(No Model.) 3 Sheets—Sheet 1.

J. PRATT.

TYPE WRITING MACHINE.

No. 477,224. Patented June 21, 1892.

Fig. 1.

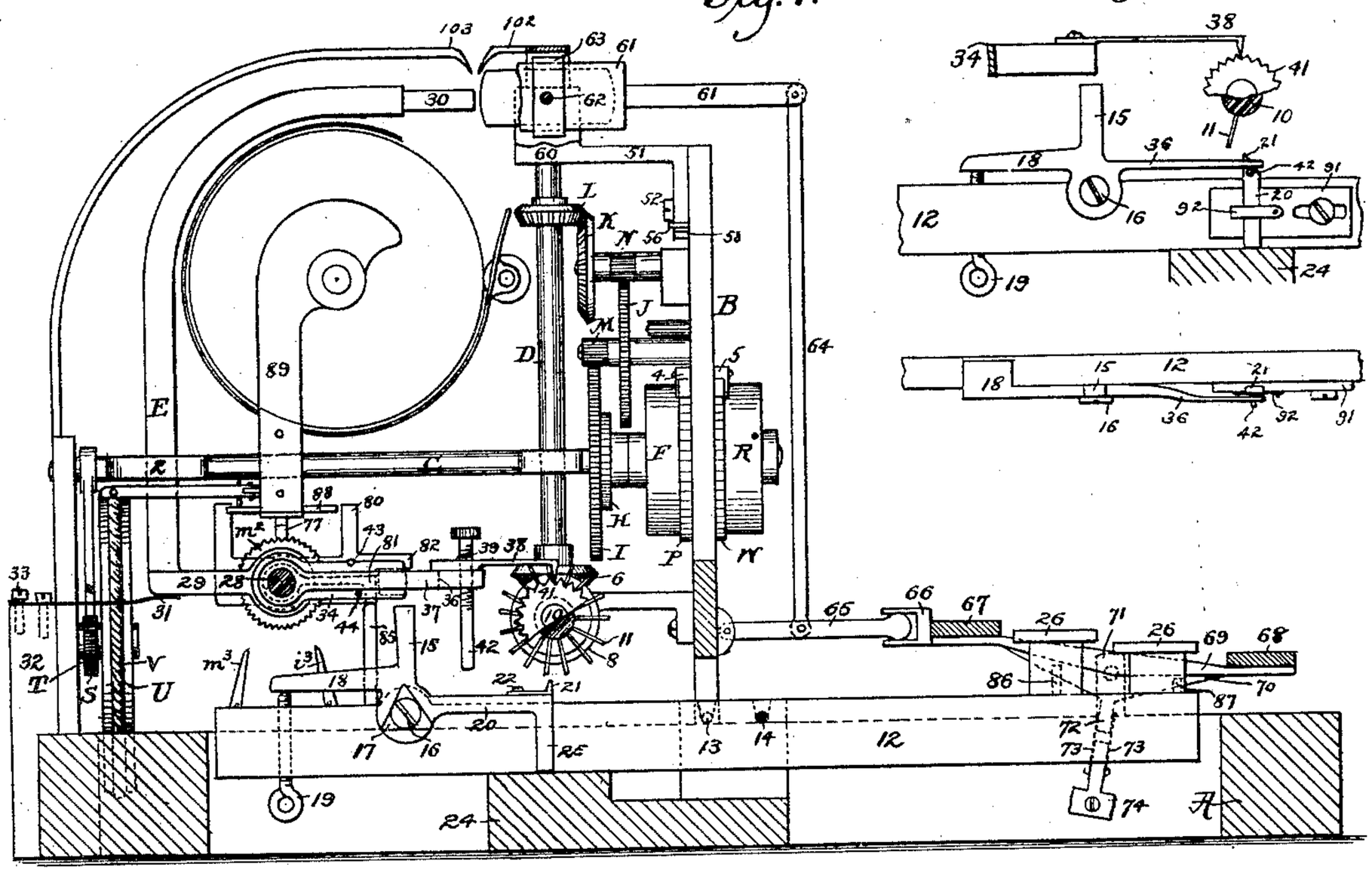


Fig. 12.

Fig. 4.

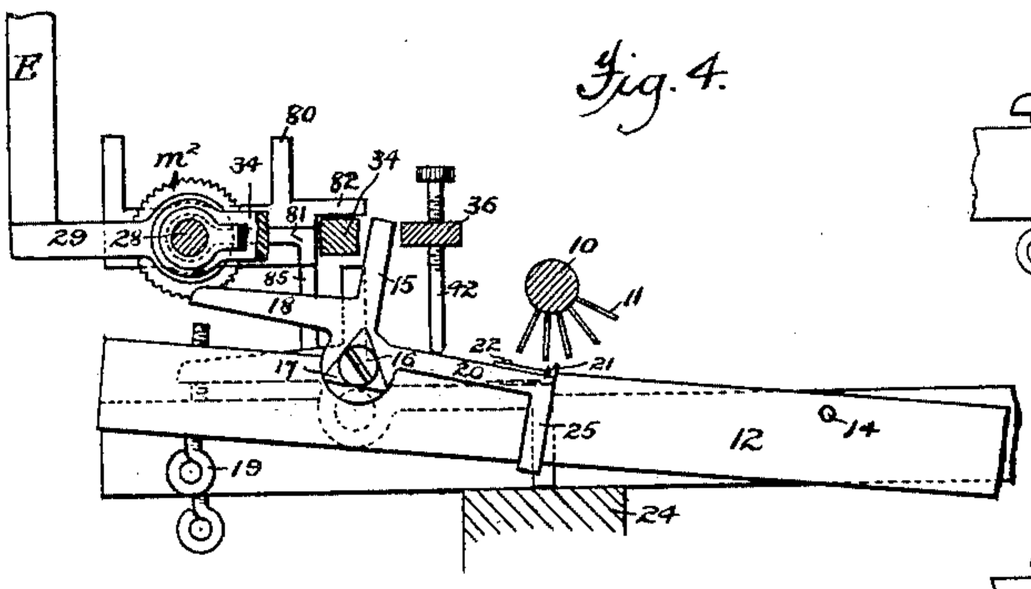


Fig. 13.

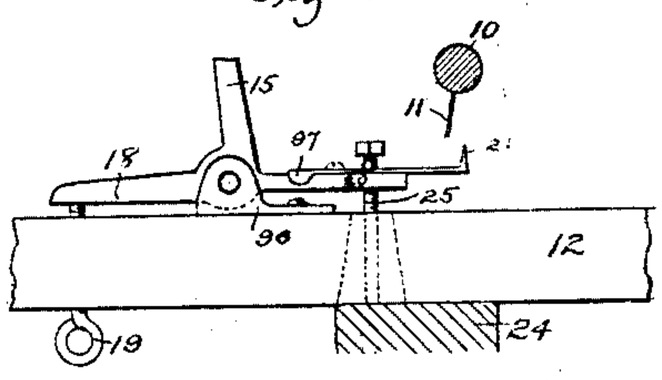


Fig. 15.

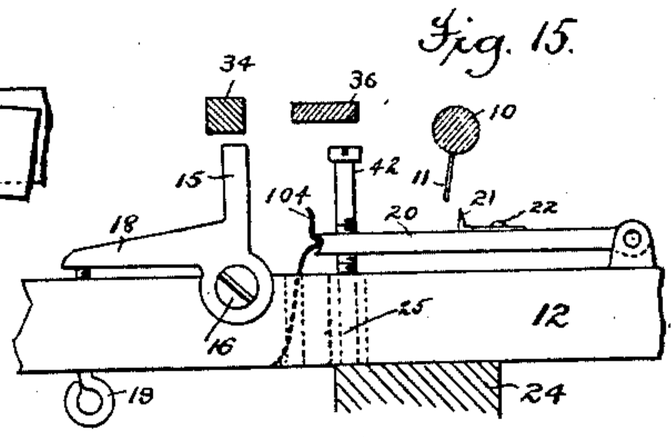
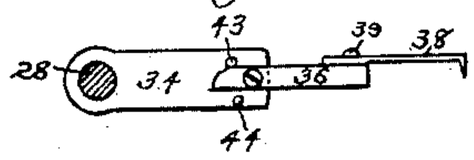


Fig. 9



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(No Model.) 3 Sheets—Sheet 2.

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TYPE WRITING MACHINE.

No. 477,224. Patented June 21, 1892.

Fig. 6.

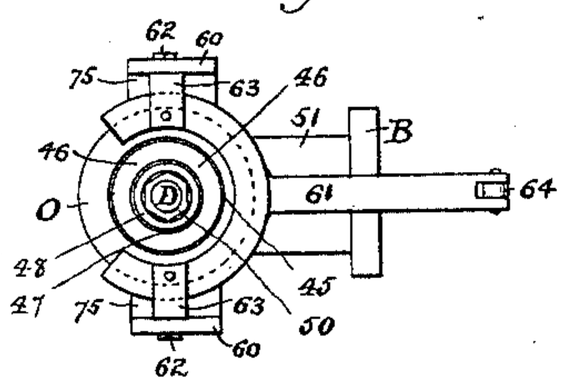
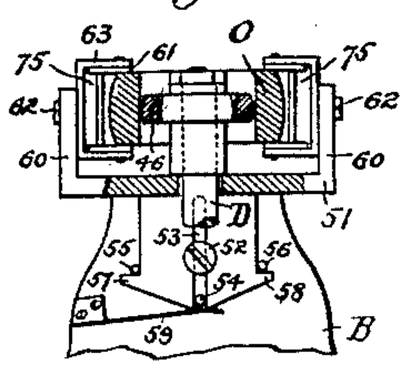


Fig. 2.

Fig. 5



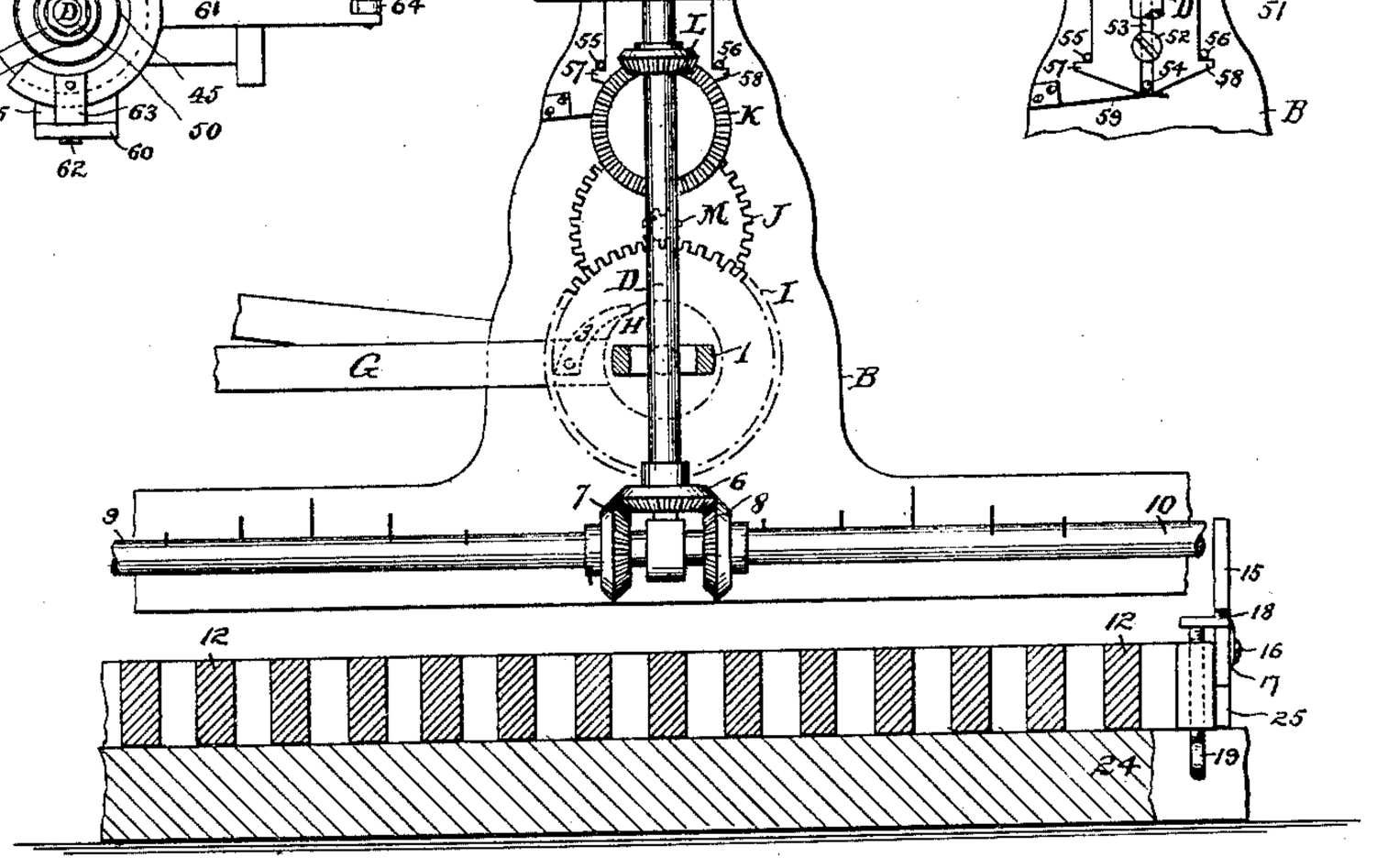


Fig. 7.

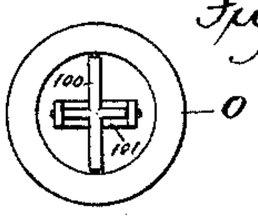


Fig. 14.

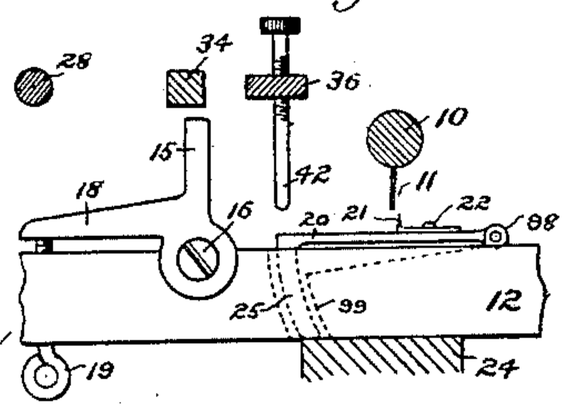


Fig. 8.

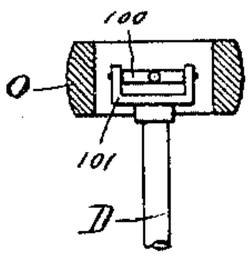


Fig. 10.

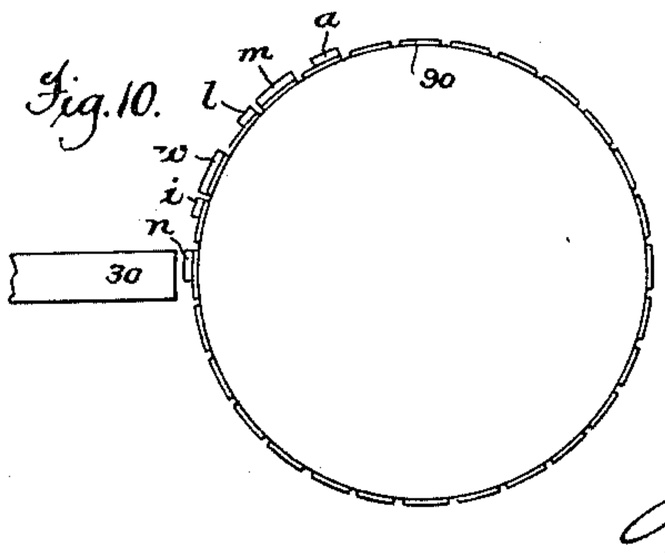
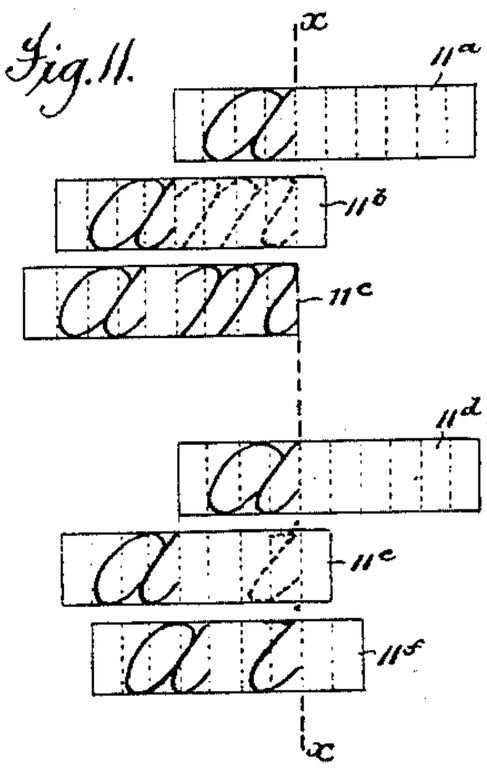


Fig. 11.



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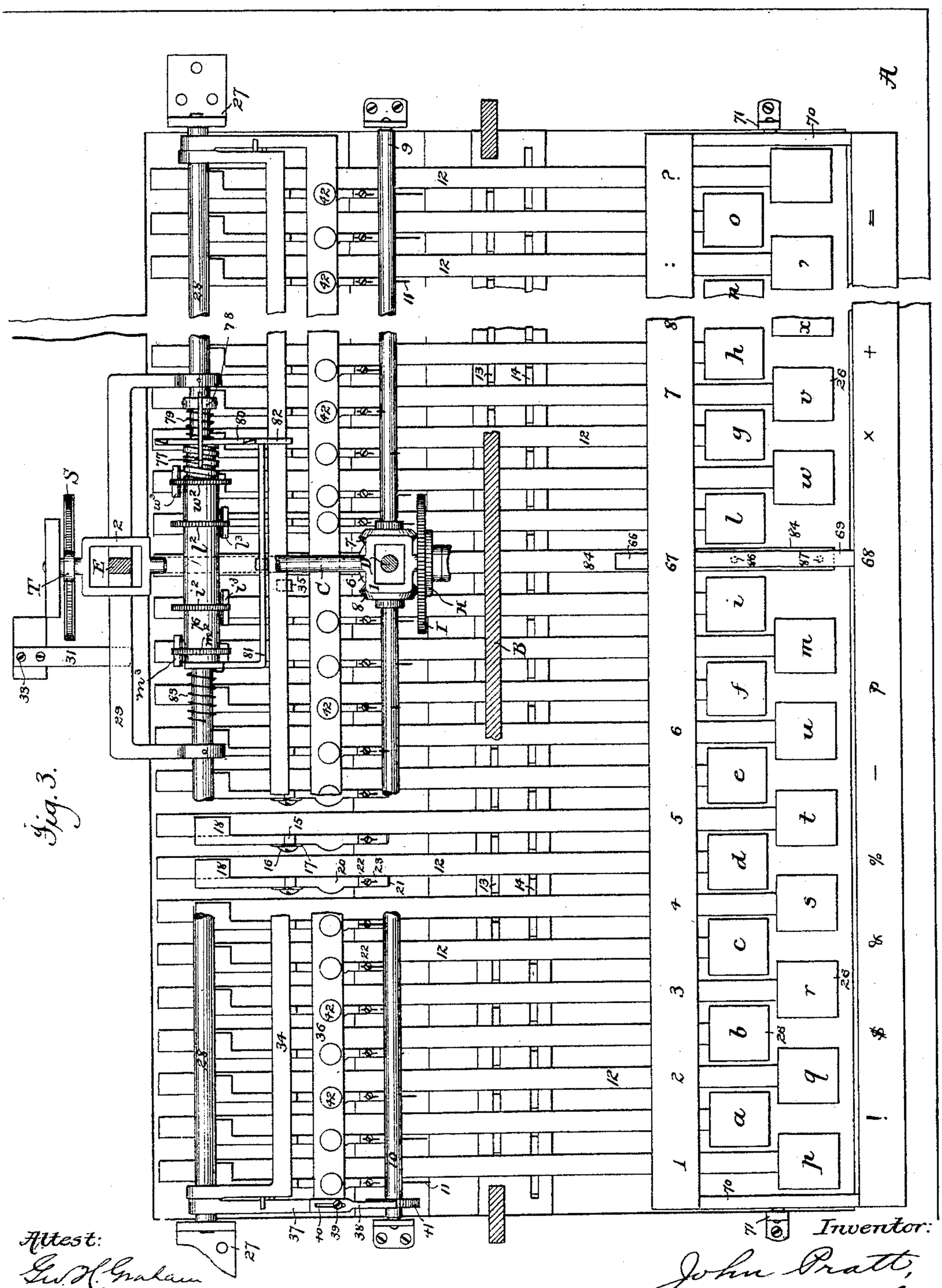

Fig. 3.

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UNITED STATES PATENT OFFICE.

JOHN PRATT, OF GADSDEN, ALABAMA, ASSIGNOR TO THE HAMMOND TYPE WRITER COMPANY, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 477,224, dated June 21, 1892.

Application filed June 3, 1885. Serial No. 167,486. (No model.)

To all whom it may concern:

Be it known that I, JOHN PRATT, a citizen of the United States, residing at Gadsden, in the county of Etowah and State of Alabama, have invented a new and useful Improvement in Type-Writing Machines, of which the following is a specification.

My invention relates to improvements in the type-writing machine described in my application for Letters Patent filed July 7, 1883, Serial No. 100,200.

The objects of my invention are, first, to construct a machine in which any key can be operated without releasing the key or keys previously depressed in order that all the keys of the keyboard may be operated with a slur movement as distinguished from a staccato movement, thus permitting the attainment of greater speed in the manipulation of the keys with a less expenditure of power; second, to construct a type-wheel having each type in the rows thereof so placed as to prevent any blurring from a type or types in a contiguous row or rows, and to so pivot such type-wheel to a rotating shaft as to allow it a universal movement; third, to provide an improved variable-spacing mechanism, and, fourth, to improve the machine in its details of construction.

In the accompanying drawings, which form a part of this specification, Figure 1 represents an end elevation of a type-writing machine embodying my invention. Fig. 2 is a vertical longitudinal cross-section on a line in rear of the type-wheel. Fig. 3 is a plan view, the paper-carriage, type-wheel, and a few other parts being removed. Fig. 4 illustrates the operation of the mechanism which permits the depression of a key before releasing another. Fig. 5 is a sectional view of the type-wheel and the shifting mechanism connected therewith. Fig. 6 is a plan view of the same. Figs. 7 and 8 represent a modification of the type-wheel-pivoting mechanism. Fig. 9 illustrates a modification concerning the connection of the disengaging lever with the hammer-lever. Fig. 10 is a plan view of the type-wheel and hammer, showing the position of the type relatively to the hammer-face at the instant the impression is taken. Fig. 11 is a diagram referring to the operation of the variable-spacing mechanism. Figs. 12, 13, and 15 refer to modifications of my invention, and Fig. 14 illustrates the preferred form for carrying out the first part of my invention.

Referring to the drawings, A indicates the base of the machine, and B the standard for supporting a part of the mechanism for driving the type-wheel and moving the paper-carriage. The shaft C of the carriage-operating mechanism is formed with two enlarged openings 1 and 2, through which the type-wheel shaft D and hammer-shank E respectively pass, said openings being sufficiently large to permit said shaft C to turn in its bearings to the extent required. With this exception the mechanisms for rotating the type-wheel and impelling the paper-carriage are precisely the same as those shown and described in my application hereinbefore mentioned, and it will be sufficient, therefore, to make a general reference to said parts. The type-wheel spring F acts through lever G, pawl 3, ratchet-wheel H, and the train of gear-wheels I J K L and pinions M N to drive the type-wheel O. The tension of said spring is adjusted by means of pawl 4 and ratchet-wheel P. The carriage-spring R acts through shaft C, cogged sector S, pinion T, pulley U, and cord V to move the carriage. The tension of said spring is adjusted by pawl 5 and ratchet-wheel W. The type-wheel shaft is provided with a bevel-gear 6, which meshes with two bevel-gears 7 and 8 on the inner ends of the two transverse check-pin shafts 9 and 10. Said shafts are each provided with a spirally-arranged row of pins or stops 11, operating in connection with finger-stops or projections on the key-levers to arrest the type-wheel, so as to bring each character thereon into alignment with the impression-hammer.

The key-levers 12, provided with finger-keys 26, are fulcrumed at 13 and 14, as illustrated, and rest back of their fulcrums on cross-bar 24. To the side of each key-lever a hopper or jack 15 is pivoted by means of a screw 16, passing through an aperture in the same into the side of the key-lever, a spring friction-washer 17 being placed between the head of the screw and the side of said jack to retain the same in the different positions to

which it is moved. Each jack is provided with an adjusting-arm 18, which projects over its key-lever and rests on an adjustable stop 19, passing upward through said lever. Each jack also carries a stop 20, the operative finger 21 of which is adjustably secured to said stop by a screw 22, passing through a slot 23 in said finger. Said stop is further provided with a foot 25, which, when the key-lever is at rest, presses or rests on the cross-bar 24. Instead of considering the jack as carrying said stop 20, it will be as correct to consider the latter as pivoted or hinged to the key-lever and carrying said jack, especially since the use of the spring-washer has relation to said stop, as will hereinafter appear.

The rock-shaft 28 is journaled in the side standards 27. The impression-hammer-supporting frame 29 is rigidly secured to said shaft, and to said frame the hammer arm or shank E is fixed or formed integral therewith. The hammer-impelling spring 31, secured to a support 32 and rendered adjustable by screw 33, presses upwardly against the under side of said frame. A second oscillating frame 34, also rigidly secured to rock-shaft 28, straddles hammer-frame 29, and is arranged so that its transverse bar is in line with and a sufficient distance above the upper ends of the jacks to permit the latter to return to their normal position. A central stop 35 may be used to keep said bar the proper distance above the jacks, said stop being of such a height as not to interfere with the necessary movement of the impression-hammer. The transverse bar of the oscillating frame 34 may consist of a roller journaled at its ends in the arms of said frame, instead of a rigid bar, as shown. This will lessen friction and render the touch of the key-levers easier. These two frames 29 and 34, being both rigidly connected with the rock-shaft 28, may be considered as a single rocking hammer-lever. The locking and disengaging frame consists of a transverse disengaging-bar 36, connected at its ends to arms 37, loosely mounted on rock-shaft 28 outside of the oscillating frame 34, and of a locking-pawl 38, adjustably connected by means of screw 39 and slot 40 to one of the said arms 37. The said locking-pawl cooperates with the toothed wheel 41 on check-pin shaft 10 to prevent rotation of the type-wheel. The disengaging-bar carries a series of adjustable disengaging projections 42, one for each key-lever, said projections operating in connection with the stops 20, as will be hereinafter described. The said disengaging projections may be applied to the stops 20, instead of to said disengaging-frame, the latter striking the upper ends of said projections. The arms 37 of the locking and disengaging frame are arranged to extend between stops 43 and 44 on the hammer-lever, by which stops movement is imparted to said locking and disengaging frame or lever and between which the same has a limited movement independent of said hammer-lever. As the said locking and releasing pawl 38 and the disengaging projections receive motion through the operation of the hammer-lever, it may be said that these parts are connected with the hammer-lever—*i. e.*, indirectly connected—the locking and disengaging frame or lever intervening.

The operation of the mechanism so far described is as follows: Upon the depression of a key the rear end of its lever rises, causing the jack thereon to tilt the rocking hammer-lever, depressing the hammer-impelling spring 31 and causing the stop 20 to project into the field of movement of the pin on the check-pin shaft, and immediately following this causing the locking and releasing pawl to be lifted out of engagement with the toothed wheel 41 of the check-pin shaft. The restraint on the type-wheel-impelling spring removed by the disengagement of said pawl, the type-wheel shaft and the transverse check-pin shafts are rotated thereby until the proper pin on one of the latter—located to bring the type represented by the key opposite the impression-hammer—strikes the stop 20 of the depressed key-lever. At about this time the said key-lever has reached the limit of its motion, so that the jack escapes from the hammer-lever, (said jack being slightly tilted thereby, but not to an extent sufficient to disengage its stop-finger from the check-pin,) and the hammer-spring being now unrestrained acts to impel the hammer 30 forward to make the impression. The instant the impression is made the hammer-lever returns to normal position, followed an instant later by the locking and disengaging lever, which latter, being free to move between the stops 43 and 44 of the hammer-lever, does not at first partake of the movement of said lever, but is subsequently (when struck by the stop 43) caused to move downwardly with the same, and after the hammer-lever has reached its normal position the locking and disengaging frame continues to move until it rests on stop 44. This final and independent movement of said frame or lever brings the locking-pawl into engagement with the toothed locking-wheel, and at the same time that said pawl commences to engage said wheel the disengaging projection 42 strikes stop 20 and forces it out of engagement with the pin of the check-pin shaft. This action causes the stop attached to the jack to assume the inoperative position illustrated in Fig. 4, all of the parts, excepting the jack and stop and the key-lever thereof, occupying the same position as in Fig. 1, the locking-pawl engaging the toothed locking-wheel and the stop out of engagement with the check-pin shaft. There is, therefore, nothing to interfere with the proper working of the machine, and any one of the other key-levers may now be depressed before this previously-operated key-lever is released. As the jack and stop of each key-lever are thus shifted to their inoperative positions it is evident that any number of keys may be

kept in the depressed position without interfering with the manipulation of those in their normal position. When the depressed key-lever is released, it returns by gravity to normal position, and on its return movement the foot 25 of the stop, which has been caused to project below the level of the under side of the key-lever by the action of the projection 42, strikes the cross-bar 24, and thus operates to return said stop and the jack to their normal position.

In the modification illustrated in Fig. 12 the locking-pawl 38 is directly attached to the hammer-lever 34 instead of indirectly, as in Fig. 1, and the disengaging-lever is omitted. The stop 20 is arranged to slide in a vertical groove in an adjustable plate 91, secured, as shown, to the side of the key-lever 12, a spring 92 pressing on said stop to hold it in any position to which it may be moved. The said stop in its normal position rests on cross-bar 24, and is provided near its upper end with a disengaging projection 42, acted upon by the disengaging-lever 36, fixed to the jack 15, which latter is loosely pivoted at 16 to the key-lever 12. Instead of fixing said projection to the stop, it may be fixed to the lever so as to act on the stop. The arm 18 of the jack rests on screw 19, as in Fig. 1. This loosely-pivoted jack, with its disengaging-lever, performs the same function as the disengaging-lever carried by the hammer-lever in Fig. 1. Instead of considering the said lever as fixed to the jack, it may be considered as pivoted to the key-lever and as having the jack fixed thereto. The operation of this mechanism is as follows: Upon the depression of a key the stop 20 rises into the field of movement of stop-pin 11 or check-pin shaft 10 and the jack removes the pawl from the toothed wheel 41, so that the said shaft is free to rotate until arrested by the operative finger 21 of the stop 20. When, following this, the jack slips off from the hammer-lever, the hammer is operated and the locking-pawl engages toothed wheel 41, while the stop 20 is still in engagement with its check-pin. Since, however, the jack is loosely pivoted, its motion is not immediately arrested, and it continues to move after the locking-pawl has come to rest until its disengaging-lever 36, acting on the projection 42 of the stop, has forced the latter out of engagement with the check-pin 11. Having moved the stop to its inoperative position, the jack and said stop remain in their inoperative positions until the key-lever is released, when they are returned to normal position, the former by gravity and the latter by cros bar 24.

In the modification illustrated in Fig. 13 the jack 15 is mounted on top of key-lever 12 in a thin metal bearing 96 and so as to fit closely between the sides thereof to secure the requisite friction. The finger 21 of stop 20 is adjustably secured thereto and is provided with two lips 97 to prevent lateral movement. The foot 25 for returning the stop and jack to normal position is in the form of a screw, so as to be adjustable, and passes through an aperture in the key-lever, as illustrated. By this screw the jack can be accurately restored to its normal position. The operation of this construction is identical with that illustrated in Fig. 1.

In the preferred construction illustrated in Fig. 14 the stop 20 is disconnected from the jack 15 and the latter is loosely pivoted at 16, returning to its normal position by the force of gravity. Said jack could, however, be provided with a friction-washer and a returning projection to rest on cross-bar 24; but it is preferred to rely on gravity to effect the return of said jack to normal position. The stop 20 is pivoted or hinged to a lug 98, projecting from the upper surface of the key-lever 12, and is provided with the foot 25, passing through an aperture 99 in said lever. The said foot closely fits said aperture, the latter being preferably lined with felt or other material, which will exercise friction and act to hold the foot, and therefore the stop, in any position to which it may be moved. The finger 21 of the stop is adjustably secured to the top thereof by a slot and screw 22. The foot 25 in its normal position rests on cross-bar 24. When the key-lever is depressed, the stop is projected into the field of movement of the check-pin 11, and the jack, acting on rock-frame 34, operates the hammer, the pawl, and the disengaging projection, as in Fig. 1. When the jack slips off from the hammer-lever, the hammer is operated to make the impression, and an instant later the disengaging projection 42 strikes stop 20 and depresses it to its inoperative position, where it remains until its key-lever is released, and the cross-bar 24, acting on foot 25, can elevate the stop to its normal position. The jack also returns by gravity to its normal position.

In the modification illustrated in Fig. 15 the parts 10, 11, 12, 15, 16, 18, 19, 21, 22, 24, 34, and 36 are the same as in Fig. 14. The stop 20, loosely pivoted, is held up by the engagement of spring-click 104 with the notch in the end of said stop. The said click is secured in a slot of the key-lever, and is limited in its forward movement by the front wall of said slot. This click and notch serve the same purpose as the friction devices hereinbefore described. The upper part 42 of the adjustable pin held by the stop of the key-lever acts as the disengaging projection, while the lower part 25 thereof acts as a foot to return the stop to normal position. In this construction when the bar 36 strikes projection 42 it entirely disengages the stop 20 from the click 104, so that said stop can drop down by gravity on the key-lever, thus disengaging finger 21 from the check-pin 11. The stop 20 is returned to normal position by foot 25 and bar 24 and the jack by the force of gravity upon the release of the key-lever.

In the modification illustrated in Fig. 9 the disengaging-bar 36 is pivoted to the front part

34 of the hammer-lever, instead of to shaft 28. In this case the stops 43 and 44 are in rear of the pivot, and said bar therefore rests normally against the upper stop 43. The locking-pawl 38 and the disengaging projection 42 (not shown) are arranged thereon, as in Fig. 1. When the jack slips off from the hammer-lever, the disengaging-bar does not at first partake fully of the movement of the hammer-lever; but when the latter has come to rest the disengaging-bar moves from stop 44 to stop 43 until arrested by the latter.

Instead of placing the pins on the check-pin shaft, so as to accurately align the type with the impression-hammer, they may be placed so as to effect this only approximately and the toothed locking-wheel used to supplement them and determine the exact position of the type. In this case the toothed locking-wheel would have its teeth equal in number to the number of characters in one row of the type-wheel, and the said locking-pawl would be so placed with reference to said teeth and the position of the type on the type-wheel as to stop and hold the latter when its type properly align with the impression-hammer. In this construction the disengaging-bar, instead of being arranged to have a movement independent of the hammer-lever, is rigidly fixed thereto, so as to have always the same movement as said hammer-lever. The operation of this construction is that the stop on the key-lever is disengaged from the check-pin shaft by the projection on the disengaging-bar of the hammer-lever before the locking or arresting pawl has fully engaged the locking-wheel, and this is necessary, in order that the final movement of said locking-pawl may not be interfered with by the stop and check pin, so that said pawl may be free to perform its function of accurately aligning the type. No other changes would be required to adapt this modification to fulfill the first-stated object of my invention.

In all the constructions hereinbefore described it will be observed that each key-lever is provided with a movable stop held against accidental movement by suitable means, and that said stop is moved to an inoperative position after it has performed its function and before its key-lever is released by some other moving part of the machine. Said moving part may be the disengaging-bar carrying the projection acting on the stop, or said bar acting on a projection on the stop, and the said disengaging-bar may thus act whether it has or has not a movement independent of the hammer-lever. In all these cases the hammer-lever may be said to act to disengage the stop and to have connected therewith the means for effecting such disengagement. The said moving part may also be actuated by and attached to the jack, as in Fig. 12. The stop may be attached to the jack, as in Figs. 1 and 13, or be separated therefrom, as in Figs. 12 and 14, and when so separated it may be shifted either by a lever forming part of the jack, as in Fig. 12, or by the disengaging-bar, as in Fig. 14.

The type-wheel O is designed to carry three rows of type and has the form of an equatorial section of a sphere. By this form all blurring from type in rows contiguous to that in use is avoided. In its normal position the middle row of type is in alignment with the impression-hammer. The said type-wheel is pivoted at 45 to a ring 46, which in turn is pivoted at 47 to a collar or projection 48 on the type-wheel shaft D. The two pairs of pivots are arranged at right angles to each other, so that the type-wheel has a capacity for movement in all directions. The collar or projection 48 is formed on a hub which slides on the type-wheel shaft, and this hub is held against upward movement by a hand-nut 50, fastened on the upper end of said shaft. To oscillate the type wheel so as to bring the top and bottom rows of type opposite the impression-hammer, I provide the following mechanism: A bracket 51 is secured to standard B by a screw 52, passing freely through a slot 53 in the vertical arm of said bracket, so that the same can be moved up and down on said standard, it being further guided by a pin 54, which projects from the standard into said slot. The upward movement of said bracket is limited by two pins 55 and 56, against which the projections 57 and 58 of said bracket abut when pressed upwardly by the spring 59. The bracket 51 is provided with two upwardly-extending arms 60, in which the forked and flanged shifting-lever 6 is pivoted at 62 by means of U-shaped pieces 63, fixed to said lever. Said forked lever lightly embraces the type-wheel above and below, as illustrated, so as not to prevent its rotation, and is pivotally connected at its outer end to the link 64, which connects it to the lever 65, operated and engaged by the fork 66 of the rocker key-lever. Said rocker key-lever consists of two transverse finger-keys 67 and 68, connected by a central bar 69, and two side bars 70, pivoted to the standards 71. One or both side bars are formed with a depending arm 72, which passes between two flat springs 73, secured to an adjustable bracket 74, the said springs operating to return the rocker key-lever to its normal position. The operation of this mechanism is as follows: If it is desired to bring a type of the upper row into alignment with the impression-hammer, the front key-bar 68 of the rocker-lever is depressed, which causes the shifting-lever 61 to rock on its pivot or fulcrum 62, so as to depress the forked end thereof. As the type-wheel is embraced by this lever and as it is universally pivoted, it partakes of the movement of the same and oscillates or tilts, so that a type of the upper row is brought down opposite the impression-hammer. When it is desired to print a type of the bottom row, the rear key-bar 67 is depressed, which causes that half of the type-wheel facing the impression-hammer to tilt upwardly.

The inking-ribbon (not shown) which is to be interposed between the type-wheel and impression-hammer passes to and from the type-wheel through the spaces 75 between the pivot-pieces 63 and the forks of the forked lever 61. When it is desired to inspect the letter last printed, the type-wheel and inking-ribbon can be lowered below the range of the impression-hammer by pressing down on the hub of the type-wheel or on the forked lever or on the bracket, so as to slide said hub on the type-wheel shaft. The spring 59 will return the bracket, and therefore the type-wheel, to normal position.

In the modification illustrated in Figs. 7 and 8 the type-wheel is pivoted to a cross-shaped piece 100, which in turn is pivoted in the arms of a yoke 101, secured to the type-wheel shaft D.

The variable letter-spacing mechanism for the letters "i," "l," "m," and "w" is in part identical with that described and shown in my application hereinbefore referred to. The screw-cylinder 76, provided with four ratchet-wheels i^2, l^2, m^2, and w^2, is loosely mounted on the rock-shaft 28, so as to slide and rotate thereon. The screw-thread of said cylinder is engaged by the finger 77, mounted in the support 78, secured to said rock-shaft. A spring 79 operates to return the screw-cylinder to position when finger 77 is lifted on the return movement of the carriage. The escapement 80 is loosely mounted on rock-shaft 28 adjacent to one end of the screw-cylinder, and is connected with the spacing-lever 81, also mounted on said shaft adjacent to the other end of said cylinder, the parts straddling the same, whereby said escapement is caused to partake of the longitudinal movement of said cylinder. The escapement is provided with an arm or extension 82, which rests on the rocking hammer-lever and by which said escapement is operated. The spring 83, bearing on the spacing-lever, keeps the escapement-arm in contact with the hammer-lever. The space-key lever 84 is provided with a vertical post 85, which engages the spacing-lever 81, whereby the escapement is operated without movement of the hammer. Said space-key lever is provided with two projections 86 and 87, which are acted upon by the central bar 69 of the rocker key-lever. The key-levers i, l, m, and w are provided with broad pawls i^3, l^3, m^3, and w^3, which engage the ratchet-wheels on the screw-cylinder to rotate the same in one or the other direction, as required. The escapement co-operates with the double rack-bar 88 on the carriage-frame 89. As the part of the variable-spacing mechanism so far described, the carriage, and the means for tilting the rack-bar thereof are identical with the constructions shown and described in my application before referred to, it will not be necessary to more fully refer thereto herein.

The type on the type-wheel, the pins on the check-pin shafts, and the stops on the key-levers are relatively so located that the right-hand edges of the types (looking down in Fig. 10 on the type-wheel and toward the impression-hammer) will align with the right-hand edge of or with an imaginary line on the hammer-face.

In Fig. 10 the type are represented as projecting from bases 90, which are all of the same width and on which the type are so located that their right-hand edges coincide with the right-hand edges of the bases, the hammer being shown of a width equal to that of the bases, and its right-hand edge in line with the right-hand edge of a type. The type-wheel, with its type so disposed or relatively located, co-operates with that part of the variable-letter-spacing mechanism heretofore described to produce the variable spacing desired. The operation of said mechanism may be explained in connection with Fig. 11. In said figure a strip of paper 11^a is represented at the instant the letter "a" is imprinted thereon and before it is moved to the left. The right-hand edge of said letter is in line with the right-hand edge of the impression-hammer. (Represented by the dotted line x x.) Let it be assumed that the type "m" and "w" occupy each a space in width equal to four units, the type "i" and "l" a space equal to two units, and all other letters or characters a space equal to three units of measurement; also, that the space between letters is equal to one unit of measurement. As much the larger number of characters occupy a space equal to three units of measurement, the teeth of the rack-bar of the carriage are therefore so spaced as to advance the carriage four units of measurement at each operation of the escapement. After the impression of the letter "a" has been effected the paper strip is therefore moved four units of measurement to the left, as indicated at 11^b. If now the letter "m" or "w" were to be next printed and no provision were made to increase the movement of the paper-carriage to the left, the result would be as indicated on the strip 11^b—*i. e.*, "m" would not be separated from "a" by the proper space. To remedy this, the escapement is moved to the left by the pawl m^3 of the m-key lever acting on the ratchet-wheel m^2 of the screw-cylinder to turn the same in the proper direction, so that the finger in the screw-thread thereof will force the cylinder to the left, carrying with it the escapement, so that the instant the impression of "m" is made the paper will be in the position shown at 11^c, and "m" will be separated from "a" by the proper space. At 11^d a strip of paper is shown in the same position as the strip at 11^a at the instant the letter "a" is imprinted thereon. If now the letter "i" or "l" were to be next printed and the escapement were immovable laterally, the said letter when printed would occupy the position shown at 11^e—*i. e.*, the space between the two impressions would be twice that desired. To remedy this, the key-lever representing "i" has its pawl i^3 so placed as to turn

the right the distance of one unit of measurement, so that the instant the impression is made the paper will occupy the position indicated at 11ᶠ, thus securing the proper amount of space between said two impressions. It is evident that this variable-spacing mechanism can be extended to include other letters than those referred to.

The variable-spacing mechanism interferes in a few cases with the slur movement heretofore described. For instance, when the key-levers representing "i" and "m" are struck successively, the latter key-lever cannot be depressed so long as the former is firmly held down, for the said key-levers operate to turn the screw-cylinder in opposite directions. The fact is, however, that the power exercised in depressing the last key-lever is greater than that exercised in holding down the previously-operated one, so that the latter is raised against the pressure of the finger and its pawl removed from the ratchet-wheel so that the former or last-depressed key can operate to turn the screw-cylinder. What is true of "i" and "m" is true of all the other instances in which the key-levers successively depressed operate to turn the screw-cylinder in opposite directions. When, however, two key-levers successively operated represent "i" and "l" or "m" and "w," there can be no interference, for said key-levers operate to turn the screw-cylinder in the same direction. This variable-spacing mechanism is obviously applicable not alone to the particular mechanism hereinbefore described, but also to that class of type-writing machines in which one stop-arm does service for a series of stops. Neither is its use limited to that class of machines employing an impression-hammer, for it may be applied in those constructions wherein the type-wheel is moved toward the paper-carrying platen or the latter toward the type-wheel. I do not, therefore, desire to limit myself in this part of my invention to the particular type-writing machine shown and described.

A curved shield 102 is secured to the arms 60 and projects over the type-wheel, as illustrated in Figs. 1 and 2. This shield co-operates with a curved guide-finger 103, secured to the rear standard of the machine to render the placing of the paper more convenient and to hold it up to the type-wheel.

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

1. A key-lever provided with a movable stop capable of being moved out of its operative position while the key-lever is in its depressed position, in combination with a holding means, substantially as described, for preventing accidental displacement of said stop key-lever is retained in its depressed position, substantially as described.

3. The combination, with the check-pin shaft, of a horizontal key-lever provided with a vertically-movable and frictionally-held stop, substantially as described.

4. The combination, with the check-pin shaft, of a key-lever provided with a pivoted or hinged movable stop held against accidental displacement by friction, said stop capable of being moved out of the field of movement of the check-pin shaft while the key-lever is in its depressed position, substantially as described.

5. The combination, with the check-pin shaft and a key-lever carrying a movable stop provided with a foot, of a stop-bar for returning said movable stop to normal position, substantially as described.

6. The combination, with a key-lever provided with a movable stop, of a check-pin shaft with which said stop co-operates, and a disengaging bar or lever for moving said stop to its inoperative position when it has performed its function, substantially as described.

7. The combination, with a key-lever provided with a frictionally-pivoted and movable stop, of a check-pin shaft and a disengaging bar or lever for moving said stop to its inoperative position when it has performed its function, substantially as described.

8. The combination, with a key-lever provided with a frictionally-held and movable stop, of a check-pin shaft and a disengaging bar or lever for moving said stop to its inoperative position when it has performed its function, and a stop-bar for returning said movable stop to its normal position when its key-lever is released, substantially as described.

9. The combination, with a key-lever provided with a jack and a movable stop, of a check-pin shaft, a hammer-lever, and a disengaging bar or lever for shifting said stop into its inoperative position, substantially as described.

10. The combination, with a key-lever provided with a jack and a movable stop, of a check-pin shaft, a hammer-lever, and a disengaging bar or lever connected with said hammer-lever, substantially as described.

11. The combination, with a key-lever provided with a jack and a movable stop, of a check-pin shaft, a toothed locking-wheel, a hammer-lever, a locking-pawl, and a disengaging bar or lever, substantially as described.

12. The combination, with a key-lever provided with a jack and a pivoted movable stop, of a check-pin shaft, a toothed wheel on said

shaft, a hammer-lever, and a pawl and disengaging bar or lever connected with said hammer-lever, substantially as described.

13. The combination, with a key-lever provided with a jack and a movable stop, of a check-pin shaft, a toothed wheel on said shaft, a hammer-lever, and a disengaging-bar separate from and moved by said hammer-lever and provided with a pawl, substantially as described.

14. The combination, with a key-lever provided with a jack and a movable stop, of a holding means, substantially as described, for said stop, a check-pin shaft, a hammer-lever, and a disengaging bar or lever connected with said hammer-lever, substantially as described.

15. The combination, with a key-lever provided with a jack and a movable stop, of a check-pin shaft, a toothed wheel on said shaft, a hammer-lever provided with stops, as 43 and 44, and a disengaging bar or lever provided with a pawl and having a movement limited by said stops independent of said hammer-lever, substantially as described.

16. The combination, with a key-lever provided with a jack and a movable stop, of a hammer-lever and a disengaging-bar provided with a disengaging projection, substantially as described.

17. The combination, with a key-lever provided with a jack and a movable stop, of a hammer-lever and a disengaging-bar provided with an adjustable disengaging projection, substantially as described.

18. The combination, with the check-pin shaft and its toothed wheel, of the hammer-lever and a pawl connected with and actuated by said hammer-lever and arranged to co-operate with said toothed wheel, substantially as described.

19. The combination, with a key-lever provided with a jack, of a hammer-lever, a disengaging bar or lever provided with a pawl and connected with said hammer-lever, so as to move partly with and partly independent of the same, and a toothed wheel with which said pawl co-operates, substantially as described.

20. The combination, with a type-wheel forming, substantially, an equatorial section of a sphere and provided with two or more rows of type, of a shaft to which said type-wheel is universally pivoted, a pivoted frame or lever engaging said type-wheel, and a lever and connections whereby said frame is moved on its pivot to bring another row of type opposite the impression-hammer, substantially as described.

21. A type-wheel in the form substantially of an equatorial section of a sphere, provided with two or more rows of type and universally pivoted to a rotating shaft, substantially as described.

22. A type-wheel in the form of an equatorial section of a sphere, provided with two or more rows of type, in combination with a rotating shaft and a ring pivoted to said shaft and to said type-wheel, the said pivots being located at right angles to each other, substantially as described.

23. A type-wheel in the form substantially of an equatorial section of a sphere, provided with two or more rows of type and universally pivoted to a shaft, in combination with a forked lever engaging said type-wheel, a supporting-bracket, and U-shaped pieces connected with said lever and pivoted in the bracket-arms, so as to provide a passage for the inking-ribbon, substantially as described.

24. A type-wheel in the form substantially of an equatorial section of a sphere and provided with two or more rows of type, in combination with the type-wheel shaft and a sliding hub thereon, to which the type-wheel is universally pivoted, substantially as described.

25. The combination, with the movable type-wheel bracket, of the type-wheel shaft passing through the same, a collar or hub sliding on said shaft and resting on said bracket, and a type-wheel universally pivoted to said hub, whereby the type-wheel is permitted to be shifted on its shaft out of the range of the impression-hammer, substantially as described.

26. The combination, with an escapement capable of being shifted both to the right and to the left, of a type-wheel and a series of stops located to arrest said type-wheel, so that the right-hand edge of each of its type shall be brought into alignment with one and the same imaginary line, substantially as described.

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Witnesses:
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