

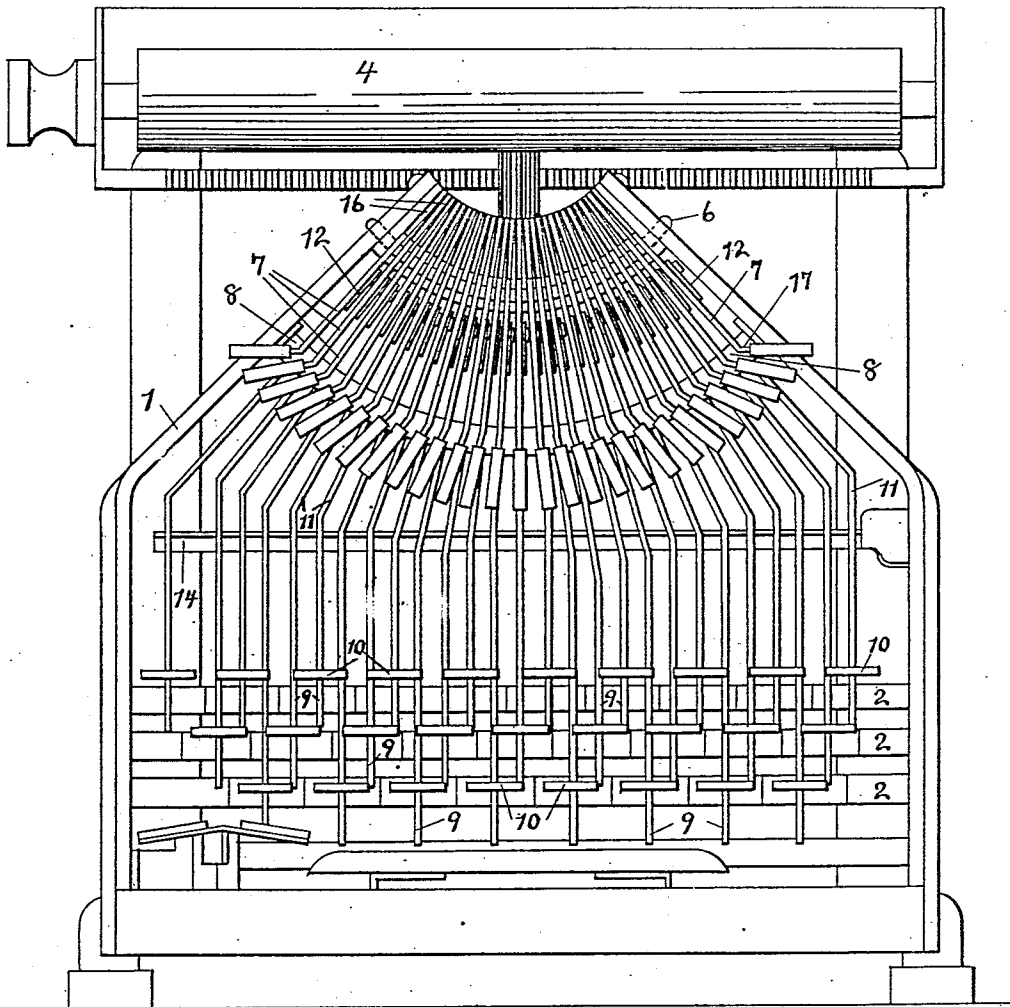
L. S. BURRIDGE.
TYPE WRITING MACHINE.
APPLICATION FILED JUNE 8, 1907.

1,060,582.

Patented May 6, 1913.

2 SHEETS—SHEET 1.

FIG. 1.



WITNESSES:

Frank G. Smyth Jr.
Charles W. Howell Jr.

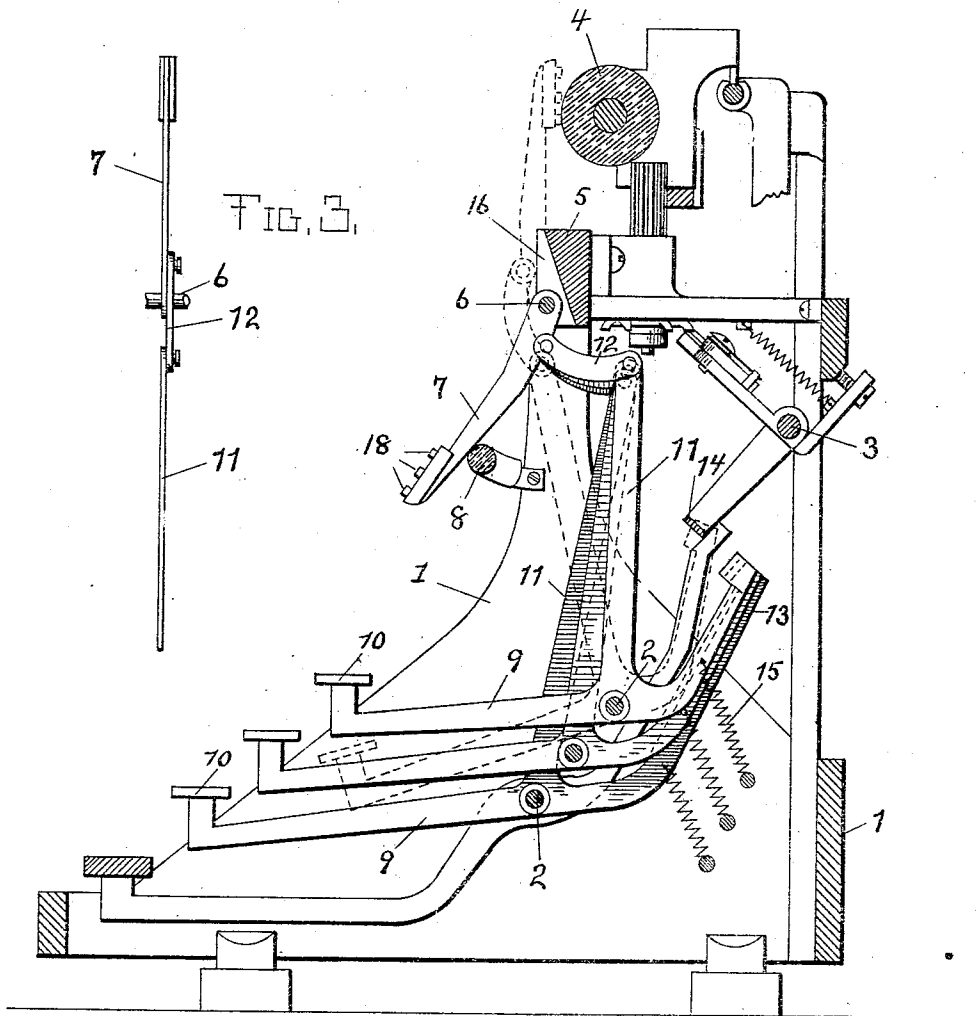
INVENTOR,

Lee S. Burridge

1,060,582.

2 SHEETS—SHEET 2.

FIG. 2.



Frank B. Smyth Jr.
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UNITED STATES PATENT OFFICE.

LEE S. BURRIDGE, OF NEW YORK, N. Y.

TYPE-WRITING MACHINE.

1,060,582.

Specification of Letters Patent.

Patented May 6, 1913.

Continuation of application Serial No. 64,624, filed June 15, 1901. This application filed June 8, 1907.
Serial No. 377,959.

To all whom it may concern.

Be it known that I, LEE S. BURRIDGE, a citizen of the United States, residing in the borough of Manhattan, city, county, 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 the key and type lever motion of a typewriting machine, and while I have illustrated in the drawings hereunto annexed to some extent the other mechanism of a typewriting machine, I do so only for the purpose of making a clear description of the invention, for such other parts may have various forms and constructions other than those herein shown and described.

The purpose of the invention is to produce a machine which will write in sight and in which they key action shall be light and agreeable, the whole being of simple and compact form.

The special kind of writing-in-sight machines to which my invention belongs is what are known as "front-strike" machines. In all former machines of this class with which I am acquainted, the type bar or lever has a motion through substantially a quarter of a circle and is supported horizontally, the result being a hard and disagreeable key action. It has, in other kinds of typewriters, been proposed to swing the type bar in substantially a half circle but in no such instance that I am aware of was the type bar so arranged as to be hung normally in a substantially vertical plane so that an easy and agreeable starting motion of the key is attained and the other advantages herein-after set forth are arrived at.

I have discovered that by the adoption of the special arrangement and construction of parts hereinafter fully described, and shown in the accompanying drawings, I am enabled to use in a front-strike machine, a series of short type levers carrying all of the letters and characters desired suspended from their pivots in a substantially vertical plane and moving through substantially a semi-circle to the point of impact on the platen or the paper thereon.

Other novel details of construction of the key and type lever action will be herein-after set forth.

In the accompanying drawings forming a

part of this specification, Figure 1 is a front elevation of so much of my improved machine as is necessary to an understanding of my invention. Fig. 2 is a vertical sectional view thereof, the plane of section being from front to rear of the machine and centrally thereof. Fig. 3 is a detail view of the connection of an operating link to a type lever.

The frame 1 of the machine is of such construction as to give suitable support to key lever journals 2, the journal 3 of the universal bar and the parts of the usual step-by-step feed mechanism connected thereto, the paper carriage of usual or preferred form (of which it is necessary here only to point out the platen 4), and the inking devices of usual or preferred form, not shown. The frame has at 5 a head or cross-bar to support the journal or journals 6 of the type levers. This is preferably arranged as indicated in Fig. 2 below the level of the platen and substantially under the point of impression of the type thereon. The type carrying members are a series of short levers 7 carried by the journal or journals 6 and arranged radially around the point of impression. When at rest they are hung substantially vertically from their journal or journals, being stopped in that position after impression of the type by a rest 8. The type levers shown carry three types each.

The key levers 9 are preferably arranged in three banks and each has three arms, one projecting substantially horizontally forward to receive the key 10, one projecting rearwardly and upwardly to engage the universal bar, and one projecting substantially vertically upward and connected at its upper end by a stiff link 12 to a point on the type lever under the fulcrum of said type lever so as to make of the latter a lever of the third class. The links are preferably slightly bent to clear the supporting head or cross-piece 5. The arms 11, while substantially vertical when viewed from the side of the machine, as in Fig. 2, are, as may be seen in Fig. 1, bent at increasing angles from the center toward the side so as to cause the upper ends of the arms 11 to converge so that they all lie within a space, transverse of the machine, equal to the width of the set of type levers at the point of attachment of the links 12 to said type levers. Thus the thrusting motion of the links 12 upon the type levers is perfectly direct and

has no tendency to cant or twist the type-levers from their fulcrums. The third arm 13 of the key lever projects rearwardly and upwardly, as shown in Fig. 2, and engages beneath a universal bar 14 which is connected to operate the step-by-step carriage feed mechanism in any usual or preferred manner. The key levers may be returned to normal position by individual springs 15, or otherwise, if preferred.

It will now be seen that when a key lever is depressed as exhibited in dotted lines in Fig. 2, its arm 11 is carried forward and its link 12 causes the corresponding type lever 7 to move about its fulcrum. The type lever being suspended substantially under its fulcrum, the starting motion is extremely easy and the type lever being carried through substantially a semi-circle before it comes in contact with the platen or the paper thereon, a full, direct and powerful blow is given by the type. Furthermore, the direct connection by the link from the key lever to the type lever in the manner shown, is such as to cause no loss of power and no unevenness of touch. It will be noticed that the links act with a direct thrust in starting the motion of the type levers, and with a toggle action, at the moment of impressing the types on the paper. Also the direct connection between the key lever and the universal bar and between the universal bar and the feed mechanism is advantageous in its simplicity and freedom from frictional elements. It will also be noticed that the type levers hang downwardly and that the weight of same is supported by the fulcrum. It will also be noticed that the front of the platen, the journals or fulcrums of the type levers and the free ends of same are substantially in one and the same plane. True the type ends of the levers at their normal position of rest, as shown in the drawings, project slightly forward of this plane and to be in precisely the same plane they would have to move through an arc of exactly 180°, but I consider these parts as shown as lying in substantially the same plane. The type bars, as will be observed, fan outwardly and downwardly from their pivots and lie radially to the printing point in normal position.

Numerous variations and modifications may be made in the connections between the links and the type levers and the key levers; as for instance they may be so changed that the type levers may be moved to the printing position by any suitable action instead of by a thrust action, without departing from the broad principle of my invention. So far as I am aware I am the first to produce a front strike typewriter in which the type levers hang downwardly substantially like an under strike typewriter and I mean to claim that broadly.

Near their fulcra the type levers are

guided and kept from vibration by slots in the head or cross-piece 5. The link 12 is preferably made of quite thin metal and is preferably attached to the type lever by a joint which allows some lateral play as illustrated in Fig. 3. This prevents binding of the parts and enables them to be put together without such careful attention to adjustment or construction as would otherwise be necessary.

The segment 5 is formed with radial slots 16 in which the bars are respectively fitted, and it will be seen that each of said slots extends about half way from the pivot to the printing point at Fig. 2, thereby affording a satisfactory guide for the type bar, and making it unnecessary to employ the center guide usual in this class of type-bar machines. Thus it will be seen that by the expedient of mounting the entire system of type bars in the pendent fashion seen at Fig. 1, the type bars may all be made so short as to accomplish a double object, first to dispense with the usual center guide, and second to avoid the liability of twisting, which is a great objection to the long type bars of the thin sheet metal class. It will be seen at Fig. 1, that the lower ends of the type bars are bent outwardly as at 17 to agree with the directions of their respective types 18, the latter being fixed upon said bends or crooks and lying in overlapping relation or side by side in a single arc, with much more than the usual amount of clearance, which is a great advantage in rapid operation.

Variations may be resorted to within the scope of the invention, and portions of the improvements may be used without others.

This is a continuation of my application Serial No. 64,624 filed June 15th 1901.

Where in the claims I use the term "complement" I mean the full number of at least twenty-six type-bars, one for each letter of the alphabet, as I claim to be the first to construct a complement of at least twenty-six bars in a manner to gain the advantages herein set forth.

Having thus described my invention, I claim:

1. In a typewriting machine, the combination of a series of suspended type levers, a series of substantially horizontal parallel similar links connected thereto, a series of arms or levers connected to said links and pivotally mounted in a series of banks, said arms or levers being bent respectively at different angles relatively to their pivots to bring their several points of attachment to said links immediately in rear of their respective type levers.

2. In a typewriting machine, the series of three arm key levers, one arm bearing a key, the second extending upwardly and connected to the type carrier and the third extending rearwardly and upwardly and ar-

ranged and adapted to operate universal spacing mechanism, substantially as set forth.

3. In a typewriting machine, the combination of a type-bar arranged to move through substantially a semi-circle, an operating lever, and a link connecting the same to the type-bar, said lever and link being so connected that they exert successively a thrust and a toggle action upon the type-bar, to increase the leverage of the lever upon the type-bar at the last part of the printing stroke, substantially as set forth.

4. In a front strike typewriting machine having a keyboard, the combination of a cylindrical platen, a complement of pendent pivoted type-bars entirely below the platen and each arranged to swing forwardly over the keyboard and then upwardly and rearwardly against the front of said platen, a system of thrust bars or links connected to said type levers, and means for operating said thrust bars or links so as to cause the said type levers to swing each through about a semi-circle.

5. In a front strike typewriting machine, the combination of a type lever arranged to move through substantially a semi-circle, a link pivoted at one end to the type lever and a key-bearing lever pivoted to the link at the other end, said key lever pivoted in such relation to the type-lever as to enable said link to swing said type-lever through the semi-circle.

6. In a typewriting machine, the combination of type-levers constructed to swing through substantially a semi-circle and key levers with intermediate links so connected that said links are caused to change their relative position to substantially right angles from their normal position of rest during the operation, and thereby exert successively two actions, a direct action and a toggle action, as shown and described.

7. In a front strike typewriting machine, the combination of pendent type levers pivoted in a segment of a circle, the distance between respective pivots being less than the distance at the free ends of the levers when at normal position at rest, and operating levers having bends so as to be substantially parallel with a portion of the type levers at their normal position at rest, as shown and described.

8. In a typewriting machine, the combination of a complement of rearwardly striking type levers lying about vertical at the normal position at rest, and operating levers having bends so as to be substantially parallel with a portion of the type levers, as shown and described.

9. A typewriting machine all the types of which are arranged in one curved row on rearwardly striking type bars pivoted in a segment of a circle, and so disposed that

the type ends of all the bars hang downward and the pivots sustain the weight of same; the center of said circle being in about the same plane as the pivots and the type bars at rest; means being provided for operating said bars.

10. In a typewriting machine, the combination of rearwardly striking type levers pivoted in a segment of a circle, and constructed to swing approximately a semi-circle from the point of rest to the impression point, and operating levers connected thereto which are pivoted in banks, each bank occupying a straight line and being parallel with the others, and means connecting said operating levers to said type levers in a manner to enable the former to swing the latter through approximate semi-circles.

11. In a typewriting machine, the combination of rearwardly striking type levers constructed to swing through substantially a semi-circle, with operating levers and intermediate links pivoted at each end to the respective levers, the connection being such that the links are caused to move from a horizontal position to a vertical one during the operation, substantially as shown and described.

12. A typewriting machine having a platen, a keyboard and a complement of type bars, all of which are disposed in a single curved row upon the lower ends of rearwardly striking type levers pivotally mounted in a segment of a circle below the platen and so constructed that when at the normal position of rest all the types face toward the front of the machine, and when operated swing forwardly over the keyboard and up and back to the platen.

13. A front-strike writing machine having a platen, a keyboard and a complement of alphabet and character types all of which are disposed closely side by side in a single curved row, a complement of type-bars forming a single row and carrying all of said types and pivoted to swing forwardly over the keyboard and strike rearwardly against the platen and fanning outwardly and downwardly from their pivots and lying radially to the printing point so as to swing substantially more than ninety degrees from normal position to the printing point, and means extending to the keyboard for actuating said type bars.

14. In a typewriting machine having a keyboard and a full set of at least twenty-six alphabet and character types, all disposed in a single curved row, a full set of at least twenty-six type-bars carrying said types, all of said type-bars supported normally in about vertical position and swinging up forwardly over the keyboard and having their point of impression about over the pivots of the middle bars, means being

provided for causing said type-bars to move through substantially a semi-circle from the point of rest to the point of impression.

15. A typewriting machine having a platen, a keyboard and a full set of at least twenty-six alphabet and character types, all of which are disposed closely together in a single curved row, a full set of at least twenty-six pendent type-bars carrying all of said types and all arranged below the level of the platen and pivoted to swing upwardly and forwardly over the keyboard and upwardly and backwardly to the platen; means being provided for imparting to said type-bars motion through about a semi-circle in bringing them to the impression point.

16. A front strike typewriter having a platen, a keyboard, a full set of at least twenty-six alphabet and character types, all of which are disposed in one row upon a full set of at least twenty-six type-bars, all similar and approximately vertical at the normal position of rest and also at the impression position; means being provided for causing the type-bars to move through substantially a semi-circle between said positions, forwardly over the keyboard and backwardly and upwardly to the platen.

17. A front strike typewriting machine having a platen, full set of at least twenty-six alphabet and character types all of which are disposed in one row upon a system of similar pendent bars all pivoted below the level of a platen, full set of at least twenty-six bars or links connected to said type-bars so as to make of the latter levers of the third class, and key-levers connected to said links and so arranged that the type-bars are caused each to move through about a semi-circle from the point of rest to the point of impression.

18. A front strike writing machine having a platen, a complement of at least twenty-six alphabet and character-type-heads all in one row, a complement of similar type-bars carrying all of said types and approximately vertical at the normal position of rest and arranged to swing forwardly from the keyboard and then strike on the front of the platen, and means for causing said type-bars to swing each through a semi-circle.

19. A front strike typewriting machine having a platen, a complement of at least twenty-six alphabet and character types all disposed in one row upon a complement of pendent type-bars arranged to strike on the front of a platen and forming an arc or segment of less than one hundred degrees, a system of links connected to said type-bars, and means for operating said links to cause the said type-bars to swing each through about a semi-circle.

20. A front strike typewriting machine

having a complement of at least twenty-six alphabet and character type-heads, and a complement of type-bars carrying all of said types; all of said type-bars being pivoted in one row at their upper ends in an arc of less than one hundred degrees, and all below the printing point and depending divergently from their pivots and carrying said type-heads at their lower ends.

21. A front strike writing machine having a keyboard at the front of the machine, a complement of at least twenty-six alphabet and character types, all mounted in one row upon a complement of pivoted type-bars connected to keys; said types forming a single row at the extreme front of that portion of the machine which surmounts the keyboard; the type-bars depending divergently from their pivots, and pivoted to swing forwardly over the keyboard; and a platen at the front of the machine and above said types.

22. A front strike writing machine having a keyboard at the front of the machine, of a complement of at least twenty-six alphabet and character types in one row, and a complement of type-bars connected to the keys and carrying all of said types and all pivoted in an arc which lies about in a vertical plane; a platen immediately in rear of the keyboard and above said pivot arc, and said type-bars depending divergently from their pivots and adapted to swing out over the keyboard and upwardly and rearwardly to the platen.

23. A front strike writing machine having a platen, a system of keys, a complement of at least twenty-six types, a complement of similar type-bars carrying said types in one row, and connections from said type-bars to said keys; one of said type-bars being connected to each of said keys, said type-bars being all pivoted in an arc, and depending divergently from their pivots, and said platen being entirely above said pivots.

24. A front strike writing machine having a system of keys, a complement of at least twenty-six types, a complement of similar type-bars carrying all of said types, and operative connections from all of said keys to said type-bars; all of said type-bars being pivoted in an arc and depending divergently from their pivots, so that the type-bar system is materially wider at the type-carrying end than at the pivot end; and a platen entirely above said pivots; said system of keys being materially wider than the complement of type-bars at the pivot ends of the latter.

25. A front strike writing machine having a system of keys, a complement of at least twenty-six type heads, a complement of type-bars carrying all of said type-heads in one row, and operative connections from all of said keys to said type-bars; said type-bars

being pivoted in an arc and depending divergently from their pivots, so that the type-bar complement is materially wider at the type-carrying end than at the pivot end, the printing point being above said pivots; and said connections converging from the keyboard to the pivotal ends of the type-bars.

26. A front strike writing machine having a system of keys, a complement of at least twenty-six type-heads, a complement of type-bars carrying all of said keys to said type-bars; said type-bars being pivoted in an arc and depending divergently from their pivots, so that the type-bar complement is materially wider at the type-carrying end than at the pivot end, and the printing point being above said pivots; and said connections converging from the keyboard to the pivotal ends of the type-bars, and including a system of levers which converge toward the type-bars.

27. A front strike writing machine having a system of keys, a system of at least twenty-six type-heads; a system of type-bars carrying all of said type-heads in one row; said type-bars being pivoted in an arc and depending divergently from their pivots, so that the type-bar system is materially wider at the type-carrying end than at the pivot end, and the printing point being above said pivots; and a system of levers between said keys and said type-bars; said levers extending forwardly and rearwardly and having upstanding arms which converge toward the type-bars.

28. A front-strike writing machine having a system of keys, a system of at least twenty-six type-heads, a system of type-bars carrying all of said type-heads in one row; said type-bars being pivoted in an arc and depending divergently from their pivots, so that the type-bar system is materially wider at the type-carrying end than at the pivot end, and the printing point being above all of said pivots; and a system of bell cranks between said keys and said type-bars; said bell-cranks comprising arms which extend forwardly and rearwardly and also upstanding arms which converge toward the type-bars.

29. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of key-bearing levers between said keys and said type-bars, said levers converging toward said type-bars; and a system of links connecting the converging ends of the type-bars to the converging ends of the levers.

30. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars be-

ing pivoted in an arc and depending divergently from their pivots; a system of key-bearing bell-cranks having a converging arrangement; and means for connecting the converging ends of the bell-cranks to the pivotal ends of the type-bars.

31. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of key-bearing bell-cranks; said bell-cranks having upstanding arms which are bent to converge at their upper ends, and means connecting said upstanding arms to said type-bars.

32. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of bell-cranks to which said keys are connected; said bell-cranks having forwardly and rearwardly extending arms and also convergent upstanding arms which at their upper ends lie in radial planes substantially coincident with the planes of the type-bars; and means connecting said upper ends of said arms to said type-bars.

33. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of bell-cranks bearing said keys; said bell-cranks having upstanding arms which are bent between their ends so that their upper ends are substantially parallel with the type-bars, and means connecting said upper ends to the type-bars.

34. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a complement of type-bars carrying said types; all of said type-bars being pivoted in an arc and depending divergently from their pivots, and the system of keys being materially wider than the complement of type-bars at the pivotal ends of the latter; and means connecting all of said keys to said type-bars, and including a system of key-bearing levers and links directly connecting said levers to said type-bars at the pivotal ends of the latter.

35. In a front strike writing machine, the combination with a platen, and a system of keys, of a system of types; a complement of type-bars carrying said types; all of said type-bars being pivoted in an arc and depending divergently from their pivots; and connections from all of said keys to said type-bars; said connections converging be-

tween the keys and the type-bars, and including a system of levers extending rearwardly from the keyboard and a system of links directly connecting said levers to said type-bars.

36. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a complement of type-bars carrying said types; all of said type-bars being pivoted in an arc and depending divergently from their pivots; a system of converging levers operated by said keys; and links connecting the converging ends of the levers to the type-bars.

37. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of forwardly and rearwardly extending levers between said keys and said type-bars, said levers having upstanding arms which converge at their upper ends; and links connecting the upper ends of said levers to said type-bars.

38. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of key-bearing levers extending up in rear of the type-bars, one lever for each of said keys; and links extending forwardly from said levers to all of said type-bars.

39. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a complement of type-bars carrying said types; all of said type-bars being pivoted in an arc and depending divergently from their pivots; and converging connections from all of said keys to said type-bars; said connections including a system of key-bearing levers extending in rear of the type-bars, and links extending forwardly from said levers and attached to the type-bars between the ends of the latter.

40. In a front strike writing machine, the combination with a platen and a system of keys, of a system of types; a system of type-bars carrying said types; said type-bars being pivoted in an arc and depending divergently from their pivots; a system of bell-cranks bearing said keys; said bell-cranks having upstanding arms; and links extending forwardly from said upstanding arms to said type-bars.

41. A front strike typewriting machine having a complement of at least twenty-six types, a complement of segmentally arranged type-bars all of which when at rest radiate downwardly and outwardly from

ing center; all of said types mounted upon the outer ends of said bars and lying at various angles thereto; the outer ends of the bars being bent to form crooks to coincide with the directions of the types, all of which lie side by side.

42. A front strike writing machine having a complement of at least twenty-six types, a complement of type-bars carrying all of said types and all pivoted in an arc below a platen and divergently pendent from their pivots, and guiding means for the type-bars between the pivots and the platen; all of said types lying side by side.

43. A front strike writing machine having a complement of at least twenty-six types, a complement of type-bars carrying all of said types and all pivoted in an arc below a platen and divergently pendent from their pivots, guiding means for the type-bars between the pivots and the platen, and means for swinging the type-bars through about a semi-circle; all of said types lying side by side.

44. A front strike writing machine having a complement of at least twenty-six types, a complement of type-bars carrying all of said types and all pivoted in an arc below the platen and divergently pendent from their pivots, fixed lateral guides for the type-bars, and key-controlled means for swinging the type-bars each through about a semi-circle; all of said types lying side by side.

45. A front strike writing machine having a complement of at least twenty-six types, a complement of type-bars carrying all of said types, a curved rod upon which all of said type-bars are pivoted below the platen, a system of keys, and connections for enabling said keys to swing said type-bars each through about a semi-circle; all of said types lying side by side.

46. A front strike writing machine having a complement of at least twenty-six types, a complement of type-bars carrying all of said types, a segment having slots in which said type-bars work, a curved rod upon which all of said type-bars are pivoted below the platen, a system of keys, and connections for enabling said keys to swing said type-bars each through about a semi-circle; all of said types lying side by side.

47. A front strike writing machine having a system of at least twenty-six types, a system of type-bars carrying all of said types, a system of key-bearing bell-cranks comprising upwardly extending arms in rear of and connected to the type-bars and forwardly-extending arms bearing the keys; said keys being arranged in banks, and said bell-cranks being mounted upon transverse rods, one rod for each bank of keys.

48. In a front strike writing machine, the combination with a system of type-bars, of

extending arms in rear of and connected to the type-bars and forwardly-extending arms, banks of keys mounted upon said forwardly-extending arms; and transverse rods upon which said bell-cranks are fulcrumed, one rod for each bank of keys; said rods being mounted one above and in rear of another, in accordance with the arrangement of the banks of keys.

49. In a typewriting machine, the combination of a series of suspended type-bars, a series of substantially horizontal links extending rearwardly therefrom, and a series of levers connected to said links and to suitable keys, the said levers being bent inwardly respectively at different angles to bring their several points of attachment to said links immediately in rear of their respective type levers.

50. In a typewriting machine, a series of three-armed key levers, one arm bearing a key, the second extending upward from the lever pivot and connected to a type carrier, and the third arm extending back and up from the pivot to operate the universal spacing bar.

51. In a typewriting machine, the combination of a system of type bars mounted to swing upwardly to the printing point through substantially a semi-circle, operating levers, and links connecting the levers to the type bars, said levers and links being so connected that they exert a toggle action at the completion of the printing stroke, substantially as set forth.

52. A front strike typewriting machine having a complement of at least twenty-six types, a complement of pendent type bars all in a single row and carrying all of said types and arranged to strike on the front of said platen, a series of thrust bars or links, and a row of levers connected successively to said type-bars by means of said links, and so placed with relation to the type-bar pivots as to cause the said type levers to swing through substantially a semi-circle up to the printing point.

53. In a front strike typewriting machine, the combination of a system of type levers each mounted to move through substantially a semi-circle up to the printing point, a link pivoted at one end to each type bar, and a key-bearing lever pivoted to each link at the other end, said key lever so constructed as to enable it to cause said link to turn the type-bar through substantially a half circle.

54. In a typewriting machine, the combination of a system of type bars each constructed to swing through substantially a semi-circle up to the printing point, and key levers with intermediate links connected to change their relative positions to substantially right angles from their normal positions of rest during the printing strokes, and thereby effect a toggle action.

55. In a front strike typewriting machine, the combination of a system of pendent type bars pivoted in an arc, the distance between their respective pivotal points being less than the distance at the free ends of the bars when at rest, and operating levers having bends substantially parallel with a portion of the respective type levers at their normal positions.

56. A front strike typewriting machine having a complement of at least twenty-six types, a complement of similar type bars carrying all of said types and all pivoted below and to strike on the front of said platen, and normally pendent; the printing point, the pivots of the type bars and their free ends when at rest, being about in the same plane, means for operating said type-levers; and types fixed upon crooks formed on the ends of said bars, and all lying side by side.

57. In a typewriting machine, the combination of a full set of at least twenty-six rearwardly striking type bars pivoted in an arc, and constructed to swing approximately a semi-circle from the point of rest to the printing point, operating levers connected thereto and pivoted in parallel banks at different elevations, and links connecting said levers to said type-bars; said levers so placed with reference to said type-bars as to swing the latter through approximately a semi-circle.

58. A typewriting machine having a complement of at least twenty-six types, and a complement of rearwardly striking type-bars carrying all of said types and all pivotally mounted in an arc below the said platen, and so constructed that when at the normal position of rest the types face toward the front of the machine, and lie close together in a single arc, the type-bars being bent near their lower ends to form crooks to agree with the directions of their respective types, and the latter all lying side by side.

59. In a front strike writing machine, the combination with a platen, of a complement of at least twenty-six alphabet and character types ranged closely side by side, a complement of short type-bars carrying all of said types and pivoted to strike rearwardly against the platen and all fanning outwardly and downwardly from their pivots and lying radially to the printing point so as to swing substantially more than ninety degrees from normal position to the printing point, the type-bars having crooks at their lower ends along which the types extend, said crooks lying at progressively increasing angles to the bars, and the types all lying side by side.

60. A front strike typewriting machine having a complement of at least twenty-six alphabet and character types ranged closely side by side, and a complement of segmen-

5 tally arranged type-bars carrying all of said types and having crooks upon which said types are mounted, all of which type bars when at rest radiate downwardly and outwardly from their pivotal portions and from the printing center; said types all lying side by side.

10 61. The combination of a system of key-bearing type-operating levers having upwardly extending arms, and a dog-carrier upon which is fixed a universal bar engaged by said arms.

15 62. In a typewriting machine, the combination of a system of pivoted key-levers, arms extending directly up from the pivots of said levers, and forwardly extending links connecting said arms to a complement of type bars pivoted below the printing point and pendent from their pivots, said levers so
20 constructed as to drive said type bars through approximately a semi-circle.

25 63. In a front-strike writing machine, the combination with a complement of type bars, of a segment in which they are pivoted, said bars being pendent from their pivots and mounted to swing through about half a circle to the printing point, and said

segment having radial slots in which said bars are guided, said slots extending about half way from the pivots to the printing point. 30

64. A full set of at least twenty-six key-bearing type-operating levers having universal bar operating arms of various lengths to give the same stroke to the universal bar. 35

65. A full set of at least twenty-six key-bearing type-operating levers having universal bar operating arms of various lengths to give the same stroke to the universal bar, each of said levers comprising upwardly extending arms to operate the type bars. 40

66. A typewriting machine comprising a keyboard, a full set of at least twenty-six type-bars pendent from their pivots and mounted to swing forwardly over the keyboard, and then rearwardly against the platen, and a system of connections extending from the keyboard upwardly in rear of the type bars to operate the same. 45

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."