G. F. BALLOU.

TYPE WRITING MACHINE.

APPLICATION FILED JAN. 22, 1907.

955,892. **Patented Apr. 26, 1910.**

3 SHEETS—SHEET 1.

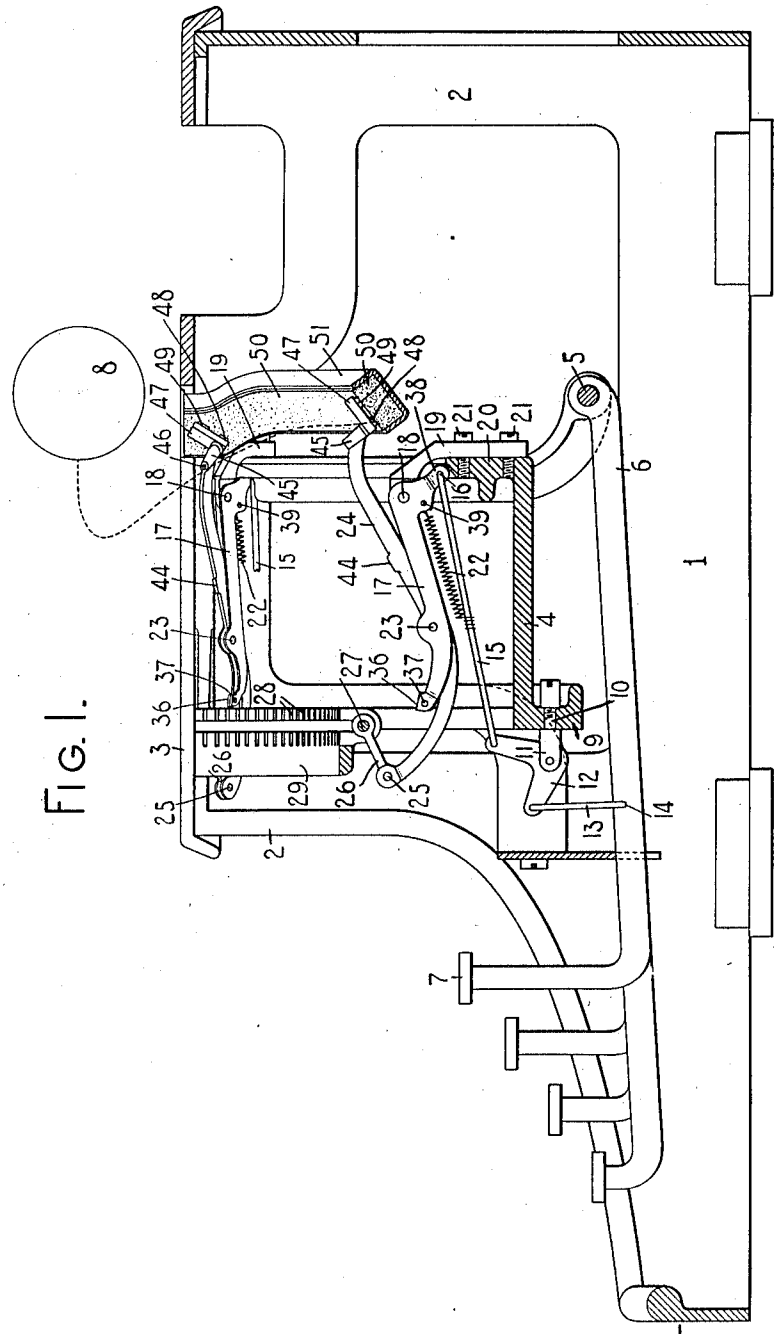

FIG. 1.

WITNESSES:

J. B. Reeves

Charles E. Smith

INVENTOR:

George F. Ballou

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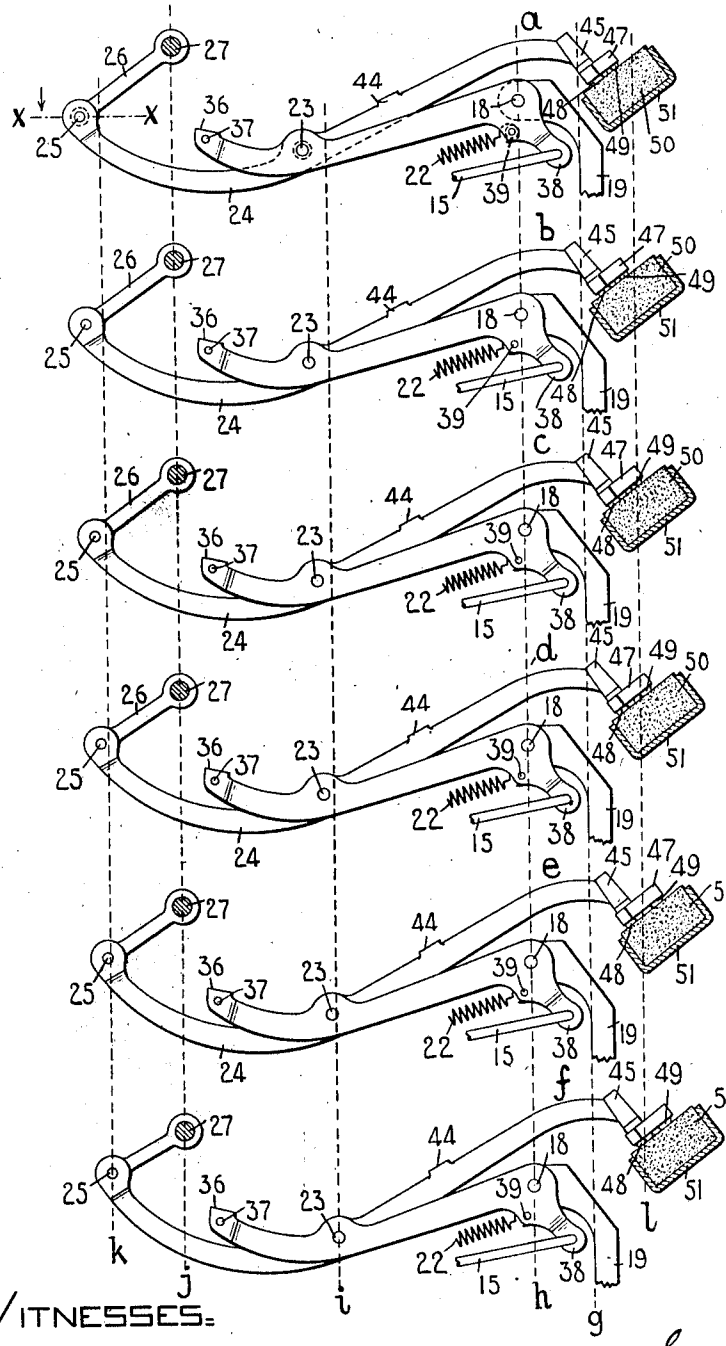

FIG. 2.

FIG. 3.

FIG. 4.

FIG. 5.

FIG. 6.

FIG. 7.

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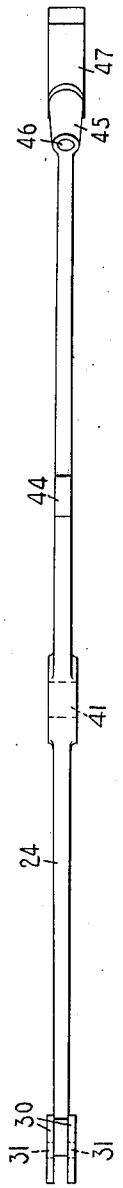

FIG. 8.

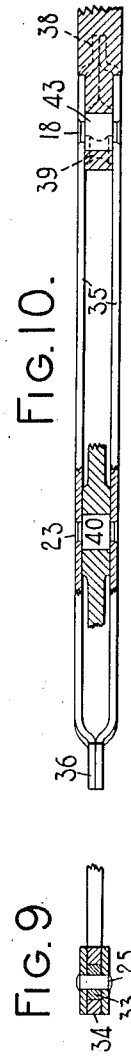

FIG. 10.

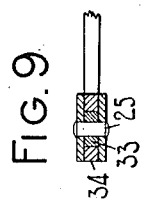

FIG. 9

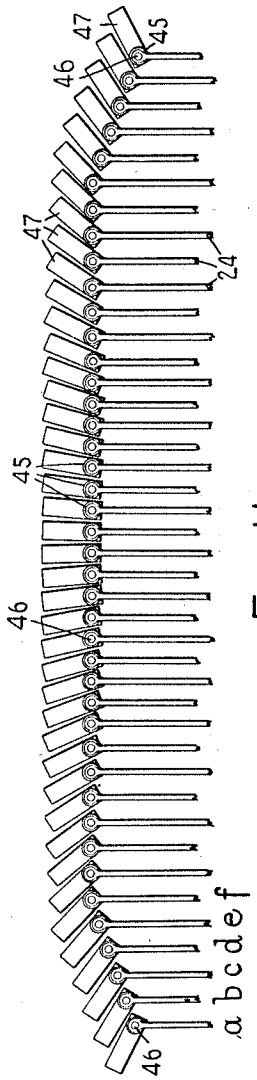

FIG. 11.

WITNESSES:

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By Jacob Tabel

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UNITED STATES PATENT OFFICE.

GEORGE F. BALLOU, OF NEW YORK, N. Y., ASSIGNOR TO YOST WRITING MACHINE COMPANY, OF ILION, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

955,892. Specification of Letters Patent. Patented Apr. 26, 1910.

Application filed January 22, 1907. Serial No. 353,558.

To all whom it may concern:

Be it known that I, GEORGE F. BALLOU, citizen of the United States, and resident of the borough of Manhattan, city of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to typewriting machines and more particularly to type actions, and the invention is in the nature of an improvement on the type action of Arthur W. Smith; application for which was filed May 15th, 1905, Serial No. 260,441.

The main object of my invention is to provide a construction whereby a close and compact arrangement of the type bars in the basket or rest may be provided without liability of the type bars interfering or clashing at or near the type pad or rest when adjacent bars are operated at about the same time.

To the above and other ends which will hereinafter appear, my invention consists in the features of construction, arrangements of parts and combinations of devices to be hereinafter described and particularly pointed out in the appended claims.

In the accompanying drawings, wherein like reference characters indicate corresponding parts in the various views, Figure 1 is a vertical front to rear sectional view of sufficient of one form of typewriting machines to illustrate my invention. Figs. 2–7 inclusive are side elevations of the first six type bars from left to right and some of the associated parts. Fig. 8 is an enlarged detail top plan view of one of the type bars proper. Fig. 9 is an enlarged detail transverse sectional view taken on the line *x*—*x* of Fig. 2 and looking in the direction of the arrow at said line. Fig. 10 is a detail top view of one of the drivers with the associated type bar and hanger shown in section and broken away in part. Fig. 11 is a fragmentary developed top plan view showing the type carrying ends of the system of the type bars.

In the drawings the frame of the machine comprises a base 1 provided with upwardly projecting corner posts 2 that support a top plate 3. An auxiliary frame 4 is detachably mounted in the main frame of the machine and supports the various parts of the type actions. Thus a pivot rod 5 supported by the auxiliary frame constitutes a pivot on which key levers 6 are mounted, each of the key levers being provided with the usual finger key 7. The key levers coöperate with a suitable universal bar to actuate an escapement mechanism for a carriage which is supported in the top plate of the machine and travels from side to side thereof in the usual manner and supports a platen diagrammatically shown at 8 (Fig. 1). The carriage and escapement mechanism may be of any suitable construction, a showing of which in the present instance is deemed unnecessary.

The auxiliary frame 4 is provided with a segmental flange 9 which is perforated for the reception and free passage therethrough of threaded stems 10 on hangers 11 for the type bar actuating bell cranks 12 which are segmentally arranged in order to properly coöperate with different type actions. The forward projecting arm of each bell crank is connected to a depending link 13, the lower end of said link being connected at 14 to the associated key lever 6. The upwardly projecting arm of each bell crank is connected to a pull rod or link 15, the rear end of which is pivoted at 16 to a driver 17 of the associated type bar. The drivers are segmentally arranged and are each pivoted at 18 to an associated hanger 19 secured to a segmental flange 20 on the auxiliary frame by screws 21. A coiled contractile restoring spring 22 connects each associated driver and pull link 15, one end of the spring being secured to the pull link and the opposite end to the driver. Each driver 17 is pivoted at 23 to a type bar proper 24, the forward end of which is pivoted at 25 to a guide link 26. The guide links are segmentally and radially arranged and turn on a fixed pivot wire 27 and work in radial slots 28 in a segment 29 formed on the auxiliary frame.

From an inspection of Figs. 8 and 9 it will be seen that the joint between each guide link 26 and its associated type bar is formed by a bifurcated portion 30 formed at the front end of the type bar, the cheek plates forming the bifurcated portion being perforated at 31 for the reception of a pivot pin 25 which passes through the central opening in a bearing washer 33, said washer being surrounded by an eye 34 formed in the forward end of the guide link 26. The joint is

formed by first placing the washer 33 within the eye 34 of the guide link and then placing the eye with the washer contained therein between the cheek plates 30 formed by the bifurcation in the forward end of the type bar. A pivot pin 25 is then passed through the registered openings in the type bar, washer and guide link and has its ends turned over or riveted as shown in Fig. 9.

From an inspection of Fig. 10 it will be understood that each driver is formed of two parallel plates 35 spaced apart throughout their length except at the forward ends where they are brought together as indicated at 36, a rivet 37 passing through the plates at this point and at the rear ends where the plates are brought together at 38, the plates being perforated at this portion to coöperate with a pull link 15. A shouldered rivet 39 is received between the plates below the point where the driver is pivoted to its hanger and where the plates are spaced apart. This shouldered rivet constitutes means for connecting the rear end of the restoring spring 22 to the driver. Each pivot 23 is in the form of a shouldered rivet, shoulders being provided near opposite ends thereof where the enlarged bearing portion 40 (Fig. 10) of each rivet meets the reduced ends. Each bearing portion 40 is seated within a bearing opening 41 in the type bar, the ends of the pivot being upset or riveted to the driver, thus firmly connecting the parallel plates 35 of the driver at the point of pivotal connection between the type bar and driver. A like construction is provided at the rear end of the driver where it is connected to the type bar hanger, thus each pivot 18 is formed as a shouldered rivet with an enlarged bearing portion 43 which is received within an opening in the associated hanger 19, the shoulders on the rivet being formed at the points where the reduced portions join the enlargement 43. The upset or riveted ends of the pivot pin firmly unite the parallel plates of the driver at this point and rigidly connect the pivot pin 18 to the driver. A stop 44, which in the present instance is in the nature of a slight projection formed on the type bar, co-acts with the end 36 of the driver during the last portion of the printing stroke in order to rigidly connect the type bar and driver during the last portion of the printing stroke in order that they may move at this time together as one part around the pivot 18. The free end of the type bar is formed with a member 45 apertured to receive a conoidal stem 46 which projects from a type block 47. The conoidal stem of the type block is formed near one end thereof and just back of the lower case type 48, the off-set portion of the type block carrying the upper case type 49. By making the drivers in the form of a two-part or parallel plate driver and making the type bar of a single piece instead of vice versa I am enabled to form the type socket of a single piece with the bar instead of riveting it to the bar as in some structures heretofore made, thus providing a stronger structure in which the socket is not liable to become displaced or detached at the riveted connection by the constant hammering of the type bars against the platen. I am also enabled to make the contact points between the driver and type bar at the last portion of the stroke stronger than heretofore where a rivet passing through the space between the parallel plates of the type bar constituted one of the abutments or contacts and was liable to become deranged or broken by the constant striking of one contact on the other.

The two ends of the plates 35 of which the driver is formed are brought together to form a strong and efficient contact 36 which coöperates with the contact 44 formed integral with the type bar proper. This arrangement also provides a means for effecting a proper alinement of the type on each bar and the effect is the same as lengthening or shortening an ordinary single piece type bar for alining purposes. Thus, if either or both of the contacts 36—44 are filed down, it results in decreasing the angular relation between the type bar and driver when the parts are in printing position and in increasing the distance between the type blocks and the pivot 18 of the driver, thereby slightly elevating the type with reference to the printing point. These and other advantages accrue from the type action forming the subject-matter of my present invention. In the normal positions of the parts the faces of the types bear against an ink pad 50 supported in a metallic trough 51 secured at its ends to the top plate of the machine. From an inspection of Fig. 1 it will be understood that this ink pad is situated in a skewed arc.

The type actions shown in Figs. 2–7 inclusive correspond to the first six bars, counting from the left when the machine is examined from the front, and these type bars are marked with corresponding letters *a* to *f* respectively in Figs. 2 to 7 and Fig. 11. From an inspection of Figs. 1 to 7 it will be understood that the front face of the hangers 19 are all secured in the same vertical plane in the rear face of the segment 20, said plane corresponding to the dotted line *g* which is coincident with the front faces of the hangers in Figs. 2 to 7. From these figures it will also be seen that the pivots 18 which connect the drivers to their hangers are likewise situated in a single vertical plane indicated in Figs. 2 to 7 by the dotted line *h*. The pivots 23 which connect the drivers to their type bars are arranged progressively nearer the front of the machine as the sides of the system are approached. This will be

understood from a comparison of Figs. 2 to 7 and from an inspection of the line *i* representing a vertical plane which passes through the pivot 23 of the sixth type bar from the left-hand side of the system or that designated specifically by the reference character *f*.

As indicated by the dotted line *j* in Figs. 2 to 7, it will be seen that the pivot wire 27 for the various type actions is in a single vertical plane so that each of the guide links 26 turns about a fixed center, all of which are in the same vertical plane. From an examination of these figures with reference to the dotted line *k* it will be seen that the forward ends of the type bars extend progressively farther toward the front of the machine as the sides of the system are approached, the distance that one type bar extends beyond the next adjacent bar corresponding substantially to the distance between the pivotal connection 23 of one type bar and that of the next adjacent bar as the sides of the system are approached. It will also be seen that the guide links 26 are gradually longer as the sides of the system of type bars are approached, the end type bars *a* having the longest links, the type bars *b* having slightly shorter links, the links slightly decreasing in length for the five type bars at each side of the system, and those for the intermediate type bars being of uniform length. The pivots 23 of all of those type bars, except five at each side of the system, are in the same vertical plane.

From an inspection of the dotted line *l* which passes through the lower case type on the type bar *f* in Fig. 7, it will be seen that the five type bars *e*, *d*, *c*, *b* and *a* are brought progressively forward toward the front of the machine as the side of the system is approached. It will be understood that the type bars at the opposite side of the system are arranged in a like manner. From this construction an arrangement such as that shown in Fig. 11 is provided for the free ends of the type bars in the basket so that the types or type blocks, which are at gradually increasing angles to their respective type bars as the sides of the system are approached, are brought forward and overlap each other in planes which extend fore and aft of the machine, in order that sufficient clearance may be given the type blocks in the basket and at or near the ink pad without liability of interference when adjacent type bars are actuated at or about the same time. While the distance between the pivots 18 and 23 of the type bars gradually increases as the sides of the system are approached, the construction is such, nevertheless, that the distance between a type at the printing point and the pivot 18 of the associated driver is the same throughout the system. By the arrangement described I am enabled to assemble a large number of type bars in a comparatively small arc without the liability of adjacent type bars clashing or interfering at or near the basket.

From an inspection of Figs. 1 and 11 it will be seen that the rear free ends of the type bars are situated in a skewed arc which corresponds substantially to the skewed arc of the ink pad, to the skewed arc of the pivots 23, and to the skewed arc of the pivots 25. These so-called skewed arcs are each in the nature of double arcs or each of the arcs is of double curvature, the arc in one direction being formed by the segmental arrangement or mounting of the type actions and the other arc being formed by the staggered arrangement of the parts by which the free ends of the type bars are disposed in the manner indicated in Fig. 11.

What I claim as new and desire to secure by Letters Patent, is:—

1. In a typewriting machine, the combination of a system of segmentally arranged upwardly and rearwardly striking jointed type bars, the construction and arrangement being such that type carrying ends of the bars at the sides of the system are arranged farther forward than those at the center of the system when the type bars are in the normal position.

2. In a typewriting machine, the combination of a system of segmentally arranged type bars, a system of segmentally arranged guide links pivoted to said type bars, a system of drivers connected with said type bars, the connection and the construction and arrangement of the parts being such that the type carrying ends of said type bars are arranged in a skewed arc when the type bars are in the normal position.

3. In a front-strike typewriting machine, the combination of a system of segmentally arranged type bars, a system of segmentally arranged guide links pivoted to the ends of said type bars, and a system of key actuated drivers pivoted to said type bars intermediate of the ends thereof, the connection and the construction and arrangement of the parts being such that the type carrying ends of the bars are arranged in a skewed arc when the type bars are in the normal position.

4. In a typewriting machine, the combination of a system of segmentally arranged upwardly and rearwardly striking type bars, guide links pivoted to said type bars, and key actuated drivers pivoted to said type bars, the pivotal connections between the drivers and type bars at the sides of the system being farther forward than those at the center of the system.

5. In a typewriting machine, the combination of a system of segmentally arranged type bars, guide links pivoted to said type bars, the guide links at the sides of the sys-

tem being longer than those at the center of the system, and key actuated drivers pivoted to said type bars.

6. In a typewriting machine, the combination of a system of segmentally arranged upwardly and rearwardly striking type bars, guide links pivoted to said type bars, the guide links at the sides of the system being longer than those at the center of the system, and key actuated drivers pivoted to said type bars, the pivotal connections between the drivers and type bars at the sides of the system being farther forward than those at the center of the system.

7. In a typewriting machine, the combination of a system of segmentally arranged type bars, a system of guide links each pivoted at one end to a type bar and at its opposite end to a fixed pivot, the fixed centers on which said links turn being in the same plane and the links at the sides of the system being longer than those at the center, and key actuated drivers, each pivoted to a type bar intermediate of its ends.

8. In a typewriting machine, the combination of a system of segmentally arranged type bars, a system of guide links each pivoted at one end to a type bar and at its opposite end to a fixed pivot, the fixed centers on which said links turn being in the same plane and the links at the sides of the system being longer than those at the center, and key actuated drivers, each pivoted to a type bar intermediate of its ends, the distance between the pivots of the drivers and the pivotal connections between the drivers and type bars being greater at the sides of the system than at the center.

9. In a front-strike typewriting machine, the combination of a system of normally substantially horizontally disposed segmentally arranged type bars, a system of guided links each connected at one end to an end of a type bar and adapted to turn on a fixed pivot at the opposite end, the links near the sides of the system being progressively longer as the sides of the system are approached, and a system of segmentally arranged substantially horizontally disposed drivers, each connected to a type bar intermediate of its ends.

10. In a typewriting machine, the combination of a system of type bars, a system of guide links, said links near the sides of the system being progressively longer as the sides of the segment are approached and to which the ends of the type bars are pivoted, and a system of drivers, the effective lengths of said drivers near the sides of the system increasing as the sides of the system are approached.

11. In a typewriting machine, the combination of a system of segmentally arranged type bars, each type bar carrying a plurality of types, the types being at progressively greater angles to the bars which carry them as the sides of the system are approached, the types at the sides of the system overlapping and arranged one in front of another, a system of guide links pivoted to said type bars, and a system of drivers connected with said type bars intermediate of the ends thereof.

12. In a front-strike typewriting machine, the combination of a system of type bars, the forward ends of the type bars near the sides of the system projecting forward progressively greater distances as the sides of the system are approached, the type carrying ends of said projecting bars having a corresponding arrangement, a system of guide links, each of said guide links being pivoted at one end to one end of a type bar, and a series of key actuated drivers near the sides of the system, said drivers being pivoted to the type bars nearer the front of the machine as the sides of the system are approached.

13. In a front-strike typewriting machine, the combination of a system of type bars, the forward ends of the type bars near the sides of the system projecting forward progressively greater distances as the sides of the system are approached, the type carrying ends of said projecting bars having a corresponding arrangement, a system of guide links that turn on fixed centers, said fixed centers being in a single vertical plane, each of said guide links being pivoted at one end to one end of a type bar, and a series of key actuated drivers that turn on fixed centers arranged in a single vertical plane, said drivers being pivoted to the type bars intermediate of the ends of the bars, and the drivers near the sides of the system being pivoted to the type bars nearer the front of the machine as the sides of the system are approached.

14. In a visible typewriting machine, the combination of a series of type bars, a series of guide links pivoted to said type bars, and a series of drivers likewise pivoted to the type bars, the pivotal connections between the links and type bars and between the drivers and type bars and the type carrying ends of the type bars being arranged in skewed arcs.

15. In a front-strike typewriting machine, the combination of a series of upwardly and rearwardly striking type bars, a series of guide links pivoted to said type bars, and a series of drivers likewise pivoted to the type bars, the pivotal connections between the links and type bars and between the drivers and type bars and the type carrying ends of the type bars being arranged in correspondingly skewed arcs one in front of another.

16. In a typewriting machine, the combination of a segmental ink pad arranged in a skewed arc, and a system of segmentally disposed type bars, the type carrying ends

of said bars being arranged when at rest in a skewed arc corresponding substantially to the skewed arc of the pad and carrying type that normally bear against said ink pad.

17. In a typewriting machine, the combination of a system of type bars both ends of the bars being arranged in a skewed arc, a system of guide links pivoted to the type bars in a skewed arc, and a system of drivers pivoted to the type bars in a skewed arc.

18. In a typewriting machine, the combination of a system of type bars arranged in a skewed arc, a system of guide links mounted to turn on fixed centers which are in a single plane and pivoted to the type bars in a skewed arc, and drivers mounted to turn on fixed centers in a single plane and pivoted to the type bars in a skewed arc.

19. In a front-strike typewriting machine, the combination of a system of type bars arranged in a skewed arc, a system of guide links mounted to turn on fixed centers which are in a single vertical plane that extends transversely of the machine and pivoted to the type bars in a skewed arc, and drivers mounted to turn on fixed centers in a single vertical plane that extends transversely of the machine and pivoted to the type bar in a skewed arc.

20. In a typewriting machine, the combination of a type bar, a driver pivoted thereto, a contact integral with the driver, and a contact integral with the type bar, said contacts being brought into coöperation at the last portion of the printing stroke so that the type bar and driver move together as one part.

21. In a typewriting machine, the combination of a type bar, a driver pivoted thereto, a contact integral with the driver, and a contact integral with the type bar, said contacts being brought into coöperation at the last portion of the printing stroke so that the type bar and driver move together as one part, the construction and arrangement of the parts being such that the filing away of a portion of either or both of said contacts changes the relation of the type to the printing point.

22. In a typewriting machine, the combination of a single piece type bar having an integral type socket formed at one end thereof, and a key actuated driver pivoted to said type bar intermediate of its ends, said driver being formed of parallel plates secured together and arranged on opposite sides of the type bar and extending beyond the pivot which connects said type bar and driver.

23. In a typewriting machine, the combination of a single piece type bar having an integral type socket formed at one end thereof, and a key actuated driver pivoted to said type bar intermediate of its ends, said driver being formed of parallel plates secured together and arranged on opposite sides of the type bar, the plates being brought together at one end to form a contact which coöperates with the type bar at the last portion of the printing movement.

24. In a typewriting machine, the combination of a type bar, a driver pivoted thereto, and a contact formed on the type bar with which the driver coöperates at the last portion of the printing stroke to cause the type bar and driver to move together as one part, the construction and arrangement of the parts being such that a filing away of a portion of the contact on the type bar adjusts the type relatively to the printing point.

Signed at the borough of Manhattan, city of New York, in the county of New York and State of New York this 21st day of January, A. D. 1907.

GEORGE F. BALLOU.

Witnesses:
E. M. Wells,
C. N. Cushman.