Aug. 18, 1936. F. SPALOSS 2,051,112

MEANS TO VARY THE IMPACT OF THE PRINTING ELEMENT IN TYPEWRITING MACHINES

Filed Nov. 28, 1932 3 Sheets-Sheet 1

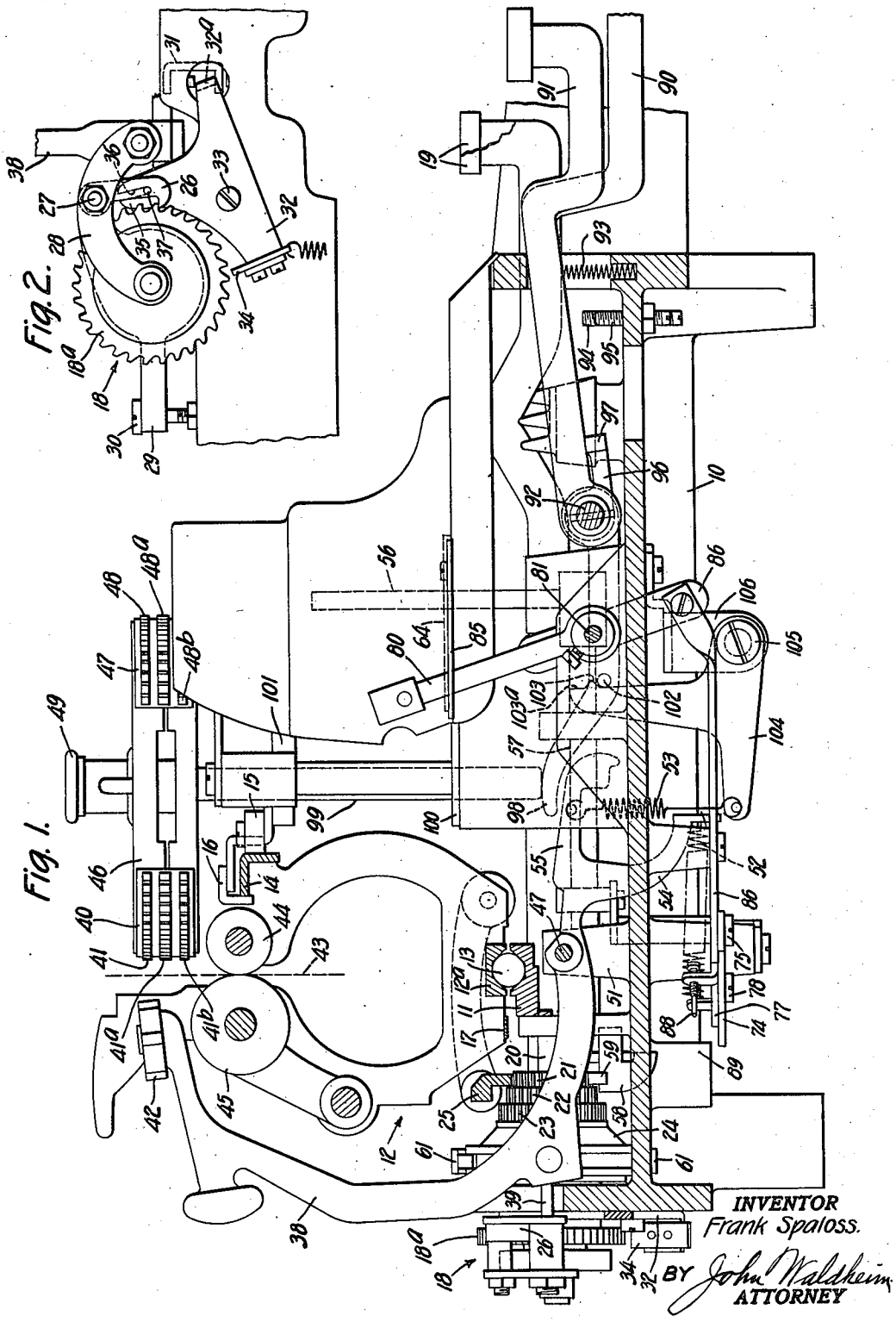


Fig. 1.

Fig. 2.

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Filed Nov. 28, 1932 3 Sheets-Sheet 2

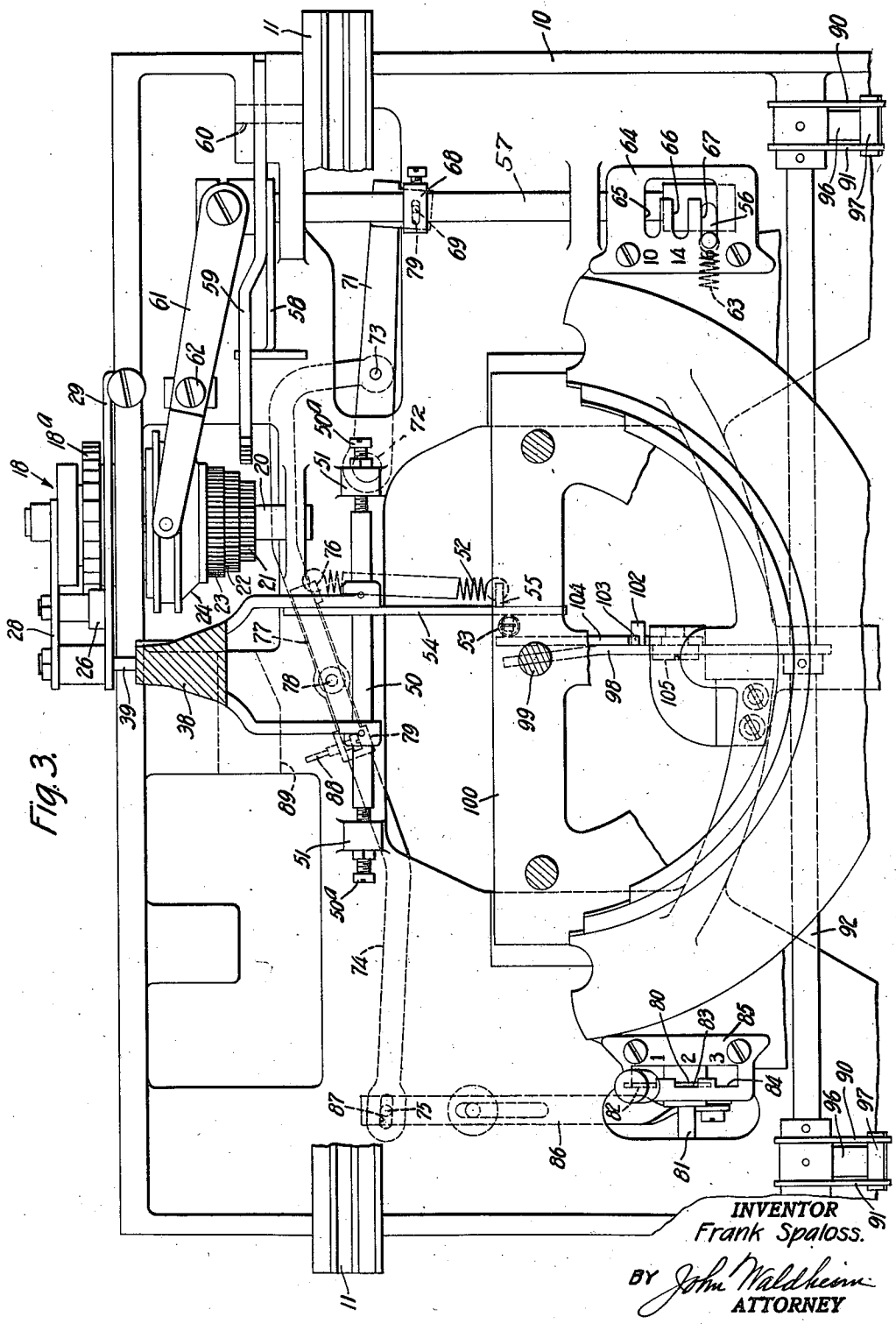


Fig. 3.

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Filed Nov. 28, 1932 3 Sheets-Sheet 3

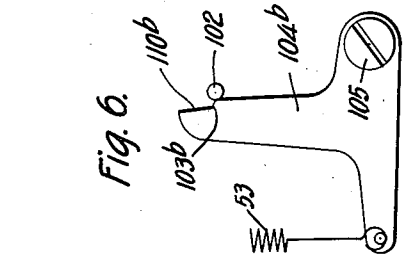


Fig. 6.

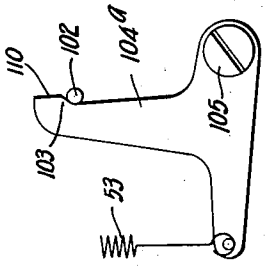


Fig. 5.

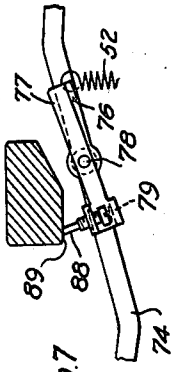


Fig. 7

Fig. 4.

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Patented Aug. 18, 1936 2,051,112

UNITED STATES PATENT OFFICE

2,051,112

MEANS TO VARY THE IMPACT OF THE PRINTING ELEMENT IN TYPEWRITING MACHINES

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Application November 28, 1932, Serial No. 644,587

21 Claims. (Cl. 197—49)

This invention relates to improvements in typewriting machines and more particularly to means to vary the impact of the printing element.

It is herein illustrated as applied to the Varityper machine in which the printing element is the hammer and cooperates with any one of a plurality of replaceable type carriers or shuttles, one at a time, each shuttle having a font of types thereon, the types of the various shuttles being of different styles and the type faces having larger or smaller areas, the hammer being actuable by power means comprising a spring; each font of types also including upper and lower case types.

The invention is in the nature of improvements which may be used with the invention illustrated in the application of Frank H. Trego, Ser. No. 399,732 filed Oct. 15, 1929, now Patent No. 1,-918,300 dated July 18, 1933, in which provision is made to alter the impact of the hammer by varying the force of its actuating spring; two setting devices being provided in said invention, one for the purpose of varying the force of the power means in accordance with the area of the type faces of various type carriers, the other device being provided to vary the power means in accordance with the thickness of the work-sheet, or pack of work-sheets. These adjustments of the hammer spring have been made to produce uniform shade of typing not only on the carbon copies but also on the original sheet.

An object of the present invention is to produce a greater percentage of uniformity of the shade of typing.

To this end provision is made to further vary the force of the power means so as to compensate for the difference in the areas of the type faces of upper and lower case types on the same shuttle.

In carrying out the invention, two springs are provided to constitute the power means for actuating the printing element or hammer, a primary spring and a secondary spring; the primary spring being settable to compensate for the types of different shuttles and to compensate for the different thickness of the work-sheet; the secondary spring being settable by the case shifting means to compensate for the difference in area of the type faces of upper and lower case types.

Other features and advantages will hereinafter appear.

In the drawings,

Fig. 1 is a sectional side view of the machine showing the invention applied thereto;

Fig. 2 is a fragmentary rear view showing the escapement mechanism;

Fig. 3 is a top plan view of the machine partly in section;

Fig. 4 is a skeleton side view showing the shuttle shifted to its upper case position and the power means for the hammer adjusted by the case-shift mechanism;

Figs. 5 and 6 show modifications of the lever operable by the case-shifting means to vary the force of the power means; and

Fig. 7 is a detail view showing the sub-lever, to which the hammer spring is connected, in its operated position.

Similar reference characters represent similar parts throughout the several views.

The machine includes a main frame 10 having a track 11 upon which a carriage 12 travels back and forth through the medium of anti-friction balls or rollers 13; the carriage being provided with a grooved bar 12a to engage said balls. To guide the carriage at the top it is provided with a bar 14 which is held against one or more rollers 15 by a guard or bracket 16 secured to the machine frame.

The carriage is urged in a letter space direction by the usual spring drum, not shown, connected to said carriage by a strap 17. Its letter space movements are controlled by escapement mechanism, indicated generally by the numeral 18, which is operated at each operation of any one of the key levers 19.

The escapement 18 includes an escapement wheel 18a secured to a shaft 20 supported on the main frame 10. Pinions 21, 22 and 23 form part of a sleeve 24 which is connected to the shaft 20 by means of an internal pawl and ratchet, not shown. A rack 25, supported on the carriage, may engage with any one of the pinions to rotate the escapement shaft in a clockwise direction, Fig. 2.

The escapement wheel 18a is normally held by a stepping dog 26 pivoted by a stud 27 on a frame 28, the latter having an arm 29 engaging a stop 30. Upon the actuation of any one of the key levers 19 a universal bar (not shown) is actuated thereby. The universal bar has a rearwardly extending arm 31 (Fig. 2) which moves downwardly and engages an inwardly projecting finger 32a of a dog rocker 32 to actuate the latter in a clockwise direction about a pivot stud 33, to thus carry a holding dog 34 into the path of the adjacent tooth of the escapement wheel 18a.

The dog rocker is also provided with an arm 35 having a slot 36 into which extends a pin 37 from the loose dog 26 whereby the loose dog is swung out of engagement of the escapement wheel; the

dog carrying frame 28 being connected to a printing hammer 38 by means of a stud 39 to be actuated thereby during a printing operation of said hammer which is actuated in a manner hereinafter described. Upon the release of the dog 26 from the escapement wheel it is carried upwardly by the action of the hammer on the frame 28, and the pin moves upwardly in the slot 36. Subsequently the dog rocker 32 is brought back to normal, upon the return of the arm 31, to first swing the stepping dog 26 into the path of the next tooth of the escapement wheel and then disengage the dog 34 from the escapement wheel, whereupon the escapement parts and the printing hammer 38 are restored to normal as indicated in Fig. 6.

The printing instrumentalities include a type carrier or shuttle 40 having a row of lower case types or small letters 41, a row of upper case types 41ª or capital letters and a row of types 41ᵇ of figures and symbols. The hammer 38 is provided with a head 42 which may cooperate with any row of types to print on an interposed work sheet 43 which may be fed in a line space direction by feed rollers 44 and 45 supported on the carriage 12. The shuttle 40 is curved to conform with the shape of a cylindrical anvil 46 upon which it is detachably supported for replacement by another. It is actuated about the axis of said anvil in the usual manner by the key levers to set the selected type at the printing point.

The types on the shuttle 40 may be small and narrow so that there may be when printed, sixteen to an inch on the work sheet. Another shuttle 47 has types 48, 48ª and 48ᵇ thereon. These types may be broader and higher than those of the shuttle 40, so that there are about ten to the inch. These shuttles may be substituted one for the other as desired and may be brought into cooperation with the hammer by means of a finger piece 49 whereby the anvil 46 may be rotated to carry the desired shuttle to its operative position.

The printing hammer 38 is secured to a rock shaft 50 supported by pivot screws 50ª on brackets 51 of the main frame 10. Upon the release of the hammer, by disengaging the stepping dog 26 from the escapement wheel, it is actuated by power means including two springs 52 and 53 connected to arms 54 and 55 respectively of the hammer 38, said springs being adjustable, in a manner hereinafter described, to vary their force and thus change the impact of the hammer to produce uniformity of the shade of typing.

The letter spacing of the carriage may be changed at will in accordance with the different sizes of types to be used. For this purpose there is provided a variable feed mechanism like that disclosed in the application of Frank H. Trego Ser. No. 361,899 filed May 10, 1929, now Patent No. 1,918,299 dated July 18, 1933. This mechanism includes the pinions 21, 22 and 23 which are of the same pitch but of different diameters, and are engageable by the rack 25, one at a time, to feed the carriage in accordance with the desired letter spacing.

To set the machine for the desired letter spacing of the carriage there is provided a handle or finger-piece 56 to a rock shaft 57 which has an arm 58 to lift the rack 25 out of engagement with the active pinion through the medium of a rack holding lever 59 pivoted by a stud 60. The rock shaft 57 is then moved axially to shift the pinion element 24 axially of the shaft 20, through the medium of a lever 61 pivotally supported by a stud 62 on the main frame, to thus bring the pinion, corresponding to the desired letter spacing, into cooperative relation with the rack. A return spring 63 connected to the handle 56 is then permitted to rock the shaft 57 back to normal, thus permitting the feed rack 25 to drop into engagement with the selected pinion.

To assist in selecting the pinions there is provided a fixed indexing plate 64 having slots 65, 66 and 67 into any one of which the handle 56 may be moved, designations "10", "14" and "16" being opposite the slots 65, 66 and 67 to indicate the number of letter spaces to the inch.

To maintain uniformity in the shade of typing irrespective of the shuttle being used, which requires a variation of the impact of the hammer in accordance with the area of the face of the type, the force of the power means is varied by the setting means of the variable spacing mechanism. To this end there is secured to the shaft 57 a collar 68 having a pin 69 extending downwardly therefrom into a slot 70 of a lever 71 to actuate the latter about a pivot 72 on the main frame 10 while the shaft 57 is being moved axially. The lever 71 has pivotally connected thereto, by a stud 73, a lever 74 to actuate the latter about a stud 75 to vary the force of the spring 52, said spring being connected to an ear 76 of a sub-lever 77 pivotally supported by a stud 78 on the lever 74. The sub-lever 77 is normally arrested against the lever 74 by a stop 79 so that under certain conditions the sub-lever 77 acts as an integral part of the lever 74 while the handle 56 of the setting mechanism is being moved from slot to slot of the index plate 64.

The power means for the hammer may also be varied in accordance with light work such as ordinary letter writing, for medium work such as one or two carbons, and for heavy work such as a great number of carbons or stencil work. To this end there is provided an arm 80 secured to a rock shaft 81 suitably supported on the main frame. The arm 80 is slightly resilient so that it may be moved laterally out of any one of suitable notches 82, 83 and 84 of a fixed index plate 85 and into any one of the other notches corresponding with the kind of work to be done by machine.

As the arm 80 is actuated fore-and-aft of the machine, a downwardly extending arm 86 also secured to the rock shaft 81 moves a connecting bar 86, to actuate the lever 74 about the stud 73, through the medium of the stud 75 which is secured to the rear end of the connecting bar 86 and engages in a slot 87 of the lever 74. Thus, the force of the spring 52, which is connected to the lever 74, through the medium of the sub-lever 77, is varied, as in Fig. 7, by the manipulation of the settable arm or finger-piece 80 to vary the impact of the hammer as required for the kind of work to be performed.

Under certain conditions, depending upon the set position of either of the finger-pieces 56 or 80 and upon a movement of the other, an adjustable screw 88 on the sub-lever 77 may engage a projection 89 on the main frame to swing said sub-lever about its pivot 78 to assist in adjusting the spring to vary its force in accordance with the required blow of the hammer.

As previously stated each shuttle is provided with lower case types 41, upper case types 41ª and figure and symbol types 41ᵇ. It should be understood that ordinarily the shuttle is set so that the hammer head 42 cooperates with the

row of lower case types 41. The other two rows of types may be rendered effective, selectively, by the usual case shifting mechanism which includes two sets of shift key levers, one set at each side of the machine and each set including a capital shift key lever 90 for the row of upper case types 41a and a figure shift key 91 for the row of types 41b.

The shift key levers of each set are loosely supported on a rock shaft 92 which is mounted in the sides of the main frame 10 and they are operable against the action of return springs 93. The downward movements of the shift key levers 90 and 91 are limited by stop screws 94 and 95 respectively, and they rock the shaft 92 through various angular distances, determined by the stop screws 94 and 95, arms 96 being secured to the rock shaft 91, each having an engaging portion 97 thereon extending under the key levers 90 and 91 of each set. The rock shaft 92 has also secured thereto, at the middle of the machine, an arm 98 the rear end of which, while the rock shaft is being operated, pushes upwardly on a post 99, upon which the anvil 46 is supported, to carry the shuttle 40 upwardly therewith, a distance depending upon the shift lever operated to position the desired row of the types 41a and 41b opposite the hammer head 42. The post 99 is guided, for its up and down movements, in a plate 100 and a cross bar 101. The usual shift lock (not shown) is used to hold either one of the shift keys in its depressed position at will; one form of shift lock being shown in the patent to Lopez #1,131,640 dated Mar. 9, 1915.

To vary the force of the power means, by the case shifting mechanism, to alter the impact of the hammer in accordance with the difference in areas of the faces of the upper case types 41a and lower case types 41 on the same shuttle, there is provided, on the arm 98 of the case shifting means, a pin or projection 102 which engages with a cam 103 of a lever or bell crank 104 to rock the latter to the position in Fig. 4, about a pivot stud 105 on a bracket 106 secured to the main frame 10. The cam 103 is provided on one arm of the bell crank and the other arm thereof is connected to the spring 53, of the power means which operates the hammer, to vary its force and thus vary the impact of the hammer in accordance with the area of the type faces in the various rows of types on the shuttle. It will be understood that in Fig. 4 the shuttle is in its upper case position. It will further be understood that when the shuttle is shifted to render effective the lower row of types 41b, which are small types like the types 41 of the upper row, the pin 102 rides off the cam 103 to a contact portion 103a of the lever 104 to accordingly decrease the force of the spring 53 of the power means.

Sometimes the rows of types are arranged differently with respect to each other on the shuttle as for example, the types of the two lower rows may be large and those of the upper row may be small. Accordingly the bell crank 104a (Fig. 5) may be provided with a raised dwell 110 upon which the pin 102 rides after it leaves the cam 103a so that the force of the spring 53 is greater when either of the two rows of larger types is used.

In another arrangement of the types on the shuttle those of the upper row may be large characters while those of the two lower rows may be small characters. For such an arrangement the bell crank 104b may be provided with a depressed dwell 110b, beyond the cam 103b, to be engaged by pin 102, so that the force of the spring 53 is greatest when the upper row of types is in use; the force of the spring 53 is least when either of the two lower rows of types is in use.

While certain preferred embodiments of the invention have been shown and described, it will be understood that changes in the form, arrangement, proportions, sizes and details thereof may be made without departing from the scope of the invention as defined in the appended claims.

I claim:

1. In a typewriting machine, the combination of printing instrumentalities including two elements, namely an anvil and a hammer to cooperate therewith, operating means to actuate one of said elements against the other, a type shuttle on said anvil, said shuttle being replaceable by another type shuttle having types in which the areas of the printing faces differ from those of the types on the first mentioned shuttle, means to vary the force of the operating means to vary the force of the actuable printing element in accordance with the group of types of the shuttle in use, and means to further vary the force of the operating means in accordance with the size of certain types of each group.

2. In a typewriting machine, the combination of printing instrumentalities including two elements, namely an anvil and a hammer to cooperate therewith, operating means to actuate one of said elements against the other, a type shuttle on said anvil, said shuttle being replaceable by another type shuttle having types in which the areas of the printing faces differ from those of the types on the first mentioned shuttle, means to vary the force of the operating means to vary the force of the actuable printing element in accordance with the group of types of the shuttle in use, means to vary the force of the operating means in accordance with the thickness of the work sheet, and means to further vary the force of the operating means in accordance with the size of certain types of each group.

3. In a typewriting machine, the combination with printing instrumentalities including two sets of types, the printing areas of the types of one set differing in magnitude from those of the types of the other set, and some of the type face areas in one of said type-sets varying in magnitude from the other types in the same set, power means to effect the printing of said printing instrumentalities, and means to cause the power means to cooperate with either set of types, of means to vary the force of the power means in accordance with the set of types in use, and means to further vary the force of the power means in accordance with the various sizes of the types in the single set.

4. In a typewriting machine, the combination of printing instrumentalities including two elements, namely a settable type carrier and a hammer to cooperate therewith, means including a spring to actuate one of said elements against the other, case shifting means for the printing instrumentalities, and means operable by the case shifting means to vary the force of the spring to thus vary the force of the actuable element.

5. In a typewriting machine, the combination of printing instrumentalities including two elements, namely a settable type carrier and a hammer to cooperate therewith, power means including a primary spring and a secondary spring to actuate one of said elements against the other, means to vary the force of the primary spring to

vary the impact of the actuable printing element, case shifting means for the printing instrumentalities, and means operable by the case shifting means to vary the force of the secondary spring to further vary the impact of the actuable element.

6. In a typewriting machine, the combination with a printing hammer, two type shuttles to cooperate therewith, one at a time, each shuttle having a set of types, the printing areas of the types of each set being different than those of the similar type of the other set, each set including also upper and lower case types, and case shifting means, of power means comprising a primary spring and a secondary spring to actuate the hammer to print against the shuttle, means to vary the force of the primary spring to vary the impact of the hammer in accordance with the set of types in use, means to further vary the force of the primary spring to vary the impact of the hammer in accordance with the thickness of the work sheet, and means operable by the case shifting means to vary the force of the secondary spring to alter the impact of the hammer in accordance with the facial area of upper case or lower case type.

7. In a typewriting machine, the combination of a settable type carrier, a hammer to cooperate therewith to print on an interposed work sheet, a spring to actuate said hammer, case shifting means for the type shuttle, and means operable by the case shifting means to vary the force of said spring to alter the impact of the hammer.

8. In a typewriting machine, the combination of a settable type carrier, a hammer to cooperate therewith to print on an interposed work sheet, means including a spring to actuate said hammer, case shifting means for the type shuttle, an anvil to support said shuttle, a rod to support said anvil, case shifting means including a rock shaft and an arm on said rock shaft to engage said rod, and a lever operable by said arm to vary the force of said spring to alter the impact of said hammer.

9. In a typewriting machine, the combination of printing instrumentalities including a settable type carrier, and a hammer to cooperate therewith to print on an interposed work sheet, means including a spring to actuate said hammer, a lever to vary the force of said spring, case shifting means for the printing instrumentalities, and a cam on said level to be engaged by said case shifting means to actuate said lever.

10. In a typewriting machine, the combination of a carriage, printing instrumentalities, power means to actuate the printing instrumentalities, means to alter the extent of letter feed movements of the carriage, means to set the altering means, means operable by the altering means to vary the force of the power means, case shifting means for the printing instrumentalities, and means operable by the case shifting means to further alter the force of the power means.

11. In a typewriting machine, the combination of a settable type carrier, a hammer to cooperate therewith to print on an interposed work sheet, means including a spring to actuate said hammer, case shifting means for the type shuttle, an anvil to support said shuttle, a rod to support said anvil, case shifting means including a rock shaft and an arm on said rock shaft to engage said rod, a bell crank one arm of which is connected to said spring, a cam on the other arm of said bell crank, and a pin on said arm to engage said cam to actuate the bell crank to vary the force of the spring and thus alter the impact of the hammer.

12. In a typewriting machine, the combination of printing instrumentalities including a set of types having upper and lower case types, power means including a prime mover to effect the printing of said printing instrumentalities, case shifting means, the latter including an actuating member, and a lever operable by said actuating member and acting directly on said prime mover to alter the condition of the prime mover to thereby vary its force of action on the printing instrumentalities.

13. In a typewriting machine, the combination of a settable type carrier, a hammer to cooperate therewith to print on an interposed work sheet, power means to actuate the hammer, case shifting means for the type carrier, said case shifting means including a key operated rock shaft, and means operable by said rock shaft to vary the force of the power means.

14. In a typewriting machine, the combination of printing instrumentalities including upper and lower case types, case shifting means, intermittently acting power means to actuate the printing instrumentalities, the power means having stored energy, and means operable by the case shifting means to alter the power means to vary the stored energy therein in accordance with the force required by the printing instrumentalities for the various sizes of the types.

15. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, a spring to actuate the printing element, a second spring to assist in actuating the printing instrumentalities, and means to alter the condition of one of said springs to thus alter the force of action on the printing element.

16. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, two power devices acting simultaneously to drive the printing element, and means to alter one of said power devices to change the force of the printing element.

17. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, a spring to actuate the printing element, a key lever, another spring associated with the printing element, and means operable by the key lever to act on the second mentioned spring to alter the force of the first mentioned spring and thus vary the blow of the printing element.

18. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, two power devices acting simultaneously to actuate the printing element, and means associated with each power device to vary the force thereof independently of the other power device to accordingly vary the blow of the printing element.

19. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, carriage feed mechanism, means to alter the extent of feeding movements of said carriage, two power devices to actuate the printing element, means operable by the altering means to vary the force of one of the power devices, and means including a key to alter the force of the other power means.

20. In a typewriting machine, the combination of printing instrumentalities including a pivoted printing element, two power devices to actuate

the printing element, means to vary the force of one of the power devices independently of the other one, and means independent of the first mentioned means to vary the force of the other power device.

21. In a typewriting machine, the combination of printing instrumentalities including upper and lower case types, a prime mover normally at rest, means to effect the actuation of said prime mover to actuate the printing instrumentalities, case shifting means, and means operable by the case shifting means to alter the prime mover while the latter is at rest to thus vary its force of action on the printing instrumentalities.

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