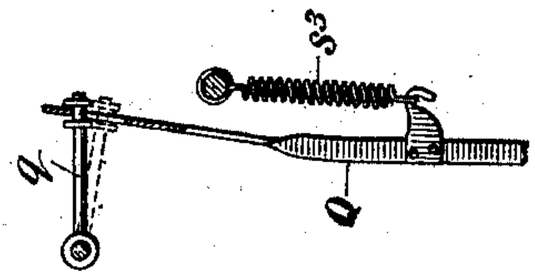


FIG. 1a.



WITNESSES:

C. E. Ashley

H. W. Lloyd.

INVENTOR:

John A. Hamilton,

By his Attorneys,

Arthur G. Fraser & Co.

(No Model.)

5 Sheets—Sheet 2.

J. A. HAMILTON.

TYPE WRITING MACHINE.

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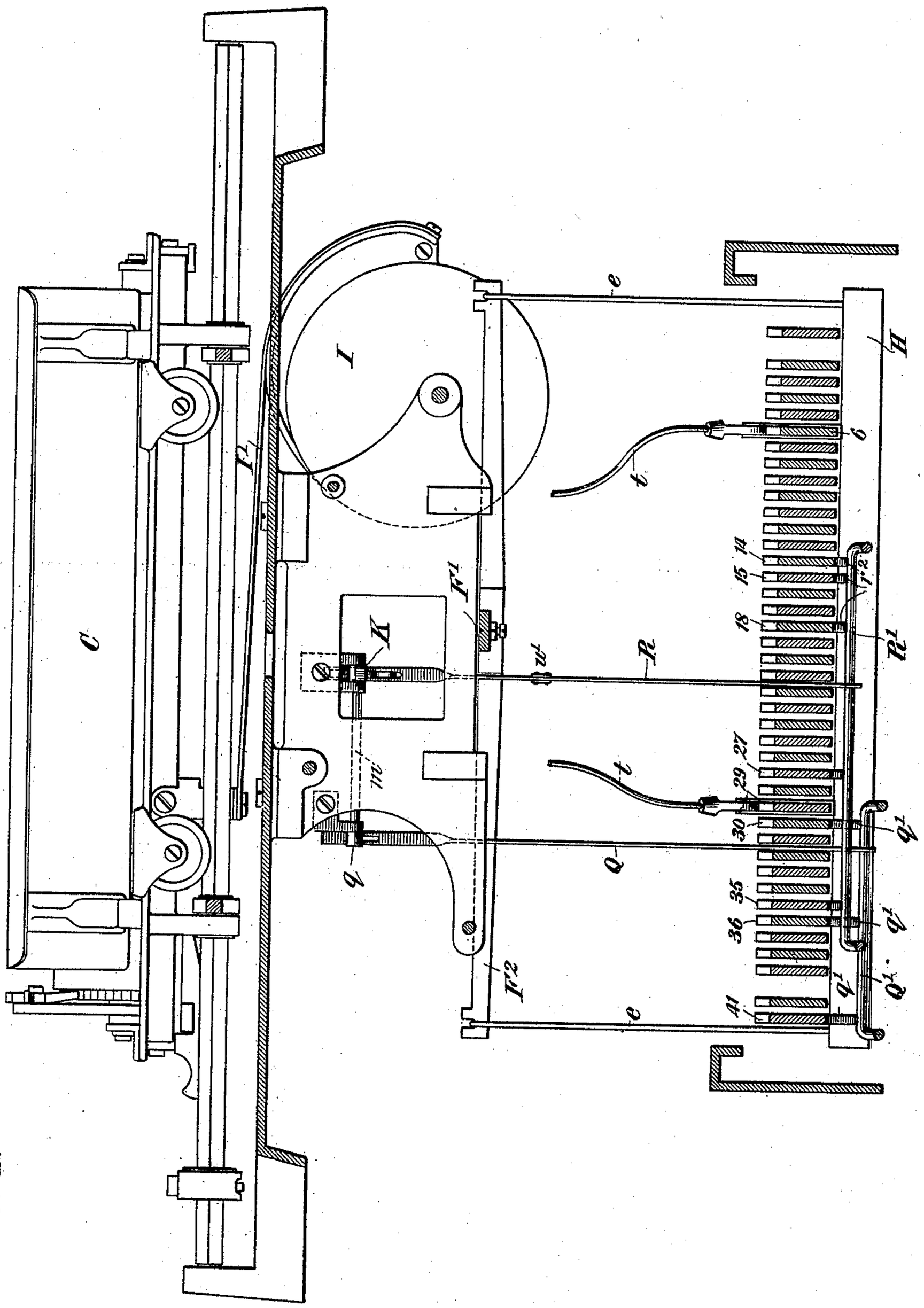


FIG. 2.

WITNESSES:
C. E. Ashley
H. W. Lloyd.

INVENTOR:
John A. Hamilton,
By his Attorneys,
Arthur C. Fraser & Co.

(No Model.)

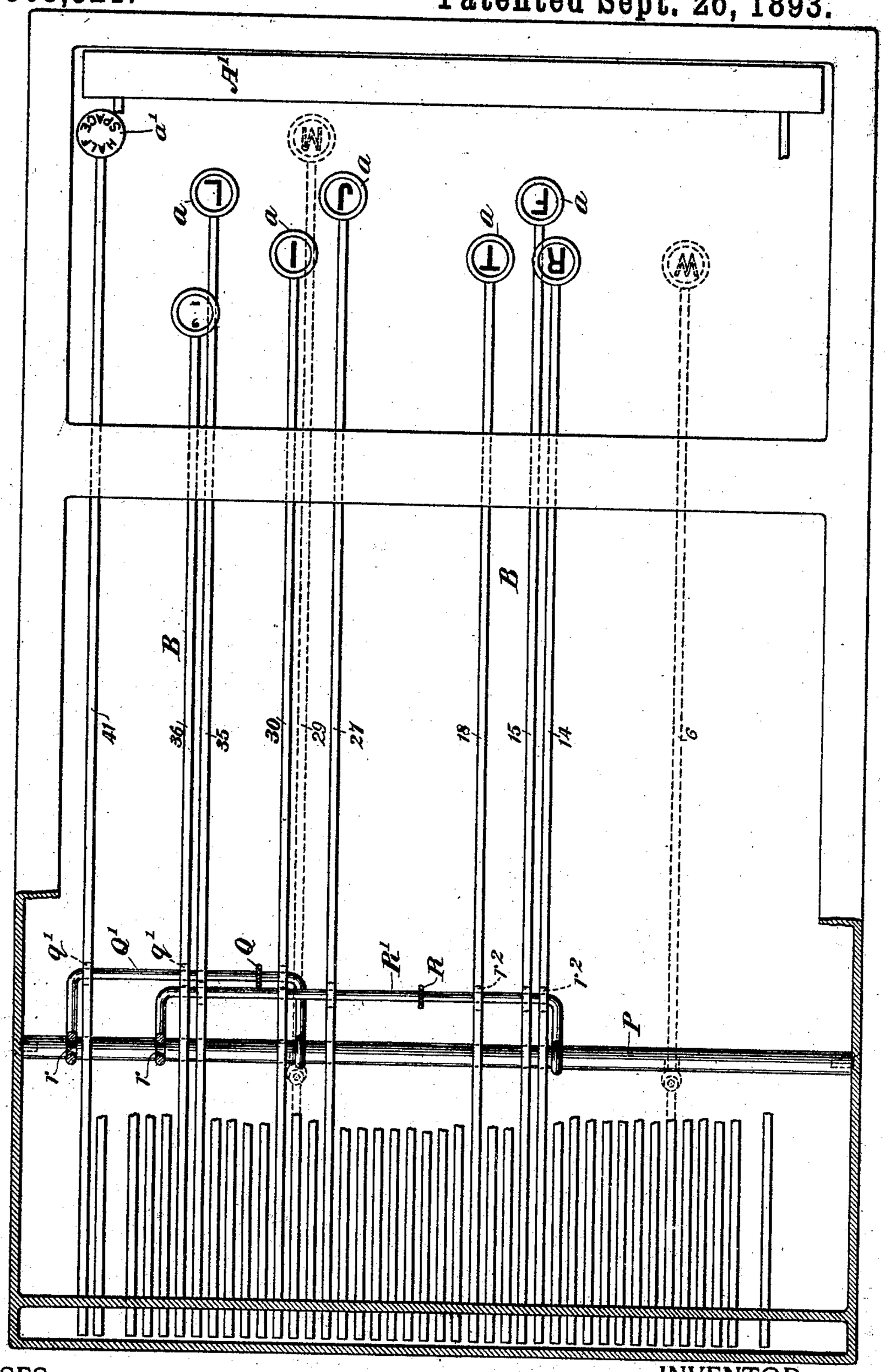
5 Sheets—Sheet 3.

J. A. HAMILTON.

TYPE WRITING MACHINE.

No. 505,521. Patented Sept. 26, 1893.

FIG. 3.



WITNESSES:

C. E. Ashley

H. W. Lloyd.

INVENTOR:

John A. Hamilton,

By his Attorneys,

Arthur G. Fraser & Co.

(No Model.)

5 Sheets—Sheet 4.

J. A. HAMILTON.

TYPE WRITING MACHINE.

No. 505,521. Patented Sept. 26, 1893.

FIG. 4.

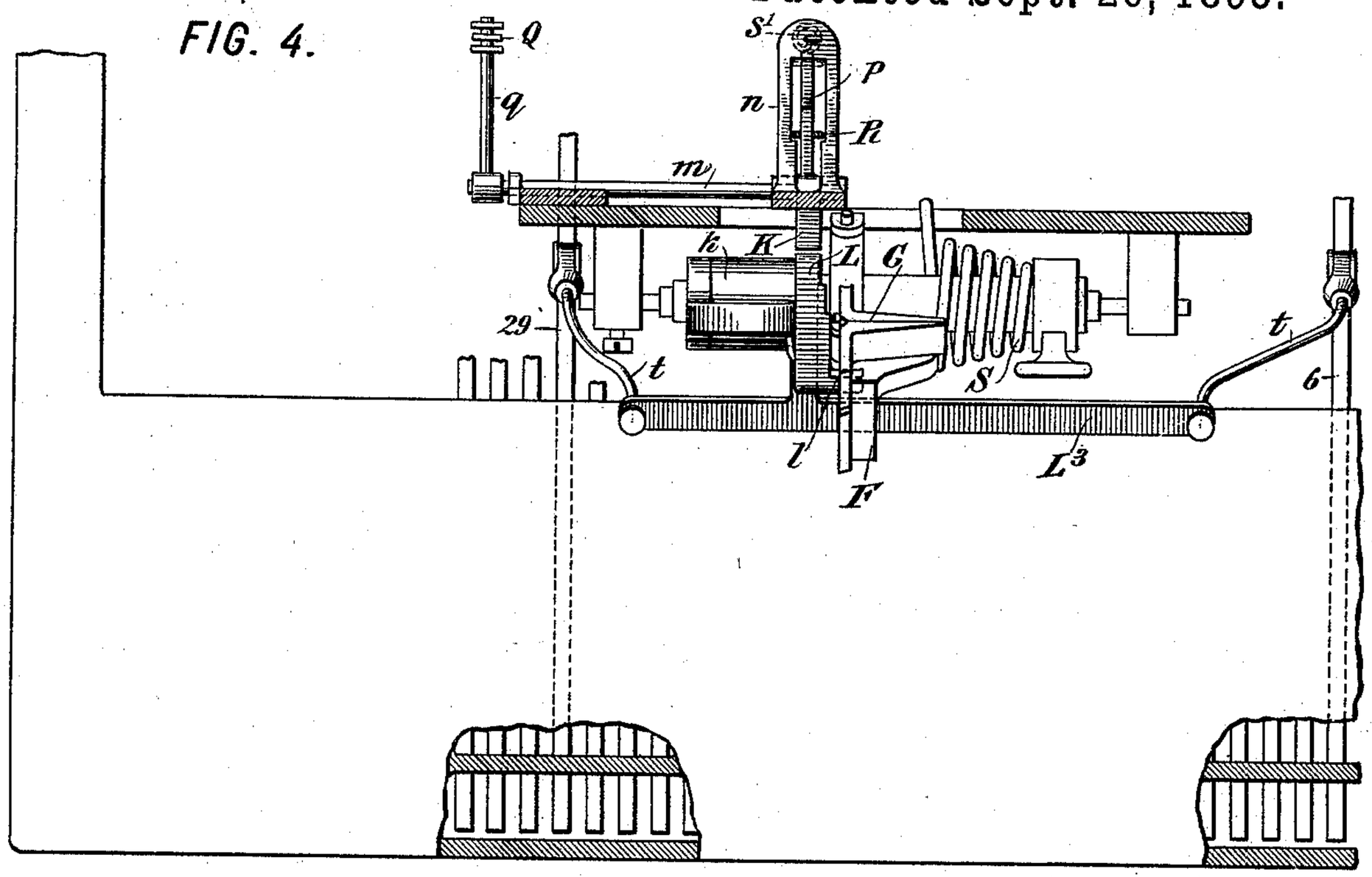


FIG. 6.

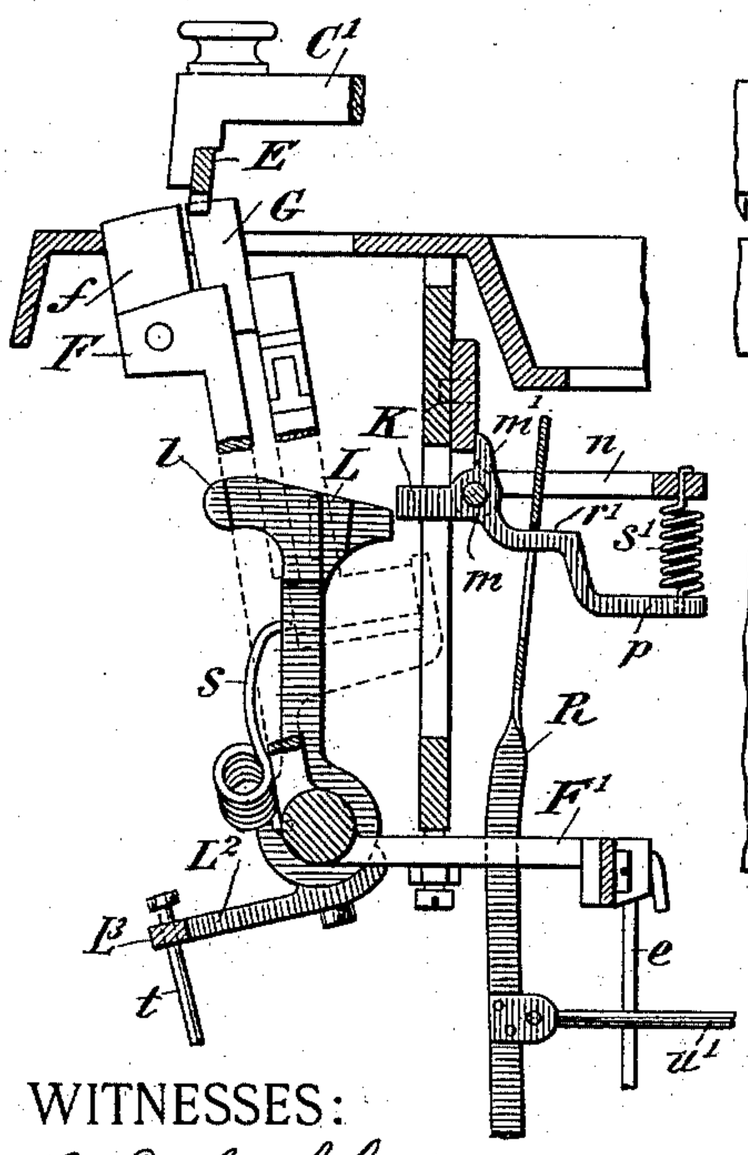
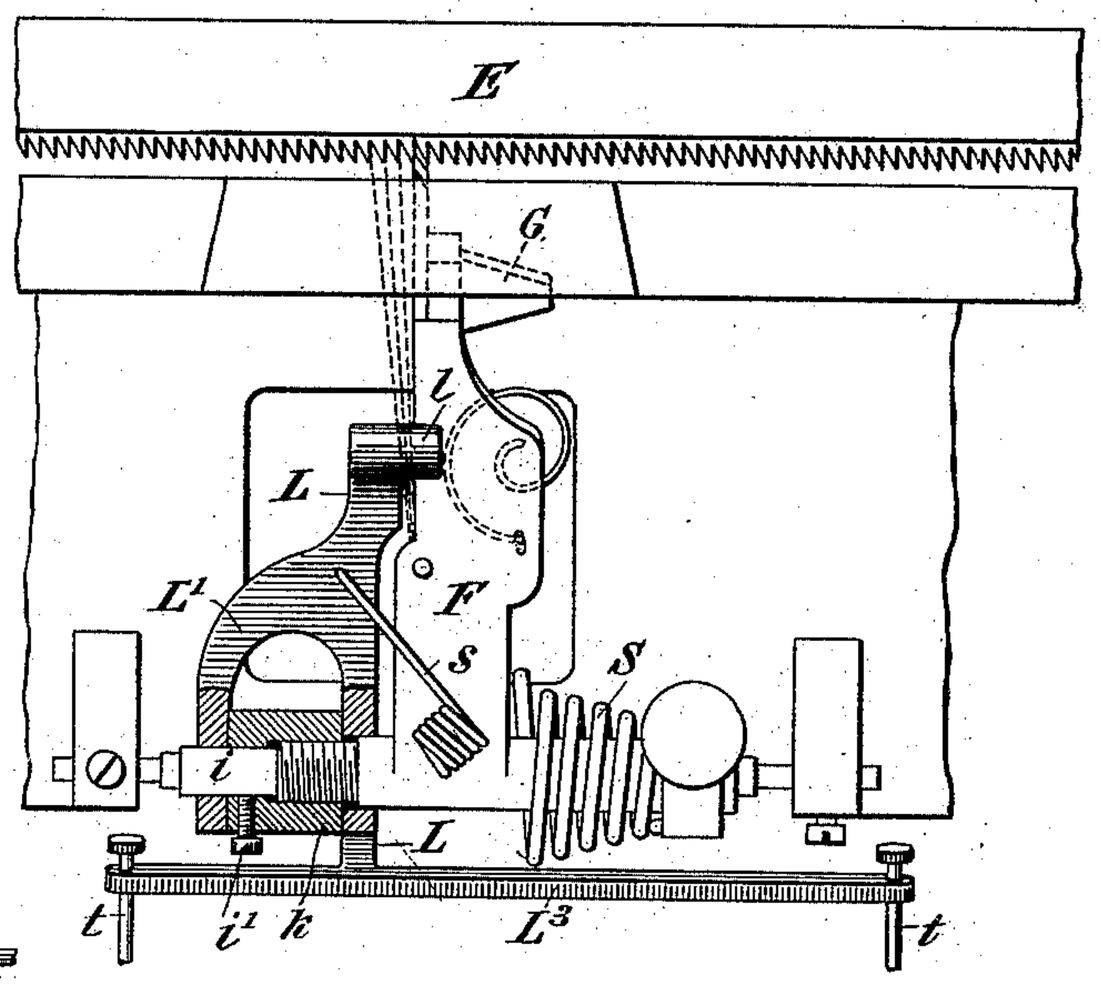


FIG. 5.



WITNESSES:

C. E. Ashley

H. W. Lloyd.

INVENTOR:

John A. Hamilton,

By his Attorneys,

Arthur G. Fraser & Co

(No Model.)

5 Sheets—Sheet 5.

J. A. HAMILTON.

TYPE WRITING MACHINE.

No. 505,521. Patented Sept. 26, 1893.

FIG. 7.

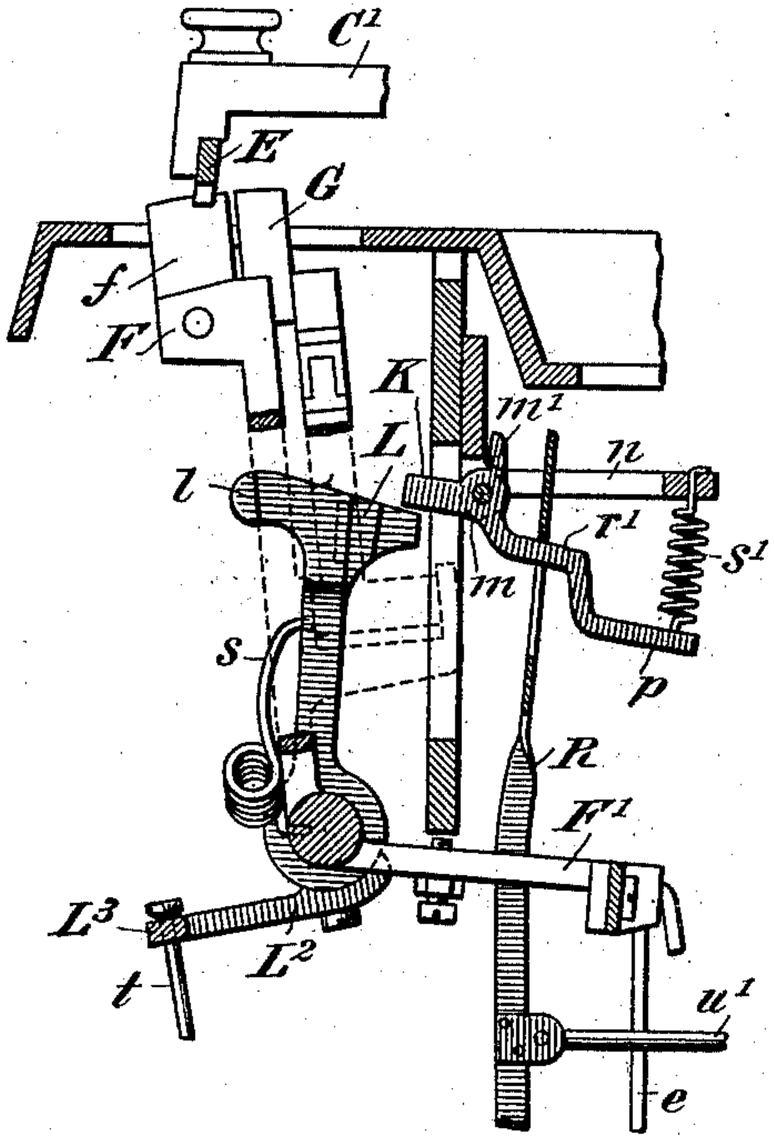


FIG. 8.

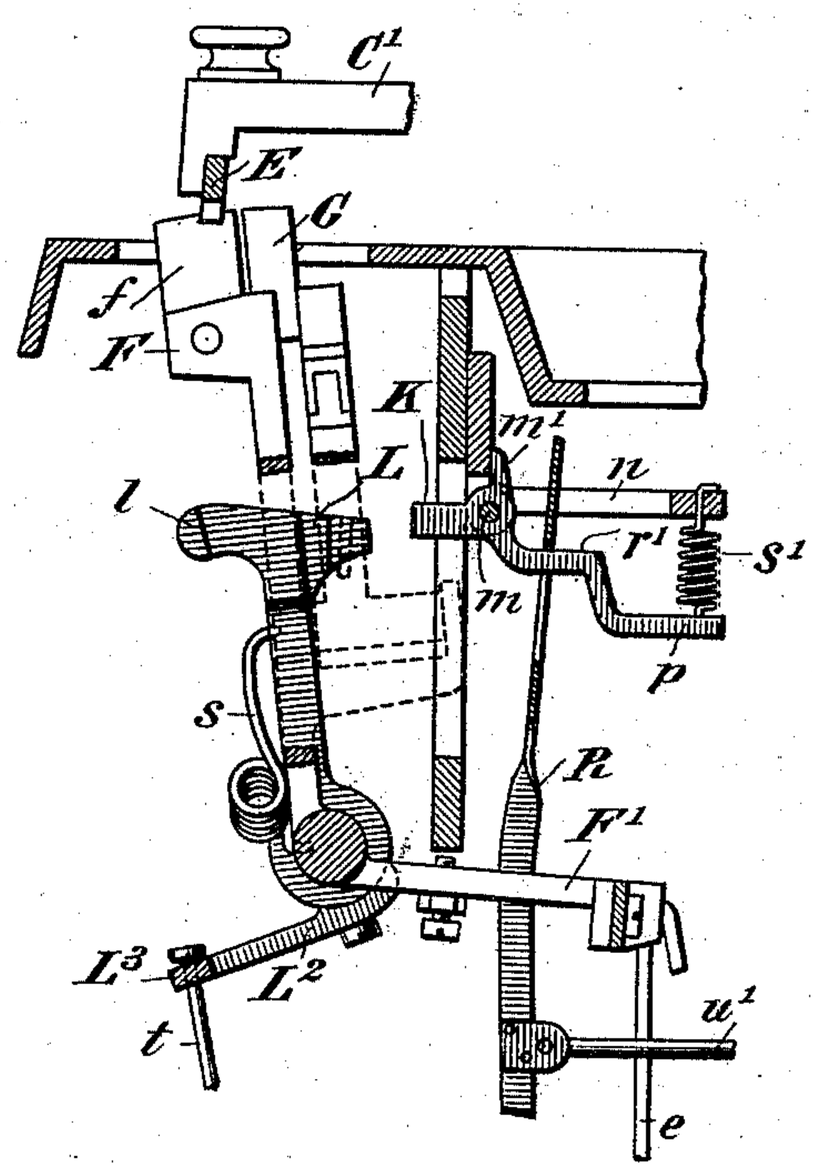
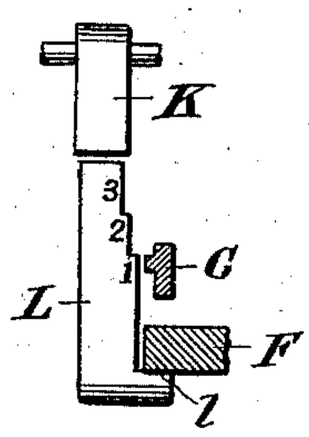
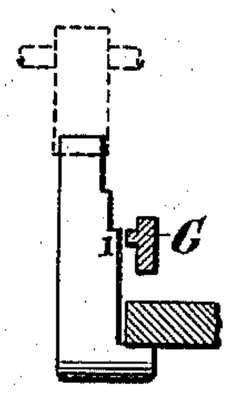


FIG. 9.



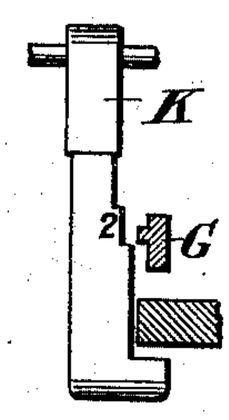
At rest.

FIG. 10.



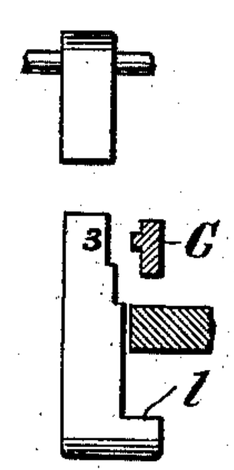
To feed one tooth.

FIG. 11.



To feed two teeth.

FIG. 12.



To feed three teeth.

WITNESSES:
C. E. Ashley
H. W. Lloyd.

INVENTOR:
John A. Hamilton,
By his Attorneys,
Arthur G. Fraser & Co.

UNITED STATES PATENT OFFICE.

JOHN A. HAMILTON, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 505,521, dated September 26, 1893.

Application filed April 1, 1893. Serial No. 468,641. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. HAMILTON, a citizen of the United States, residing in the city, county, and State of New York, have invented certain new and useful Improvements in Type-Writers, of which the following is a specification.

Typewriters as ordinarily constructed have a uniform feed for all letters or characters, so that narrow letters, as i or l, are given the same space as letters of average width, as a, b, n, p, &c., while letters which in type are of extra width, as W w, M m, are crowded into the space suitable for letters of average width. This results in apparently very uneven spacing of the letters, the narrow letters presenting an isolated appearance, particularly when two or more narrow letters occur in sequence, while the letters of extra width appear greatly crowded. The disadvantage of this system has been recognized, and attempts have been made in the construction of certain machines to provide a variable feed exactly proportional to the varying widths of the letters.

The object of my invention is to provide a variable feed for typewriters which shall be applicable to the machines in current use, such as the "Remington," "Yost," "Caligraph," "National," "Premier," &c.

My invention does not propose a variable spacing wherein the letters or types shall have the same relative widths as in type printing, and a feed which shall be variable in exact proportion to such varying widths of letters, as this would involve a degree of nicety which I consider impracticable of realization in a typewriting machine for commercial use.

My invention proposes such a degree of variable spacing as shall correct the most perceptible defects of the uniform spacing now employed in commercial typewriting machines.

My invention also aims to provide such a construction of feed mechanism or escapement as shall be applicable to existing machines without any serious alteration thereof.

To these ends my invention provides a feed mechanism or escapement for the carriage adapted to impart or permit to the carriage a movement or travel to an extent of one, two or three spaces, these spaces being so proportioned to the widths of the several letters or characters to be printed that two spaces shall correspond to the feed required for the majority of letters, such as A a, B b, C c, L, N n, O o, &c., the feed mechanism being so connected to the operating keys, or to such of them as may be necessary, as to cause a feed of one space for narrow letters or characters, as I, i, j, l, f, r, t, -, ', of three spaces for letters of extra width, as M m, W w, and of two spaces for the letters or characters of average width. In carrying out this principle my invention provides a feed-rack having teeth of approximately twice the fineness of the feed-racks heretofore used on typewriters, that is to say, in which the space of two teeth corresponds to the width of feed required for letters of normal width, as b, e, n, &c.; and a variable stop operatively connected with the type-keys or such of them as may be necessary so as to present different stop surfaces or steps for determining the extent of movement of the carriage in feeding, in order to cause the escapement to slip one tooth for narrow letters, two teeth for letters of average width, and three teeth for letters of extra width.

In applying my invention to any existing machine, I propose to avoid any alteration of the feed mechanism beyond a change of those parts by which the extent of the escape movement is limited or determined. For example in the Remington typewriter, where the feed is effected by the transverse movement of a dog in a rack attached to the carriage, the dog having a free tooth or pawl which on passing out of engagement with the rack flies forward a distance of one tooth until arrested by striking a stop, I remove this stop and substitute for it a variable stop having three steps or faces corresponding to movements of one, two or three teeth respectively of the finer rack which I substitute for the ordinary feed-rack; and I connect this variable stop by any suitable operative connections to the respective keys, in order that the variable stop shall move to present one face or another in the path of the free pawl according to whether the letter being printed requires one, two or three spaces. The details of this connection between the variable stop and the keys may be variously worked out, and I will

in this specification as one example thereof, describe in detail the means for effecting such connection which I have devised as best applicable to the Remington typewriter.

In applying my invention to other typewriting machines, I propose to effect similar substitutions for the corresponding parts of the feed mechanisms or escapements of such machines. It will be understood therefore that my present invention is not limited in its application to any one particular construction or kind of typewriting machine, but is applicable to any machine in which the carriage tends to move forward and is restrained therefrom by feed mechanism in the nature of an escapement.

In my present application for patent I shall claim the generic features of my invention as applicable to numerous existing or possible constructions of typewriting machines of this character, and I shall also make specific claims to those features which I have devised for applying my generic invention to the Remington typewriter, and to other typewriting machines of analogous character.

I will now proceed to describe my invention in its special application to a Remington typewriter, referring for that purpose to the accompanying drawings, wherein--

Figure 1 is a vertical mid-section cut transversely of the travel of the carriage. Fig. 1ª is a fragmentary section showing a part not clearly visible in Fig. 1. Fig. 2 is a rear elevation thereof partly in vertical section in the plane of the line 2—2 in Fig. 1. Fig. 3 is a horizontal section taken generally on the line 3—3 in Fig. 1, showing the key-levers in plan, those levers and keys not affected by my invention being omitted. Fig. 4 is a horizontal section on a larger scale cut in the plane of the line 4—4 in Fig. 1. Fig. 5 is a fragmentary sectional rear elevation on the same scale as Fig. 4. Fig. 6 is a sectional side view of the parts shown in Fig. 5, and on the same scale, the section being cut in nearly the same plane as in Fig. 1. Figs. 7 and 8 are sectional views showing the same parts as in Fig. 6, but illustrating two different positions of the feed mechanism; the scale being the same as in Figs. 4 to 6. Figs. 9, 10, 11 and 12 are diagrammatic horizontal sections on a larger scale showing the variable stop at rest and in its three different stop positions.

The construction of the Remington standard type-writer is so well understood as not to require description. I will briefly refer to those parts which are shown in the drawings, and which have some relation to my invention.

Let A A designate the general framework of the machine, *a a* the keys, B B the key-levers, *b b* the links or connecting rods between the key-levers and the type-levers, *c c* the type-levers, and *d d'* the types carried thereby, the types *d* being lower case letters, numerals, &c., and the types *d'* being capitals, &c. The carriage C carrying the impression cylinder D and its accessories, has the usual rack frame C' carrying the feed-rack E.

F is the feed-dog, having immovably fixed upon it a tooth *f*, and pivotally or movably mounted upon it a free tooth or pawl G, which I shall hereinafter refer to as the "spacer," since it is that part of the escapement which by its movement determines the space or distance through which the carriage shall travel at each feed. The dog F is an elbow-lever, its lower arm F' terminating in a cross-arm F^2 connected at its opposite ends by suspension rods *e* to the universal feed-bar H beneath the levers B B, so that whenever any lever is pressed down it depresses the bar H and throws the dog F forward, moving the tooth of the spacer G out of the rack E, and sliding the fixed tooth *f* into engagement therewith. As the free tooth or spacer G passes out of the teeth of the rack, it flies forward the distance of one tooth in the machine as ordinarily heretofore constructed, so that upon the release of the key-lever, as the dog F moves backward, the spacer G moves into engagement with the next tooth of the rack, and as the fixed tooth *f* passes out of the rack, the carriage C moves forward, being impelled by its spring wound in the barrel I and connecting with the carriage through a band I'.

It is well known that in the Remington machine each key *a* is marked with two characters corresponding to the two types *d d'*, and that when the keys are struck ordinarily it is the type *d* that will make the impression against the paper on the cylinder D, these types *d* printing the lower case letters, numerals, and certain punctuation marks, while the types *d'* print the capitals and certain other punctuation marks. To cause these latter types to print it is necessary to provide a "shifting mechanism" to shift the carriage D backward by pressing down what is known as a "capital key" having a lever similar to the levers B, and connecting through a link *b'* with an arm *j* on a rock-shaft J which has upwardly projecting arms J' carrying a bar J^2 entering forks on the portion of the carriage which directly carries the cylinder D, in order to throw this portion of the carriage backward upon pressing down the capital key, a spring being arranged to throw it forward again upon releasing this key.

Having now described the ordinary Remington machine in so far as is necessary to a comprehension of my present invention, I will proceed to describe the latter.

The first change which my invention requires is the substitution for the ordinary feed-rack E of a rack having approximately twice as many teeth. In the ordinary machine the rack has ten teeth to the inch, and by preference I substitute for it a rack which for the same size of type has sixteen teeth to the inch, although it may have twenty teeth, more or less. I thus space the letters of average width, such as *a*, *b*, *n*, &c., slightly far-

ther apart than they are spaced in an ordinary Remington machine, giving them a space of one-eighth of an inch instead of one-tenth.

My invention involves no necessary change of the dog F or spacer G. The restoring spring S of the dog I place however by preference on the opposite side from that customarily occupied, as shown in Fig. 4. The adjustable stop which is usually applied for limiting the throw of the spacer when released is removed, and in its place I provide the variable stop L, which is one of the characteristic elements of my invention. In the construction shown this stop L is pivoted on the same axis as the dog F. As best shown in Figs. 5 and 6, the stop L is made with a double arm L′ perforated to slip over the spindle *i* of the dog, being held against endwise displacement by a collar *k* set to the spindle by a screw *i′* and entering between the arms L′. For adjusting the variable stop L toward and from the dog F, this collar *k* is made preferably as a nut screwing upon threads cut on the spindle *i*, and set in any position by the screw *i′*. A light spring *s* reinforced against the dog F is arranged to press against the variable stop L, tending to press it forward, so that normally a shoulder *l* formed on the back of the stop L, is pressed against the rear surface of the dog F, as best shown in Fig. 9, and by reason of the tension of this spring the variable stop L tends to retain this position relatively to the dog, and consequently when the dog is thrown forward the stop L tends to move forward with it. The stop L is formed with three stop faces or steps, best shown in Figs. 9 to 12, and marked 1, 2 and 3 respectively. These steps are arranged so that in different positions of the dog, one or another of them will stand in the path of the free tooth or spacer G. For a feed of one space the step 1 stands opposite the spacer as shown in Fig. 10; for a feed of two spaces the step 2 stands opposite it as shown in Fig. 11; and for a feed of three spaces the step 3 stands in the path of the spacer as shown in Fig. 12.

I will now describe how the variable stop is operated upon so as to bring its steps 1, 2 or 3 in the path of the spacer as may be required. The variable stop tends as already stated to remain in position against the dog, so that as the latter is moved forward the stop tends to move forward with it, and if its movement be not obstructed it will move with it as shown in Fig. 10, so that the step 1 is kept in line with the spacer, and upon the freeing of the latter by its passage out of engagement with the rack, it will fly forward the distance of one tooth of the rack. But for the great majority of letters which require a feed of two spaces, the variable stop is to be stopped in such position as to bring the step 2 in the path of the spacer as shown in Fig. 11. To effect this result I provide an abutment or intercepter K, which stands normally in the path of the stop L and intercepts it in the correct position, as shown in Fig. 11. This abutment may be variously constructed, the construction shown consisting of a pivoted arm projecting from and fixed to a little shaft *m* which is mounted in suitable bearings attached to the fixed frame. This abutment is shown in its normal position in Fig. 6, and is shown displaced by being tilted upward in Fig. 7. In its normal position it comes opposite the nose or front end of the stop L, so that it stands as an obstruction in the path of the stop and arrests it almost immediately upon the moving forward of the stop with the dog. Thus the stop by striking against this abutment is arrested in the position shown in Fig. 11, with its step 2 in the path of the spacer. But if before the stop L moves forward the abutment arm K is thrown up as shown in Fig. 7, the forward movement of the stop will not be interfered with, and its step 1 will remain in the path of the spacer, as shown in Fig. 10. The abutment K is normally passed down into the path of the stop by the tension of a spring *s′* hung from a projecting bracket *n*, and acting against a stepped arm *p* projecting forwardly from the abutment K or shaft *m*. A stop arm *m′* may be provided for arresting the abutment when restored to its normal position by the tension of this spring.

I will now describe how the abutment K is operated to bring it into or out of the path of the variable stop. Inasmuch as the spring *s′* keeps it pressed normally into the path of the stop where it is required to remain during the printing of all letters of normal width, as a, b, n, &c., which I shall hereinafter refer to as "two-space letters," it is only for the printing of narrow letters such as I, i, j, &c., which I shall hereinafter refer to as "one-space letters" that the abutment requires to be displaced. For thus dispacing it, I provide its shaft *m* with a forwardly projecting arm *q*, shown in Figs. 4 and 1ª, with which arm engages the slotted upper end of an upright rod or link Q, which extends downward as shown in Fig. 2, and at its lower end is pivoted or jointed to a pivoted frame Q′, which I shall call a treadle, and which is well shown in Fig. 3. This treadle is made of a rod or wire bent to the shape shown in Figs. 1 and 3, and having its ends bent into eyes loosely embracing a rod P extended across the base of the machine as shown. To keep the treadle from being displaced endwise along this rod, the latter has half-round grooves turned in it, as shown at *r* in Fig. 3, within which grooves the pivotal eyes are sunk. The treadle Q′ extends transversely beneath the key-levers B B of such of the keys as are used in connection with letters or characters requiring a feed of one space. These levers are the lever 30 in Fig. 3, for printing I i, the lever 36 for printing ', -, and the lever 41 which is an extra lever carrying a key *a′* called a "half-space key." These levers 30, 36 and 41 have applied beneath

them downward projections or blocks q' which extend down into contact with the treadle Q'. It results that when either of these key levers is depressed, the treadle Q' will be pressed down, thereby pulling down the link Q and the arm q, and consequently oscillating the shaft m against the tension of the spring s', and throwing up the abutment K, as shown in Fig. 7. Thus provision is made for the feed of the single space letters. The weight of the treadle Q' and rod Q is upheld by a light spring s^3 (Fig. 1[a]) hung from any suitable part of the machine, and engaging a hook or projection on the rod Q so as to keep the treadle pressed up into firm engagement with the blocks q'.

For feeding the three space letters M m, W w, I provide the following described connections:—The variable stop L is formed with a lever-arm L^2 projecting rearwardly and terminating in a cross-bar L^3 (Figs. 4 and 5) extending for a suitable distance from side to side, and connected at its ends with headed pull-rods t t. These rods are preferably carried loosely through holes in the ends of the cross-bar L^3, with their heads projecting sufficiently above it so that during the extreme forward movement of the variable stop the cross-bar L^3 will barely come into contact with these heads (Fig. 7). The rods t t extend downward and are jointed respectively to the key-lever 6 for printing W w, and the lever 29 for printing M m. Whenever either of these key-levers is depressed it pulls down its connected rod t until the head thereof abuts against the top of the cross-bar L^3 and pulls the latter downward, and thereby pulls the variable stop L backward, while the dog F is moving forward until the stop is pulled so far back as to bring its step 3 into the path of the spacer G, as shown in Figs. 8 and 12. Consequently the spacer upon disengaging itself from the rack, will fly forward a distance of three spaces. It is thus seen that in printing one-space letters the abutment arm is thrown up by the action of the key-lever upon the treadle Q', thereby permitting the variable stop to move fully forward with the dog. In printing two-space letters, the abutment arm is not disturbed, so that it intercepts the variable stop and arrests it with its intermediate step in the path of the spacer. And in printing three-space letters the variable stop is drawn backward while the dog moves forward, so that the third step of the stop is brought into the path of the spacer.

That feature of the Remington machine wherein one key serves for printing either one or other of two types according to the position of the impression roller, taken in connection with the fact that certain type-levers carry both one-space and two-space letters or characters, necessitates a further provision which I will now describe. Take for example the letter L which is a two-space letter, the type of which is carried on the same lever with the letter l which is a one-space letter. Provision must be made for controlling the spacing according to the position of the impression cylinder, whether it be for the two-space type L or the one-space type l. This I accomplish by placing the variable stop under the control of the capital key or "shifting mechanism" for such keys as operate both one-space and two-space types. To establish such control, I provide, first, a second treadle R', (which may be identical in construction with the treadle Q', except that having to pass under more key-levers it is made longer as shown in Fig. 3), this treadle being connected by a link R with the stepped arm p of the abutment K. This stepped arm is formed with an upper step or ledge r' in engagement with which the upper end of a slot in the link R normally stands, as shown in Fig. 6, so that if the treadle R' be pressed down, the downward movement of the link R will cause the upper end of its slot to carry down the stepped arm with it, and thereby tilt up the abutment K to give a one-space feed. The link R is, however, movable to the position shown in dotted lines in Fig. 1, so that its upper end swings off beyond the step r', so that if while in this position the treadle is depressed, the downward movement of the link does not carry with it the stepped arm, and the abutment consequently remains undisturbed and causes a two-space feed to be given. This displacement of the link R from its normal position to that shown in dotted lines, is determined by the operation of the "shifting mechanism" and coincidently with the shifting of the impression cylinder D. This connection may be variously made, the arrangement shown being well adapted for the purpose. According to the construction shown, motion is transmitted to the link R from the oscillating shaft J through which the impression roller is shifted. An arm u is fixedly attached to this shaft, and is connected by a rod u' to the link R, so that on pressing the capital key the shaft J, arm u, rod u' and link R are thrown from the positions shown in full lines to those shown in dotted lines in Fig. 1. The key-levers B which engage with the treadle R' are those marked 14 for the letters R r, 15 for F f, 18 for T t, 27 for J j, and 35 for L l (see Fig. 3). Each of these levers has a projection R^2 fixed to its under side projecting down into contact with the treadle R', so that upon the depression of any one of these levers the treadle is depressed, thereby pulling down the link R against the tension of a light spring s^2, which has just sufficient tension to uphold the link and treadle, so that in printing a lower case letter, all of which are single space, the abutment K is thrown up, but in printing a capital letter, all of which are two-space, the displacement of the link R beyond the step r' prevents the disturbance of the abutment.

The purpose of the slots in the upper ends of the links Q and R is to permit the arms q p of the abutment shaft to move freely down-

ward in the slot of either link when drawn down by motion imparted through the other link.

The purpose of the "half-space key" a', is to effect a feed of the carriage corresponding to one tooth of the feed-rack, or just half the feed that is given by the ordinary space-bar A' used for spacing between words. The half-space key has two uses: First, for purpose of display it may be used to throw a narrow space between letters in order thereby to make a word or heading more prominent without isolating the letters so widely apart as must necessarily be done with the existing constructions; second, this space key is useful in bringing the impression cylinder to any required position for impressing the types, as for example in making corrections or striking in omitted letters or words. For this purpose the space-bar A' is used on existing machines, but on a machine to which my invention is applied, the required point may be the space of one tooth beyond that to which this space-bar feeds the carriage by moving it two teeth at a time, and to supply this space of one tooth the operator has only to depress the half-space key.

In so far as the generic claims of my invention are concerned, it will be understood that the application of my invention to a Remington typewriter is only one example of its applicabilities. With modifications merely of specific mechanisms, and without departing from its essential principle, my invention may be applied to numerous other constructions of typewriters. In the Remington machine the type base is stationary and the carriage carries the paper being printed upon, but typewriting machines have been proposed in which the paper remains stationary and the type base is carried by the carriage. With respect to the feeding mechanism, the essential parts of an escapement feed are in substance, in combination with a feed-rack, a feed-dog moving transversely in and out of the teeth of the rack, and a "spacer" or free pawl, tooth or other part pressed forward by a spring at each movement, and serving to limit the extent of feed of the carriage. In some instances the feed-rack is mounted on the carriage, and the dog is pivoted on a stationary frame, as in the Remington machine, but this arrangement might be transposed. In the Remington the feed-rack is immovable transversely and the dog is movable, but this arrangement might be transposed, the dog being immovable transversely of the rack, and the latter moving sidewise in and out of engagement with the dog. The spacer or escape part may be a free pawl or tooth as in the Remington machine, or a free rack as in the Caligraph machine. My invention is applicable to any of these various modifications of the feed mechanism employed on typewriters, the precise construction and arrangement of the parts of my improved variable feed being necessarily dependent upon the construction of the feed mechanism of the typewriter to which it is applied.

An obvious modification of my invention will consist in the subdivision of the letters of the alphabet into one, two, three and four-space letters, or two, three and four-space, or three, four and five-space, the fineness of the teeth of the rack and the proportionate widths of the steps of the variable stops being proportioned correspondingly.

I claim as my invention the following-defined novel features, substantially as herein-before specified, namely:

1. In a typewriter, the combination with the feed-mechanism comprising a relatively-movable feed-rack and dog, and a spacer, said rack having teeth of a fineness equal to a fraction of the feed for types of average width, of a variable stop for determining the movement of the spacer, mounted to reciprocate with the feed mechanism and means for operating said stop consisting of a movable abutment standing normally in the path of said stop, to intercept it in position to give a normal feed, and a connection between said abutment and the requisite keys for throwing said abutment out of the path of the stop to vary the movement of the spacer and give a feed of different length when any of the keys so connected is depressed.

2. In a typewriter, the combination with the feed-mechanism comprising a relatively-movable feed-rack and dog, and a spacer, said rack having teeth of a fineness equal to half the feed for types of average width, of a variable stop for determining the movement of the spacer, mounted to reciprocate with the feed mechanism and means for operating said stop consisting of a movable abutment standing normally in the path of said stop, to intercept it in position to give a two-space feed, and a connection between said abutment and the keys for one-space types for throwing said abutment out of the path of the stop to permit the latter to move farther and thereby limit the movement of the spacer to give a one-space feed.

3. In a typewriter, the combination with the feed-mechanism comprising a relatively-movable feed-rack and dog, and a spacer, said rack having teeth of a fineness equal to half the feed for types of average width, of a variable stop for determining the movement of the spacer, mounted to reciprocate with the feed mechanism and means for operating said stop consisting of a movable abutment standing normally in the path of said stop, to intercept it in position to give a two-space feed, and a connection between said abutment and the keys for types requiring a different feed, consisting of a treadle, projections on such keys arranged to encounter and displace the treadle, and means for communicating motion from the treadle to said abutment to throw the latter out of the path of the stop on the depression of the treadle.

4. In a typewriter, the combination with feed-rack E, dog F, and spacer G, of variable stop L, movable abutment K, treadle Q′ arranged to be depressed by certain keys, and rod Q connecting it to said abutment, to the effect set forth.

5. In a type-writer wherein the same type-keys print two different types under the control of a "shifting mechanism" the combination therewith of a variable letter-feed, comprising a feed-rack, dog and spacer, a variable stop for determining the movement of the spacer over one or more teeth of the rack, a stop-actuating mechanism connected to the keys for printing each two types which require different feeds, so that the depression of any of said keys operates said stop-actuating mechanism, said mechanism normally connected to the stop to actuate the latter to give a narrow feed, and a connection between said stop-actuating mechanism and the "shifting-mechanism" for disconnecting the former from the stop upon the operation of the shifting mechanism, so that the depression of any of said keys fails to act upon the stop, and the latter gives the wider feed, whereby the same key will cause a wide or narrow feed according to the type it is printing as determined by the shifting mechanism.

6. In a typewriter wherein the same type-keys print two different types under the control of a "shifting mechanism," the combination therewith of a variable letter-feed, comprising a feed-rack, dog and spacer, a variable stop for determining the movement of the spacer over one or more teeth of the rack, a movable abutment normally in the path of said stop and acting to hold it to the position for giving a two-space feed, a stop controlling mechanism for displacing said abutment to enable the stop to give a one-space feed, connected to and normally operated by the keys for printing each two types which require different feeds, so that normally the depression of any of said keys displaces said abutment and gives a one-space feed, and a connection between said stop-controlling mechanism and the shifting mechanism for throwing the former out of action upon the operation of the latter, so that while the shifting mechanism is in use the depression of any of said keys fails to displace said abutment and gives a two-space feed.

7. In a typewriter wherein the same type-keys print two different types under the control of a "shifting mechanism," the combination therewith of a variable letter-feed, comprising a feed-rack, dog and spacer, a variable stop for determining the movement of the spacer over one or more teeth of the rack, and mechanism for controlling the stop consisting of a movable abutment K, having an arm with active portion r', a treadle R′ arranged to be depressed by the keys for printing each two types which require different feeds, a rod R connecting the treadle to said arm, normally engaging the portion r' thereof, so that the depression of the treadle displaces the abutment, and a rod u for connecting said rod R with the shifting mechanism so that when the latter is operated said rod R is moved out of engagement with the active part of said arm, and the depression of said keys, treadle and rod fails to displace the abutment.

8. In a typewriter, the combination with feed-rack E, dog F, and spacer G, of variable stop L, movable abutment K having arm p, treadle R′ arranged to be depressed by certain keys, rod R, connecting it to said arm, arm u attached to the shifting mechanism of the typewriter, and rod u' connecting said arm u to said rod R for throwing the latter out of action.

9. In a typewriter, the combination with feed-rack E, dog F, and spacer G, of variable stop L, movable abutment K, treadle Q′ arranged to be depressed by certain keys, treadle R′ arranged to be depressed by certain other keys, rods Q and R for connecting the respective treadles to the abutment, and rod u' connecting said rod R to the shifting mechanism for throwing it out of action.

10. In a typewriter, the combination with feed-rack E, dog F, and spacer G, of variable stop L, movable abutment K, having arms q and p, treadles Q′ and R′ arranged to be depressed by certain different keys, rods Q and R connecting the respective treadles to said arms q and p, both of said rods having free or slotted engagement with said arms to enable either arm to move down independently of its rod under the pull of the other rod, and rod u' connecting rod R with the shifting mechanism for throwing it out of action.

11. In a typewriter, the combination with feed-rack E, dog F and spacer G, of variable stop L, movable abutment K constructed as a pivoted arm pressed normally to place by a spring s', and mechanism in connection with certain keys for displacing said abutment when said keys are depressed.

12. In a typewriter, the combination with feed-rack E, dog F and spacer G, of variable stop L, movable abutment K having an arm q, a treadle Q′ arranged to be depressed by certain keys, a rod Q connecting it with said arm, and a spring s^3 for upholding the said treadle and rod.

13. In a typewriter, the combination with feed-rack E, dog F and spacer G, of variable stop L, movable abutment K having an arm p, a treadle R′ arranged to be depressed by certain keys, a rod R connecting it with said arm, a rod u' connecting said rod R with the shifting mechanism, and a spring s^2 for upholding said treadle and rods.

14. In a typewriter, the combination with feed-rack E having teeth of a fineness equal to a fraction of the feed for types of average width, dog F and spacer G, of a variable stop L mounted to move with the dog, and movable relatively to the dog in the direction of the dog's movement, having a shoulder abut-

ting against the dog and a spring *s* for tending to keep it in place with said shoulder pressed against the dog, whereby the stop normally moves with the dog to cause a feed of a certain width, and connections between said stop and the requisite type-keys for displacing the stop relatively to the dog, and against the tension of said spring, for causing a feed of a different width.

15. In a typewriter, the combination of feed-rack E, pivoted dog F and spacer G, with a variable stop L pivoted on the same axis as the dog, and spring *s* acting against it and reacting on the dog.

16. In a typewriter, the combination of feed-rack E, pivoted dog F and spacer G, with a variable stop L mounted to move relatively to the dog in the direction of the movement of the dog, having shoulder *l* abutting against the dog for limiting its movement relatively thereto, and spring *s* tending to press it forward to bring said shoulder against the dog whereby the stop is normally carried with the dog.

17. In a typewriter, the combination of feed-rack E, pivoted dog F and spacer G, with a variable stop L mounted to move with the dog, and movable independently in the direction of the dog's movement, and an adjusting device for determining its position longitudinally of the rack to adjust it to stop the spacer in positions coinciding with the spaces between the rack teeth.

18. In a typewriter, the combination of feed-rack E, pivoted dog F and spacer G, with a variable stop L mounted to move with the dog, and an adjusting device for determining its position relatively to the spacer consisting of a screw collar *k* engaging the stop to move it toward or from the spacer.

19. In a typewriter, the combination of feed-rack E, pivoted dog F formed with an axial shaft *i*, and spacer G, with a variable stop L pivoted on said shaft, and a collar *k* adjustable thereon and engaging the stop.

20. In a typewriter, the combination to form a variable letter feed, of a feed-rack, a dog and spacer working therein, a variable stop for determining the movement of the spacer over a greater or less number of teeth, mounted to move with the dog, and movable relatively to the dog in the direction of the dog's movement, a spring pressing against said stop and tending to cause it to move normally with the dog, and a connection between the keys for types of extra width, and said variable stop adapted upon the depression of either of said keys to draw back the stop during the forward movement of the dog to a position where it permits an increased movement to the spacer, thereby causing a wider feed.

21. In a typewriter, the combination to form a variable letter feed, of a feed-rack, a dog and spacer working therein, a variable stop L mounted to move with the dog, having a spring *s* acting against it and reacting on the dog, and a shoulder abutting against the dog for limiting its movement relatively thereto, whereby normally the stop moves with the dog, and having a rearwardly projecting arm, and a connection between said arm and a key lever for impressing a type of extra width, adapted on the depression of such key-lever to draw back the variable stop against the tension of its spring during the forward movement of the dog.

22. In a typewriter, the combination of feed-rack E, dog F, spacer G, variable stop L mounted to move with the dog, having a spring tending to press it forward with the dog, and formed with a rearward arm L^2, and a rod *t* connecting this arm with the key-lever of a type of extra width, whereby on the depression of said lever it draws back the stop.

23. In a typewriter, the combination of feed-rack E, dog F, spacer G, variable stop L mounted to move with the dog, having a spring tending to press it forward with the dog, and formed with a rearward arm L^2, having a cross-bar L^3, and two rods *t t* connecting the opposite ends of this cross-bar with two key-levers for types of extra width, whereby on the depression of either of said levers the stop is drawn back.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

JOHN A. HAMILTON.

Witnesses:

ARTHUR C. FRASER,

GEORGE H. FRASER.