

No. 634,183.

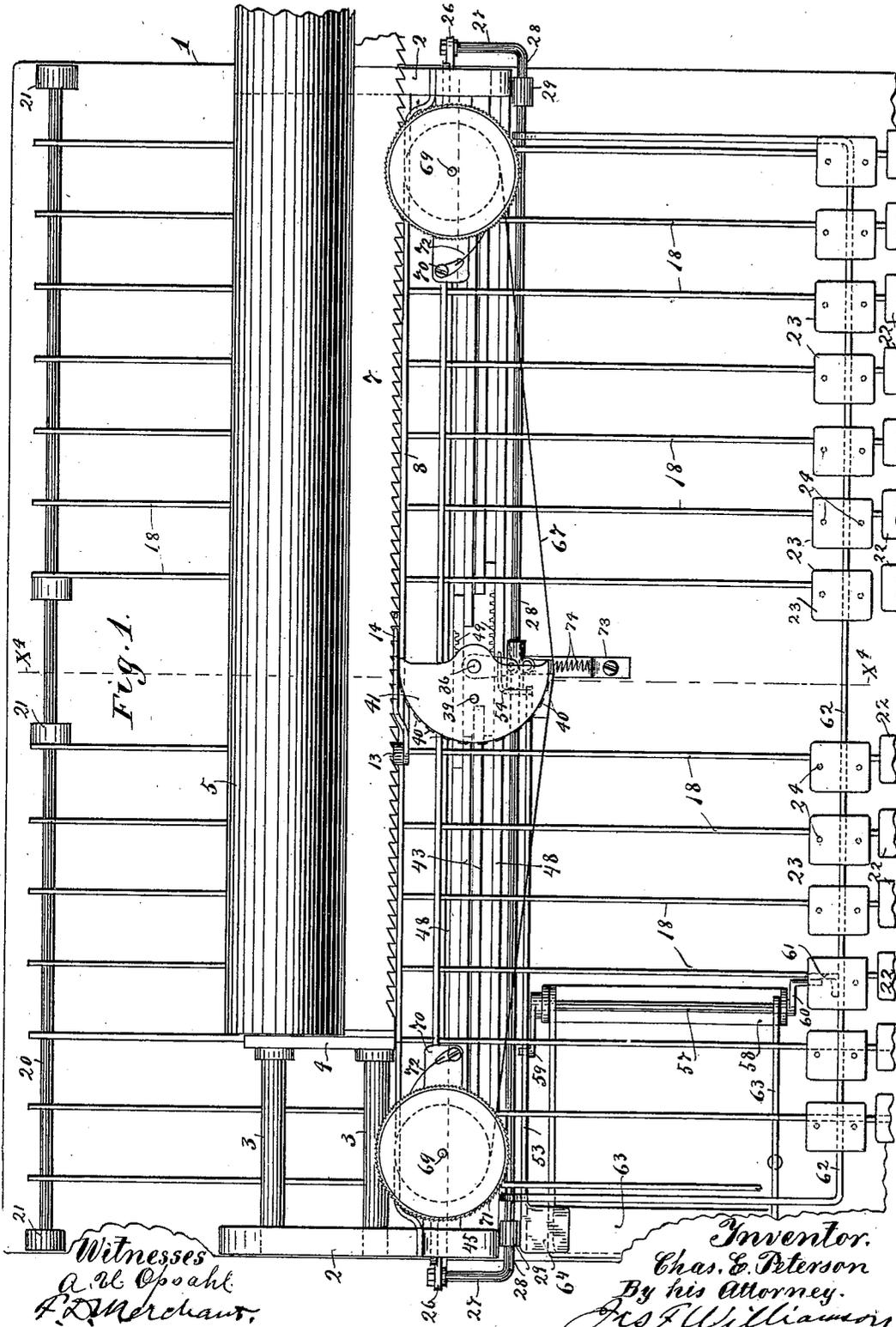
Patented Oct. 3, 1899.

C. E. PETERSON.
TYPE WRITER.

(Application filed July 22, 1898.)

(No Model.)

5 Sheets—Sheet 1.



No. 634,183.

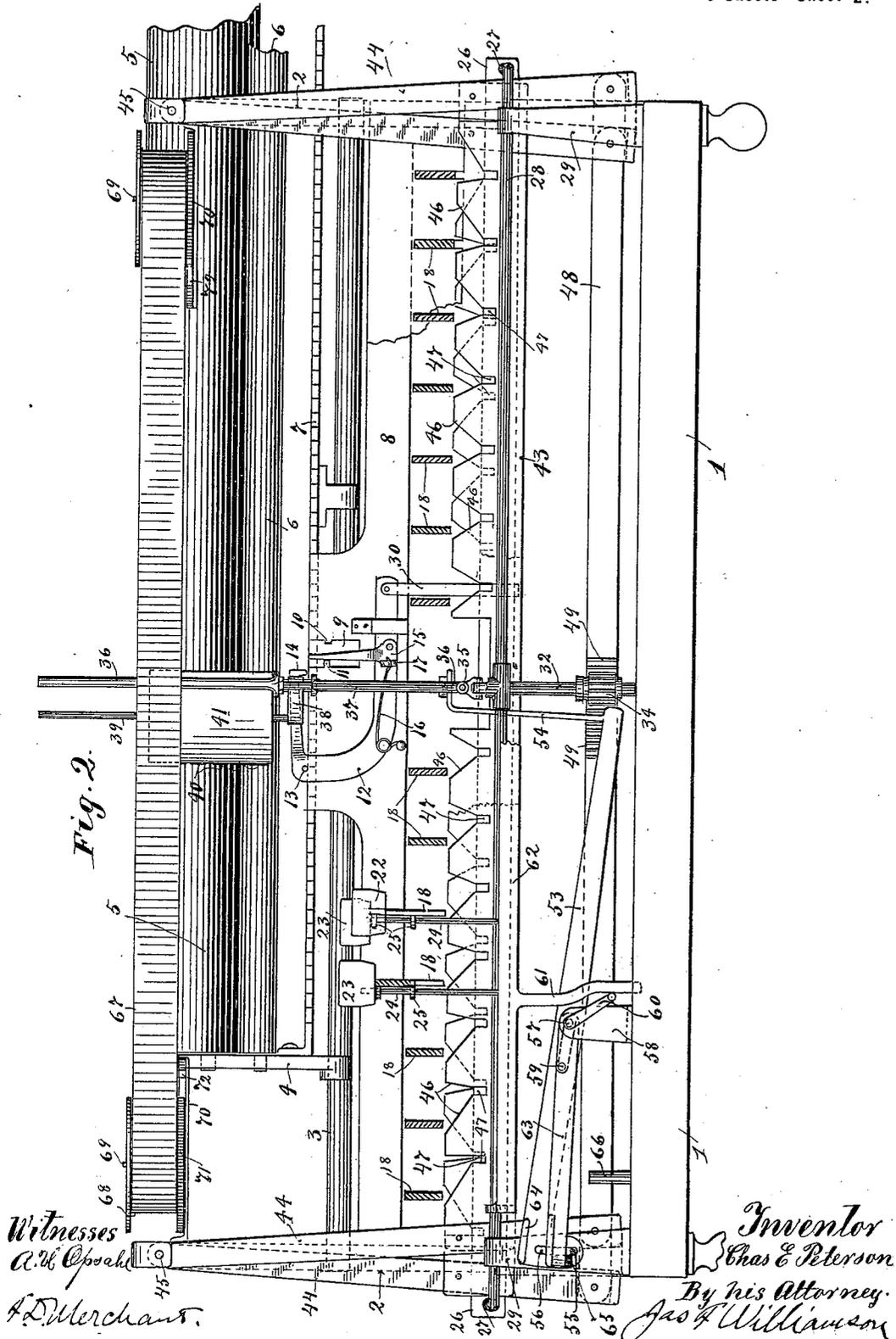
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5 Sheets—Sheet 2.



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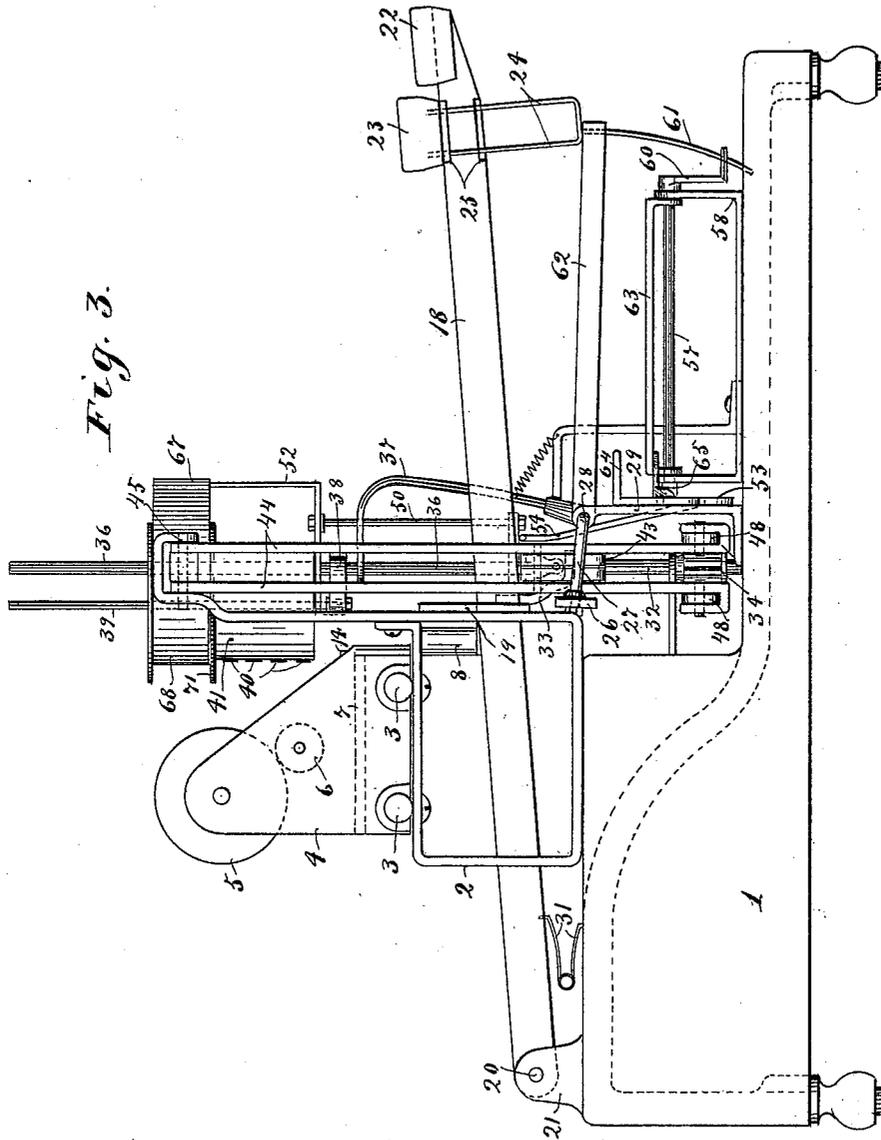
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5 Sheets—Sheet 3.



Witnesses.
A. H. Opsahl.
F. D. Merchand.

Inventor.
Chas. E. Peterson
By his Attorney.
Jas. F. Williams

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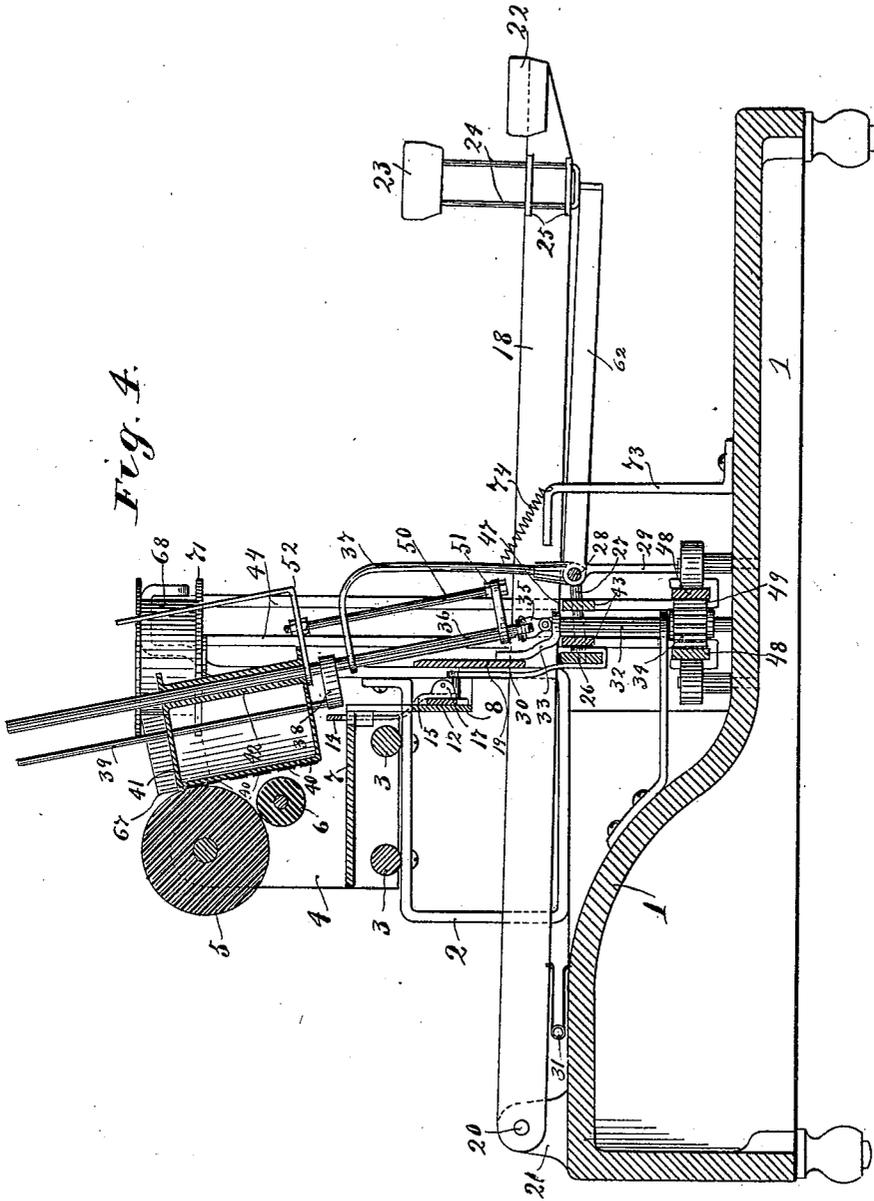


Fig. 4.

Witnesses
A. H. Opsahl,
R. D. Merchant,

Inventor.
Chas E Peterson
By his Attorney.
Jas F Williamson

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5 Sheets—Sheet 5.

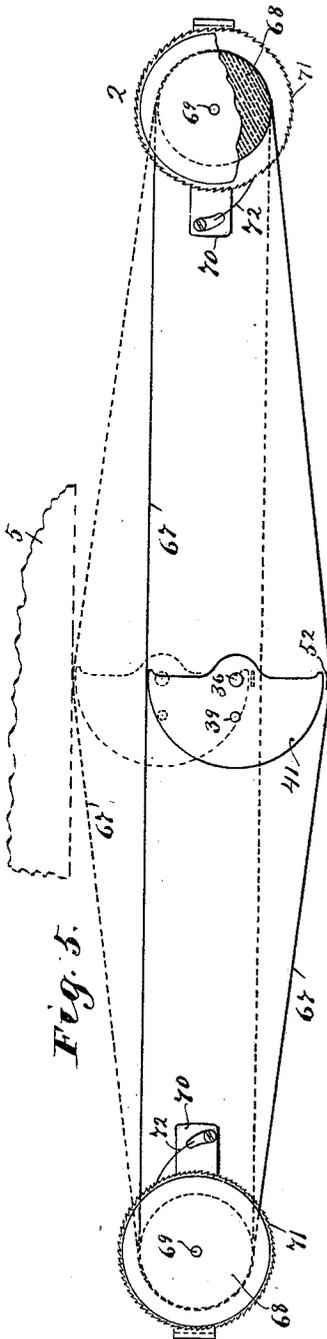


Fig. 5.

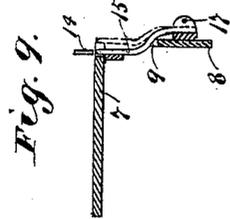


Fig. 9.

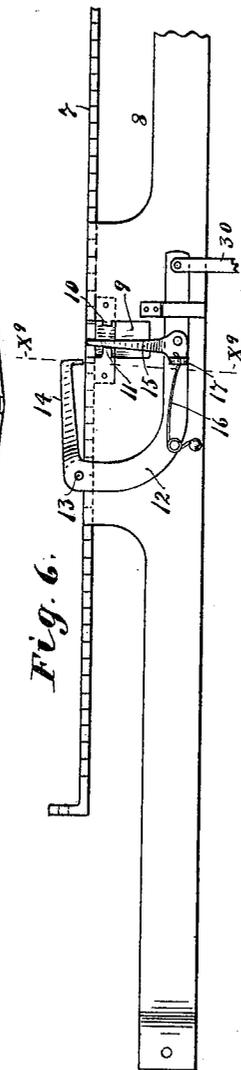


Fig. 6.

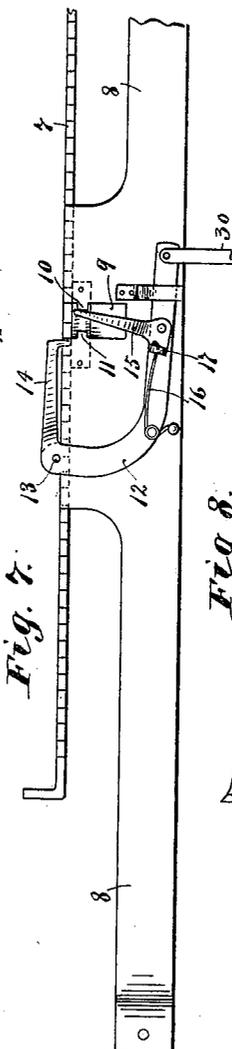


Fig. 7.

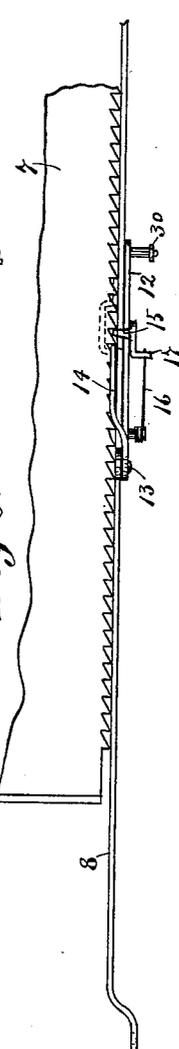


Fig. 8.

Witnesses.
A. W. Opahl
F. D. Merchant.

Inventor.
Chas. E. Peterson.
By his Attorney.
Jas. F. Williams

UNITED STATES PATENT OFFICE.

CHARLES E. PETERSON, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO RICHARD C. COX, OF NEW YORK, N. Y.

TYPE-WRITER.

SPECIFICATION forming part of Letters Patent No. 634,183, dated October 3, 1899.

Application filed July 22, 1898. Serial No. 686,581. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. PETERSON, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Type-Writers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates generally to machines for the production of print or printed surfaces, but is particularly directed to the production of an efficient type-writer of very low cost.

To these ends my invention consists of the novel devices and combinations of devices hereinafter described, and defined in the claims.

The preferred form of this invention is illustrated in the accompanying drawings, wherein like notations refer to like parts throughout the several views.

Figure 1 is a plan view of a type-writer constructed in accordance with my invention, some parts of the same being broken away. Fig. 2 is a front elevation of the machine with some parts broken away and others shown in section. Fig. 3 is a left side elevation of the machine. Fig. 4 is a transverse vertical section taken approximately on the line $x^4 x^4$ of Fig. 1. Fig. 5 is a detail view in plan, with some parts broken away, illustrating the construction and action of the ribbon-feeding device. Fig. 6 is a detail view, in front elevation, of the carriage-escapement and immediately-connected parts. Fig. 7 is a similar view to Fig. 6, but illustrating a different position of the escapement. Fig. 8 is a plan view of the parts shown in Figs. 6 and 7, and Fig. 9 is a transverse vertical section taken on the line $x^9 x^9$ of Fig. 6.

1 indicates the bed of the machine, from the sides of which rigidly-secured brackets 2 rise. To these brackets 2 a pair of parallel transversely-extended guide-rods 3 are rigidly secured, and on these guide-rods 3 the carriage-frame 4 is mounted to freely move transversely of the machine, as is ordinary. In the ends of the carriage-frame 4 the ordi-

nary impression-roller 5 and cooperating presser-roller 6 are mounted and operated by any of the suitable well-known devices, not necessary for the purposes of this case to illustrate. This feed-carriage 4 has rigidly secured thereto longitudinally thereof a forwardly-projecting ratchet-bar 7.

8 indicates a supporting-bar which is set in a vertical plane immediately in front of the ratchet-bar 7, extends transversely across the machine, and is rigidly secured at its ends to the fixed brackets 2. At its central portion the bar 8 is cut away, as shown at 9, this cut-away portion 9, as shown, being provided with inwardly-projecting stop-lugs 10 and 11. 12 indicates an escapement-lever pivoted to the bar 8 at 13 and provided with an escapement-pawl 14, which cooperates with the ratchet-bar 7. On the escapement-lever 12 is a pivoted escapement-finger 15, which normally engages the teeth of the ratchet-bar 7 and is forced against the stop-lug 11, thereby normally holding the type-writer carriage against movement toward the left. It should be here remarked that this type-writer carriage is, as is customary, under strain to move toward the left from a suitable spring device. (Not shown.) The spring-finger 15 is so pivoted to the lever 12 that it has freedom for a slight lateral movement as well as pivotal movement transversely of the machine, so that under the return movement of the carriage it will yield and cam itself over the teeth of the ratchet-bar 7. A spring 16 on the support 8 engages a forwardly-projecting lug or ear 17 on the escapement-finger 15, and thus tends to hold said escapement-finger in engagement with the teeth of the ratchet-bar 7 and the free end of the pawl 14 upward above said ratchet-bar, as shown in Fig. 6. This spring 16 will of course be overcome by the tension of the spring device applied to move the carriage toward the left, so that normally the finger 15 will be forced against the stop 11. When the free end of the escapement-lever 12 is drawn downward, the free end of the pawl 14 will first engage with the teeth of the bar 7 to hold said bar and carriage against movement, and immediately thereafter the spring-finger 15 will be released from the teeth of said bar and by

the action of the spring 16 will be thrown toward the right against the stop-lug 10 in position to engage the next tooth of the bar 7, which stands toward the right, when it is again thrown upward by the movement of the escapement-lever 12. Under this upward movement of the lever 12 and finger 15 the pawl 14 will be raised above the bar 7, and the escapement movement will then take place. The means by which this escapement-lever 12 is drawn downward against the action of the spring 16 will be described later on.

A bank of key-levers 18, provided with finger-pieces, extend from front to rear of the machine and are pivoted at their rear ends on a pivot-shaft 20, secured by lugs 21 on the bed 1. At their forward ends these key-levers 18 are provided with primary finger-pieces 22, and just to the rear of said finger-pieces 22 they are provided with secondary finger-pieces 23, which have a limited movement with respect thereto, to accomplish which movement they are, as shown, provided with U-shaped stems 24, that work loosely through ears 25 on said levers 18.

Extending transversely under all the key-levers 18 is an escapement-bar 26, carried by the arms 27 of a rock-shaft 28, which is mounted in standards 29, secured to the base 1. indicates a short link which connects the free end of the escapement-lever 12 with the escapement-bar 26, so that the depression of the escapement-bar by the action of any of the keys will produce the escapement movement of the carriage through the escapement device already described. Springs 31 normally hold the key-levers 18 upward to their limits of movement.

Approximately at the center of the machine is a short vertical shaft 32, mounted at its lower end in the base 1 and at its upper end in a projection 33 from a supporting-bar 19. Near its lower end the shaft 32 is provided with a pinion 34, and at its upper end it is connected by a knuckle-joint 35 with the lower end of an oscillating shaft 36. At its intermediate portion the oscillating shaft 36 is journaled in the free end of a bent arm 37, which is carried by and rigidly secured to the intermediate portion of the rock-shaft 28, so that while it is free to rotate it is held against movement transversely of the machine and caused to vibrate toward and from the front of the machine by the movement of said arm 37 whenever a key-lever 18 is depressed. The shaft 36 is provided with an offset portion 38 just above the arm 37, and from this offset portion a small stem 39 projects parallel to said shaft 36 and terminates near the end of the same.

The type or characters 40 are arranged in segmental rows, one row over the other, (as shown, there are six of these rows,) on the periphery of a segmental barrel section or head 41, the hub of which is in the form of a sleeve 42, that is mounted for both rotary and sliding movements on the shaft 36. The stem

39 passes through the top and bottom portions of the segmental head 41, so that while said head may be moved up and down on the shaft 36 it will be caused to oscillate therewith. As this head 41 carries a complete font of type, it may be designated as the "font-head."

The oscillations of the font-head 41 are caused by the depression of one of the keys 18, acting on the following mechanism: indicates a pair of reversely-movable parallel cam-bars, which are suspended each by a pair of oscillating hangers or bars 44, that are pivoted to the ends thereof and are themselves in turn pivoted at their upper end to vertical uprights or projections 45 of the side brackets 2. The upper edges of these cam-bars 43 are provided with cam-surfaces 46, that extend downward into alining notches 47. These cam-surfaces 46 are so positioned that each key when depressed will engage the cooperating and reversely-inclined members of each of the pair of bars 43 and will impart equal movements to the cam-bars 43, but in reverse directions. The cam-surfaces 46, upon which the different keys operate, are differently inclined, so as to give different movements to the cam-bars 43. The lower ends of the hangers 44 project below the cam-bars 43, and each pair is connected by a tie-bar 48. These tie-bars 48 work one on each side of the pinion 34 on the shaft 32, and each bar 43 is provided with a rack 49, which is in mesh with the teeth of said pinion 34. As the conjoint action of the bars 43 move the font-head to different printing positions thereof, dependent upon the particular character-key that has been depressed, they may very properly be termed "differential" cam-bars.

Mechanism has now been described for giving the font-head 41 more or less oscillatory movement, so as to cause any given character of the particular segmental row of type 40 which is in vertical line with the printing-point on the roller 5 to be aligned at the printing-point. Mechanism will now be described for moving the font-head vertically, so as to bring the different segmental lines of type into vertical line with the printing-point on the roller 5.

50 51 indicates a vertically-movable frame, 50 being a rod which works through a perforation in the bed end of the oscillating arm 37, and 51 being end pieces which work freely on the shaft 36. For a purpose to be hereinafter noted the upper end piece 51 is provided with a vertical extension or finger 52. The frame 50 51 is thus held against rotation, but is permitted free vertical movement, and the upper end piece 52 bears directly under the lower end or bottom of the font-head 41.

53 indicates a shifting lever or key which extends transversely of the machine and is provided at its right-hand end with a vertical extension 54, the upper end of which is bent laterally and engages the bottom of the lower end of the frame 50 51. This key 53 should be considered as a lever of the third class ful-

crumed at its left-hand end. The lever is thus fulcrumed at its left-hand end on a pin 55, projected from the upright 29 and working in a segmental slot 56 in the left-hand end of said key or lever 53.

57 indicates a short rock-shaft which extends from the front toward the rear of the machine and is mounted in bearings 58 on the base 1. At its rear end this shaft 57 is provided with a crank 59, the free end of which is pivoted to the intermediate portion of the key or lever 53. The forward end of the shaft 57 has a crank-arm 60, which is operated upon when one of the secondary finger-pieces 23 is depressed by a depending cam-finger 61 of a bail 62, the transverse portion of which passes under all of the U-shaped stems 24 of the secondary finger-pieces 23 and the prongs of which are pivoted on the transverse shaft 28. When any one of the secondary finger-pieces 23 is depressed, the bail 62 will be depressed also, and its finger-piece 61 by its cam action on the crank-arm 60 will rock the shaft 57 and its arm 59, and thereby raise the right-hand end of the shifting key or lever 53, the vertically-movable rack or frame 50 51, and font-head 41. Hence when one of the key-levers 18 is depressed by placing the finger on its secondary finger-piece 23 the font-head 41 will be raised, so that the segmental line of type next to the top will be brought in vertical line with the printing-point, and the said font-head will also be oscillated, so as to bring the character indicated by markings on the said secondary finger-piece to the printing-point. The depression of the said key will also cause the escapement movement of the carriage and will throw the oscillating arm 37, the shaft 36, and the font-head 41 forward and the selected type against the roller 5, or, rather, against a ribbon, to be hereinafter described, which is thereby forced against the page which is being printed. However, this escapement movement of the carriage takes place after the impression has been made and while the font-head and other parts are returning to their normal positions. It is important to note that when one of the keys is depressed to its limit it causes the registration of the cooperating notches 47 of the cam-bars 43 and enters into these coincident notches, and thereby insures the proper positioning of the selected type. Furthermore, the side strains in opposite directions on the key-levers under the camming action are equal, so that the said levers will not be forced sidewise and do not require side bearings to prevent lateral movements thereof, as is usually the case.

63 indicates another small bail, the prongs of which are pivoted on the rock-shaft 57. The transverse portion of this bail 63 is widened, so as to adapt it to be struck and depressed by the finger, and its rear portion underlies a finger-piece or projection 64 on the left-hand end of the shifting lever or key 53. A projection 65 from the left-hand end of the key

or lever 53 underlies the rear portion of the bail 63 and engages therewith when the parts are in their normal position. (Indicated in Fig. 2.) 66 indicates a stop projection from the base 1, adapted to limit the downward movement of the bail 63. The arrangement is such that when the bail 63 is depressed against the stop 66 it will be given one-half as much movement as permitted by the slot 56. Otherwise stated, when the bail 63 is depressed against the stop 66 it will give the key or lever 53 such movement as will raise the font-head 41 sufficiently to bring the segmental row of type which is third from the top into vertical line with the printing-font, while, on the other hand, if the left-hand end of the key or lever 53 is depressed to its limit by placing the finger on the finger-piece 64 thereof the segmental row of type which stands fifth from the top will be raised into vertical line with the printing-point. Now if these actions just described are summed up they may be briefly stated as follows: If one of the finger-pieces 22 of the key-levers 18 is struck while the shifting-lever 53 and bail 63 are in their normal positions, (indicated in Fig. 2,) one of the type in the top row of the font-head will be struck. If one of the secondary finger-pieces 23 is depressed while the said parts 53 and 63 are not engaged by the finger or depressed, one of the type in the second segmental row from the top of the font-head will be raised into vertical line with the printing-point. If one of the primary finger-pieces 22 is struck while the bail 63 is depressed, the type in the third row from the top of the font-head will be raised to the printing-point. If one of the secondary finger-pieces 23 is struck while the bail 63 is depressed, the type in the fourth line from the top of the font-head will be raised to the printing-point. If one of the primary finger-pieces 22 is struck while the left-hand end of the shifting lever or key 53 is depressed to its limit, as permitted by the slot 56, one of the type in the fifth line from the top will be alined at the printing-point, and, finally, if one of the secondary finger-pieces 23 is struck while the left-hand end of said key or lever 53 is depressed to its limit the type in the sixth or lowest segmental row of the font-head will be raised in line with the printing-point. It will be thus seen that the shifting-lever 53, with its pivots 55 and 59, provides means whereby the shifting of the font-head due to the secondary finger-piece may be added to that due to the depression of the bail 63 or to that due to the depression to its limit of the left-hand end of the shifting-lever, thus permitting the separate shifting means above specified to be simultaneously brought into action to shift the font-head to a vertical row different from that to which it would have been raised by either of said shifting means separately.

I preferably employ an endless inking-ribbon, as indicated at 67. This ribbon 67 passes

over the printing-face of the font-head 41 and in front of the finger-like projection 52 of the vertically-movable frame or bracket 50 51, and it is mounted to run over feed-rollers 68, 5 mounted on pins 69, that project upward from horizontal extensions 70 of the side brackets 2. These rollers 68 are in the form of sheaves, one flange of which is provided with ratchet-teeth 71, with which spring-pawls 72, secured 10 on the extensions 70, cooperate. The ratchet-teeth and pawls of the two feed-sheaves 68 work in opposite directions and under opposite strokes of the font-head 41 and finger 52. Normally the parts stand as indicated by full 15 lines in Fig. 5; but when the font-head is moved rearward against the impression-roller 5 the ribbon will be moved as indicated by dotted lines in Fig. 5. This movement of the ribbon will cause the right-hand ratchet 20 device to move one tooth in advance, and the return movement of the ribbon to normal position will cause the left-hand ratchet device to operate in a reverse direction, thus causing the ribbon to move step by step in a constant 25 direction. I do not, however, in this application claim the hereinbefore-described ribbon-feed mechanism, as that forms the subject-matter of and is claimed in another application filed by me January 27, 1899, Serial No. 703,582. 30

The forward movement of the arm 37 and parts carried thereby are limited by a stop 73, rising from the bed 1, and said arm 37 is under tension to move against this stop 73 35 from a spring 74, secured thereto and to said stop.

I consider it broadly new to employ a pair of reversibly-movable differential cam-bars having the variably-inclined cam-surfaces in a 40 machine of this character, for a single cam-bar would not in any sense be the full or approximate equivalent of the pair of differential cam-bars arranged on the general principle described, whereby the simultaneous 45 movement of both cam-bars impart movements to the font-head. In this connection it is very important to note that by arranging the corresponding and cooperating cam-surfaces of the different differential bars so that 50 they are simultaneously engaged by the depression of the character-key which corresponds thereto the said cam-surfaces of themselves are made to serve as guides for the character-key and the entire frictional 55 resistance offered to the downward movement of the key is converted into forces acting in opposite directions on the pinion 34, (in the specific construction shown,) and hence on the font-head. From this statement it must 60 be obvious that a key action having a minimum of frictional resistance, and hence a maximum speed efficiency, is accomplished. As the differential bars themselves are suspended by pivoted hangers, they will of course 65 be very easily moved. On the depression of any key the cam-bars will be moved thereby and will be positively held in that position

until the key is released. This results in locking the cam-bars against movement by any other key while one key is depressed, and 70 thus prevents the simultaneous depression of two or more keys or the depression of one key while another is held depressed.

It is also important to note that the construction and action of the parts just described 75 for controlling the oscillatory movement of the font-head 41 are such that the font-head will remain in whatever position it is turned until it is set in another position by the depression of some other key than that 80 previously struck. This is important, as it removes the necessity of retracting-springs, and hence reduces the number of movements necessarily given to the font-head in the type-aligning action. 85

It will of course be understood that I do not limit myself to the details of construction above specifically described; but, on the contrary, it is obvious that various alterations 90 and rearrangements of the parts described may be made within the scope of my invention.

The expression "differential cam-bar" as used throughout this specification and the claims is used in its broadest possible sense 95 and is intended to include, for example, a cam bar or rod having projections of any kind adapted to be engaged by the keys or parts carried thereby to impart differential movements to said bar. 100

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a type-writer, the combination with character-keys of a plurality of differential cam-bars moved in opposite directions by 105 each of the said key-levers, and a printing device actuated by the movement of the cam-bars, substantially as described.

2. In a type-writer, the combination with character-keys, of a pair of reversibly-movable cam-bars, each of the cam-bars having cam-faces thereon engaged by opposite sides 110 of the character-key, and printing mechanism actuated by the depression of a key, through the cam-bars, substantially as described. 115

3. In a type-writer, the combination with character-keys, of an oscillating shaft, a font-head carried thereon, and differential cam-bars engaging the opposite sides of said shaft, 120 and moved in opposite directions upon the depression of each character-key, substantially as described.

4. The combination, with a type-writer frame, of arms pivoted thereto, a differential cam-bar and a rack-bar supported in such 125 arms, a rotating shaft engaged by the rack-bar, a font-head carried by said shaft and character-keys actuating the cam-bar, substantially as described. 130

5. In a type-writer, the combination with an oscillating font-head and a bank of character-keys, of a pinion connected to the font-head to operate it, two pairs of pivoted hang-

ers, two rack-bars, one carried by each pair of hangers, and in mesh with opposite sides of the said pinion, and a pair of reversely-acting cam-bars, one carried by each pair of pivoted hangers, each of the cam-bars being subject to the action of all of said character-keys, substantially as described.

6. In a type-writer, the combination with an oscillating font-head free to retain any position into which it has been oscillated until positively removed therefrom by the actuation of a key, of a series of keys, and means actuated by the depression of each key in any position of the font-head to positively oscillate it to bring the corresponding type thereon in alinement with the printing-point, substantially as described.

7. In a type-writer, the combination with an oscillating font-head, free to retain any position into which it has been oscillated until positively removed therefrom by the actuation of a key, of a series of keys and a cam mechanism engaged by each key on the depression thereof in any position of the font-head to positively oscillate the font-head to bring the corresponding type thereon in alinement with the printing-point, substantially as described.

8. In a type-writer, the combination with an oscillating shaft formed in two parts and united by a universal joint, of a font-head mounted upon one part of the said shaft, means connected to the other part of the shaft for oscillating it, and means for vibrating the font-head portion of the shaft upon the universal joint to effect the printing, substantially as described.

9. The combination with an upper shaft and a lower shaft and a universal joint connecting them, of character-keys, a font-head carried by the one shaft, means engaging the other shaft and actuated by a movement of the different character-keys to oscillate the font-head, and means actuated by the depression of the keys for vibrating the font-head shaft upon the universal joint to effect the printing, substantially as described.

10. The combination with two shafts and a universal joint connecting them, one of said shafts being rigidly mounted, of a font-head carried by the other shaft, means acting upon the rigidly-mounted shaft to oscillate it and the font-head, a rock-frame to vibrate the font-head shaft upon the universal joint to effect the printing, and character-keys for actuating the means for oscillating and vibrating the font-head, substantially as described.

11. In a type-writer the combination with a font-head having a plurality of rows of type thereon, separate means for shifting the font-head to print from certain of said rows of types, and means whereby the said separate shifting means are simultaneously brought into action to shift the font-head to print from another row of the said types, substantially as described.

12. In a type-writer, the combination with

a shiftable font-head having six rows of types thereon, separate means for shifting the font-head to print from the second, third and fifth rows of type, and means for bringing the means for shifting to print from the second row into simultaneous action with the means for shifting to print from the third and fifth rows for the purpose of shifting to print from the fourth and sixth rows respectively, substantially as described.

13. In a type-writer, the combination of a shiftable font-head having a plurality of rows of types, a lever for shifting the type-head and having a plurality of pivotal points and means for rocking the lever upon any one of the pivotal points to shift the font-head to print from the different rows of types thereon, substantially as described.

14. In a type-writer the combination with a shiftable font-head having a plurality of rows of types thereon, of a lever for shifting the font-head having a plurality of pivotal points, a movable part carrying one of the said pivotal points, means for varying the position of the movable part, and a finger-key for rocking the lever on the said movable part, substantially as described.

15. In a type-writer, the combination with a shiftable font-head having a plurality of rows of types thereon, of a lever for shifting the font-head having two pivots, one of which is movable, means for shifting the said movable pivot, and character-keys for oscillating the font-head and actuating means for shifting the movable pivot, substantially as described.

16. In a type-writer, the combination with a shiftable font-head, a shifting-lever to shift the font-head, a rock-shaft having a crank-arm to rock the said lever, and a series of key-levers, each of which is provided with a fixed and a loosely-mounted key, the loosely-mounted key actuating the rock-shaft to shift the font-head, substantially as described.

17. In a type-writer, the combination with a bank of character-keys and a movable font-head, of a pair of reversely-acting differential cam-bars each subject to the action of all of said keys for moving the font-head, substantially as described.

18. In a type-writer, the combination, with a shiftable font-head having a plurality of type thereon, and a pivoted lever for shifting the said font-head, having a finger-key and a projection thereon, and a second finger-key adapted when depressed to engage the said projection and rock the lever through a portion of the distance through which it is rocked by a depression of the finger-key thereon, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES E. PETERSON.

Witnesses:

F. D. MERCHANT,
B. B. NELSON.