A. T. BROWN.

TYPE WRITING MACHINE.

APPLICATION FILED MAY 21, 1901.

962,418. Patented June 28, 1910.

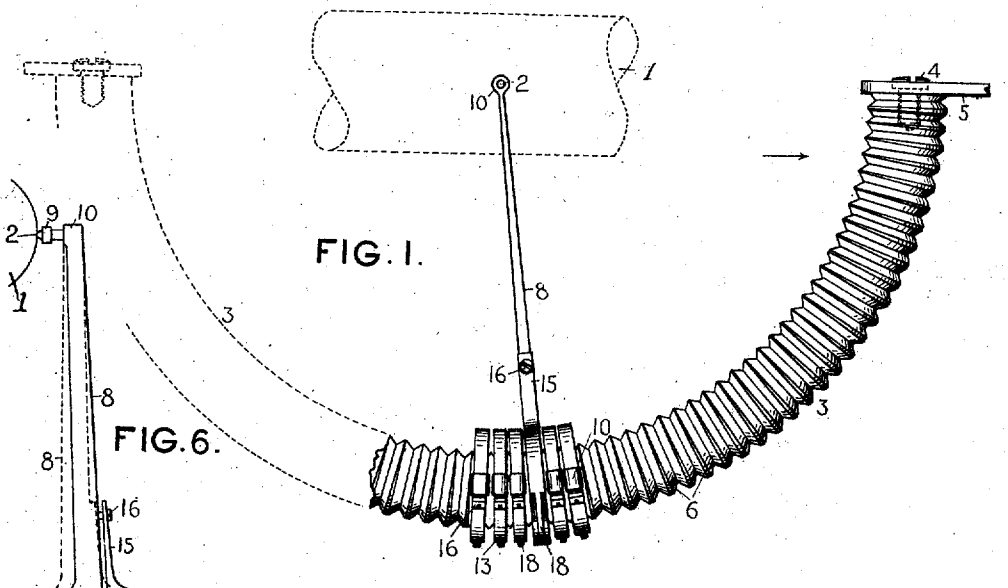

FIG. 1.

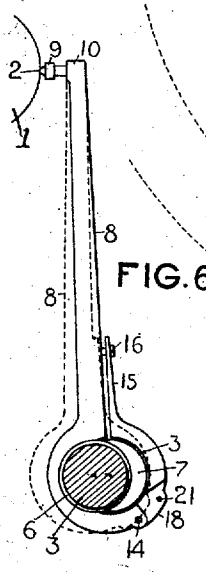

FIG. 6.

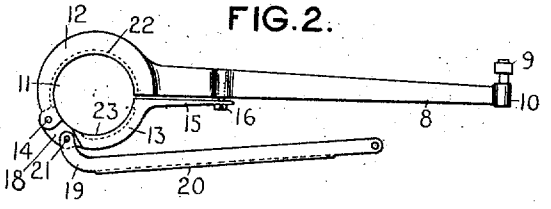

FIG. 2.

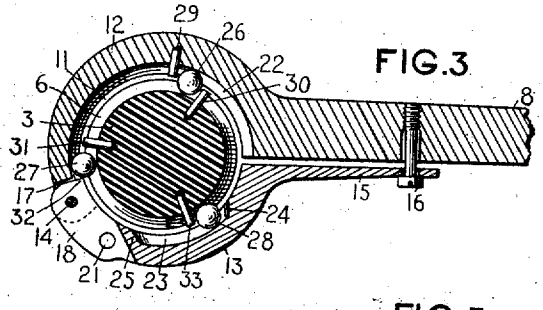

FIG. 3.

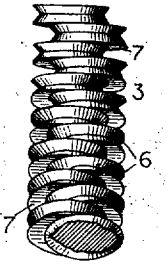

FIG. 4.

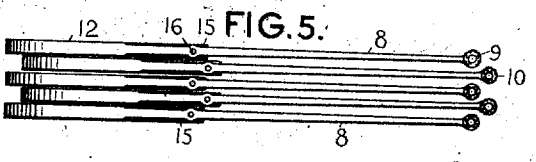

FIG. 5.

Witnesses:

K. V. Donovan.

E. M. Wells.

Inventor.

Alex. T. Brown

by Jacob Felbel

His Attorney

UNITED STATES PATENT OFFICE.

ALEXANDER T. BROWN, OF SYRACUSE, NEW YORK.

TYPE-WRITING MACHINE.

962,418. Specification of Letters Patent. Patented June 28, 1910.

Application filed May 21, 1901. Serial No. 61,206.

To all whom it may concern:

Be it known that I, ALEXANDER T. BROWN, citizen of the United States, and resident of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to the type bars and type bar bearings of writing machines.

The main object of the invention is to mount a large number of efficiently mounted type bars in a small space and yet afford ample clearance for the type ends of the bars.

A further object is to provide for ready attachment and adjustment of the type bars upon their pivotal bearings and their convenient detachment therefrom.

Other objects will hereinafter appear.

In the accompanying drawings, Figure 1 is a fragmentary front view of a segmental supporting bar and a series of type bars hung directly thereon, one of the latter being shown in printing position. Fig. 2 is a side view of a type bar and an attached operating link. Fig. 3 shows, on an enlarged scale, a cross section of the segmental supporting bar, and illustrates the method of mounting a type bar thereon, the hub end of the type bar being shown in vertical section. Fig. 4 shows an inner side elevation of the upper end of the segmental supporting bar, viewed in the direction of the arrow at Fig. 1. Fig. 5 is a diagram illustrating the staggering arrangement of the type bars. Fig. 6 is a sectional side view illustrating the staggering arrangement of the type bar hubs, and the printing position of the type bars, the rear type bars being indicated by dotted lines.

In the several views, similar parts are designated by similar numerals of reference.

1 designates the platen of a front strike writing machine, 2 the common printing center and 3 a supporting bar curved concentrically with the printing center and secured at its ends by screws 4 upon the framing 5 of the machine. Upon said bar is cut externally a set of annular V-shaped ball-bearing grooves 6, the direction of each groove being radial to the printing center, so that the bearings have a converging arrangement. The bar is formed substantially as set forth in the Patent No. 688,744 of Charles P. Mosher, dated Dec. 10, 1901, except that, when viewed from the top or side, it has the appearance of a series of peripherally-grooved disks 7 having a zigzag alternating or staggering arrangement and placed together flatwise or side-by-side, as illustrated at Fig. 4. The disks are formed integrally upon the bar, but their axes do not lie in a single vertical plane, so as to form practically a single continuous curve, as in said patent. On the contrary, one disk or bearing-groove is offset from or arranged out of line with another, so that type bars 8 mounted upon these bearings may lie in staggering fashion, considered endwise, thus affording more room for their types 9 and type sockets 10; or in other words, the type bars can lie more closely side by side, as indicated at Fig. 5, than is the case where the types lie in a single row, since the sockets or types upon the type bars in the rear set (Fig. 5) are separated only far enough to afford clearance for the thin shank portions of the type bars in the forward set, thus condensing the type bar system, or in other words, enabling the type bars to be grouped more compactly about the printing center, so that they may be decreased in length and weight, thus becoming at once stiffer and easier to operate. They may be of substantially equal length, since the offsetting of the grooves, while being in a direction longitudinally of the bars when the latter are at rest, is crosswise of the bars when they are printing, and hence does not materially affect their printing position.

Each type bar comprises, besides the socket 10 and shank 8, a thin ring-like hub or portion having an enlarged eye 11, said hub portion being made up of two opposite segmental parts or sections. One of these eye-segments 12, constituting the upper or main portion of the ring, is formed integrally with the shank 8, and the other eye-segment 13 is hinged at 14 to the free rear end of the segment 12, the latter forming preferably about half of the ring, and the hinge 14 being preferably opposite to the junction of the hub and shank. The segment 12 may form a little more than half of the ring and still slip over a disk 7, which is of smaller diameter than the eye 11. The hinged segment or flap 13, which forms the under portion of the ring, is provided with a thin hasp 15, extending along under the shank of the type bar and perforated at its forward end to receive the shank of a lind-

ing screw 16, which is tapped into the type bar shank 8. The rear end of the main segment 12 is mortised at 17 to receive a thin ear portion 18 of the flap, which is also adapted to forks 19 formed upon the rear end of a folded connecting rod 20, said forks straddling said ear and being pivoted thereto at 21.

The eye-segments are provided with concentric interior ball-bearing V-grooves, the groove in the segment 12 being indicated at 22 and extending continuously around the inner edge thereof, while the groove 23 in the segment 13 is a short one and terminates abruptly at 24 and 25, Fig. 3. Three bearing balls 26, 27 and 28 run in the race-ways formed by the coöperation of the exterior disk-grooves 6 with the interior eye-grooves 22 and 23. The upper ball 26 is confined between two pins, one of which, indicated at 29, is set into the upper portion of the eye-segment 12 and projects into its groove 22, and the other of which, 30, is set into the bar 3 and projects into the disk groove 6. The rear ball 27 is confined between a pin 31 in the groove 6 and an abutment 32 formed at the hinge end of the segment 13; while the lower ball 28 is confined between a pin 33 in the groove 6 and the abrupt terminal 24 of the groove 23. Thus the play of the balls is limited, and they are kept separated at substantially equal intervals, so as to afford a firm support for the type bar all around the bar 3; while by means of the screw 16 the ball-bearing joint may be made so tight as to prevent either longitudinal or lateral shake of the bar; without preventing the free swinging movement thereof to and from the printing point.

The type bar is assembled upon the curved supporting bar 3 before the screw 16 is inserted, the hinged eye-segment or flap 13 being open so that the main eye-segment 12 may be dropped over the disk 7. The balls having been placed in position, the hinge 13 is closed, and its hasp 15 is secured to shank 8 by screw 16, the latter being adjusted until the requisite tightness of the ball bearing joint is obtained. It will be perceived that type bars may be made cheaply and assembled with ease and rapidity; that the type is accurately guided to the printing center; that the screws 16 may be adjusted from time to time to take up play arising from wear or otherwise; that any type bar may be instantly detached when desired, and readily reassembled, without reference to any other type bar; and that the bar 3 cannot spring during the printing strokes of the type bars.

It will be seen that upon the curved or segmental bar 3 are formed radial converging staggered exterior circular bearings arranged side by side and that the type bars are directly hung side by side upon said bearings, the annular grooves upon the segment being encircled by the interiorly grooved type bar hubs; that the grooves upon the segments are substantially equidistant from the printing center, but offset one from another forwardly and rearwardly; that the downwardly curving segment 3 forms substantially half of a ring and is arranged forwardly of the platen and hung by its ends upon the framing of the machine, and is provided with two sets of bearings, those in one set being forward of those in the other set and having a staggering or alternate arrangement with reference thereto; that each type bar hub is composed of separate segmental interiorly grooved sections, the hasp 15 and screw 16 being provided for holding the sections together; that the grooves 6 form pivotal bearings for the type bars, and have a common internal support consisting of the body of the bar 3; that means are provided for adjusting the type bar hubs to said grooves or bearings; that in each type bar the segmental hub sections 12 and 13, taken together, form an incomplete ring, the screw 16 serving to draw the ends thereof toward each other; that the section 12, which is formed integrally with the shank 8 of the type bar, forms substantially half of the hub, the section 13 being hinged thereto at a point opposite the junction of the hub and shank, the screw 16 serving to bind the unhinged end of the section 13 to the section 12; and that the segmental or segment-shaped ball bearing groove 23 has abrupt terminations 24 and 25, which limit the excursions of the ball 28 placed therein.

While I prefer to alternate or stagger the disks or bearings 7, as shown, still the invention includes disks which are offset one from another, whether or not they have a uniform staggering arrangement; and while I prefer to offset or stagger [illegible]d bearings in a direction longitudinally of [illegible] type bars when the latter are at rest, still I do not wish to limit the invention to this particular direction for the offsetting in so far as certain features of my invention are concerned. It will be seen that the type bars are segmentally arranged in two series, the type bars of each series having their pivotal centers situated in a plane that is at an angle to a horizontal plane, or in other words, the type bar pivotal centers of each set are arranged in a vertical plane extending transversely of the machine, that the two planes in which the pivotal centers of the type bars are located are parallel to each other, and that the pivotal centers of the type bars are alternately staggered fore and aft of the machine. While I prefer to use type bars such as illustrated, other kinds of type bars may be employed, if desired, in connection with the novel forms of bearings. While

I prefer to hinge one of the segmental hub sections to the other, still the hub sections may be otherwise attached and otherwise formed within the scope of the invention. While I prefer to adjust the hubs of the type bars so as to secure a close fit of the type bar upon the hanger, other provision for adjustment may be made, or if desired, there may be no adjustment. While I prefer to insert anti-friction balls between the fixed bearings and the type bar hubs, still, so far as certain novel features of the invention are concerned, balls may be omitted. While I prefer to form the offset or staggering bearings integrally upon a single curved bar, still it is not essential that they be formed integrally, so long as they have a common internal support and are encircled by the type bar hubs. While I illustrate a segment forming substantially half of a ring, so as to accommodate a full set of 80 or more type bars, still it is obvious that a longer or shorter segment may be employed and the radius may vary as desired. The invention is applicable to under strike machines, in which a full ring may be employed. It is immaterial that the grooves in the segment and type bar hubs be V-shaped, although I prefer this form.

Although I show the type bars hung upon a set of hangers formed integral upon a single bar, still it is obvious that many important features of the invention relating to the type-bar *per se* may be employed in type-bar joints where the type bars are hung upon detachably mounted hangers. It is also apparent that certain of the novel features disclosed herein may be used upon either the type bar or the hanger, as desired, such use involving a reversal of the parts; for instance, so long as one of the hanger and type-bar elements has an exterior annular groove and the other thereof is composed of attached segmental interiorly-grooved sections, it is immaterial which part has the exterior groove or which part is divided into interiorly grooved sections. So long as the outer bearing is in the form of an incomplete ring, it is not essential that said ring be additionally divided into hinged or attached sections, so far as certain features of my invention are concerned, since in either case the screw 16 may be employed for drawing the ring ends toward each other and placing the parts under spring tension to automatically take up any wear that may occur.

I believe myself to be the first to place a plurality of offset converging bearings side by side and encircle them by type bar hubs, with or without bearing balls.

The purpose of making the arm or hasp 15 thin and long is to render it slightly flexible or elastic, so that when the hub segments of the type bar are drawn toward each other by the screw 16, the hasp may be sprung slightly, thus producing a tension of the hinged section toward the axis of the type bar, so as to take up automatically any wear that may occur in the bearing or in the balls, and also to compensate for any imperfection of the balls. The parts may be so formed that when the hasp 15 is put under a light tension by the screw 16, a perfect fit of the balls in the bearing is secured and this fit is constantly maintained by the capability of the parts to adjust themselves automatically as wear occurs. Many other changes in details of construction and arrangement may be resorted to within the scope of the invention, and parts of my improvements may be used without others.

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

1. In a typewriting machine, the combination with a platen, of a curved bar having converging staggered exterior circular bearings, a series of type bars directly hung side by side upon said bearings, and balls placed between the type bars and the bearings.

2. In a typewriting machine, the combination with a platen, of a segment having formed thereon converging offset exterior annular V-grooves, and type bars having interiorly grooved hubs which encircle said segment, and balls placed in said grooves.

3. In a front strike writing machine, the combination with a platen, of a segment extending downwardly therefrom and having exterior annular converging V-grooves substantially equidistant from the printing center but offset one from another forwardly and rearwardly, forwardly extending type-bars having enlarged interiorly-grooved hubs which encircle said segment, and balls placed in the grooves.

4. In a front strike writing machine, the combination with a platen, of a segment arranged forwardly thereof and hung at its ends upon the framing of the machine, a series of exterior annular converging staggered V-grooves formed upon said segment, type bars having interiorly grooved hubs which encircle said segment, and bearing balls placed in the grooves.

5. In a typewriting machine, the combination with a platen, of a segmental bar having converging exterior annular grooves, and type bars having interiorly grooved hubs of enlarged diameter which encircle said segmental bar, each of said hubs being composed of separate segmental attached sections, and balls placed in the grooves.

6. In a typewriting machine, the combination with a platen, of a segmental bar having formed thereon a series of exterior converging staggered annular grooves, type bars having hubs of enlarged diameter which encircle said segment, each of said hubs being composed of attached segmental sections having interior grooves corresponding to the

grooves in the segmental bar, and balls working in said grooves.

7. In a typewriting machine, the combination with a platen, of a segment upon which are formed converging exterior annular grooves, type bars encircling said segment, each type bar having a hub which is composed of hinged segmental interiorly grooved sections, means for holding the sections together, and balls working in the grooves.

8. In a typewriting machine, the combination with a platen, of a curved bar having formed thereon converging staggered exterior annular grooves, staggered type bars having hubs which encircle said grooves and are composed of hinged segmental interiorly grooved sections, means for holding said sections together, and balls placed in said grooves.

9. In a typewriting machine, the combination with a platen, of a segmental bar having converging offset exterior annular grooves arranged side by side, and type bars having interiorly grooved hubs of enlarged diameter encircling said bearings, balls being placed in the grooves, and means being provided upon the type bars for adjusting the hubs to the bearings.

10. In a front strike writing machine, the combination with a platen, of a segment supported by its ends and having formed thereon two sets of converging exterior annular grooves, one set being forward of the other set and the grooves in one set alternating with the grooves in the other set, type bars having interiorly grooved hubs encircling said exterior grooves, each type bar hub being composed of adjustable hinged segmental sections, and balls placed in said grooves.

11. In a typewriting machine, the combination with a platen and a series of type bars, of a curved bar upon which the type bars are hung, converging pivotal bearings for the type bars being provided in staggering arrangement upon said curved bar.

12. In a typewriting machine, the combination with a platen, of a curved supporting bar having formed thereon converging exterior circular bearings for type bars, said bearings being arranged out of line with one another, and type bars whose hubs encircle said supporting bar and said bearings.

13. In a typewriting machine, the combination with a platen, of a curved supporting bar having formed thereon exterior circular converging bearings, and type bars directly mounted upon said bearings, the latter being substantially equidistant from the printing center but offset one from another in a direction longitudinal of the type bars when the latter are at rest.

14. In a typewriting machine, the combination with a platen, of two sets of exterior circular converging bearings, the bearings in one set alternating with the bearings in the other set, and all of said bearings having a common internal support, and type bars having means for directly engaging said bearings.

15. In a front strike writing machine, the combination with a platen, of a downwardly curving segment supported by its ends and arranged forwardly of the platen and being provided with exterior circular converging bearings for forwardly extending type bars, some of said bearings being set forwardly of the others, and the hubs of the type bars encircling the segment.

16. In a front strike writing machine, the combination with a platen, of a downwardly curving segment hung by its ends upon the framing, two sets of exterior circular converging bearings formed upon said segment, the bearings in one set being forward of those in the other set and alternating therewith, and type bars having means at their rear ends for engaging said bearings.

17. In a typewriting machine, the combination with a platen, of a segment having formed thereon a series of exterior circular converging offset bearings, type bars having hubs of enlarged diameter which encircle said bearings, and means for adjusting the hubs to the bearings.

18. In a typewriting machine, as a support for a series of type bars, a segmental bar having formed thereon a series of external annular converging staggered V-grooves.

19. In a front strike writing machine, as a support for a set of upwardly and rearwardly striking type bars, a segment forming substantially half of a ring and supported at its ends and having upon its exterior a series of external annular converging V-grooves staggered fore and aft of the machine.

20. In a typewriting machine, the combination with a platen, of a type bar, a bearing or hanger, one of said parts having an exterior annular groove and the other of said parts being composed of attached segmental interiorly grooved sections, and balls placed in the grooves.

21. In a typewriting machine, the combination with a platen, of a type bar, a hanger or bearing, one of said parts being exteriorly grooved and the other of said parts being composed of hinged segmental interiorly grooved sections and having means for holding said sections together, and balls placed in the grooves.

22. In a typewriting machine, the combination with a platen, of a type bar, a bearing or hanger, one of said parts having an exterior groove and the other of said parts being composed of adjustable hinged interiorly grooved sections, and balls placed in the grooves.

23. In a typewriting machine, the combination with a platen, of a type bar, a hanger or bearing, one of said parts being exteriorly grooved and the other of said parts being interiorly grooved and encircling the other part, said encircling member forming an incomplete ring, means for drawing the ends thereof toward each other, and balls placed in the grooves.

24. In a typewriting machine, the combination of a type bar having a hub of enlarged diameter which is divided into segmental sections, a fixed bearing encircled by said hub, and balls inserted between said hub and said bearing.

25. In a typewriting machine, the combination with a platen, of a type bar having an enlarged annular hub made up of separate attached segmental sections which are interiorly grooved, an exteriorly grooved bearing encircled by said hub, and balls placed in the grooves.

26. In a typewriting machine, the combination with a platen, of a type bar whose hub is divided into hinged segmental sections, means for holding the sections together, a fixed bearing encircled by said hub, and balls inserted between said bearing and said hub.

27. In a typewriting machine, the combination with a platen, of a type bar whose hub is composed of hinged sections, means for adjusting said sections so as to compensate for wear upon the parts, and a fixed bearing encircled by said hub.

28. A type bar having a shank portion and an enlarged annular hub portion which is divided into segmental sections hinged together and having internal ball-bearing grooves, one of said sections being formed integrally with said shank portion of the type bar, and means for adjusting said sections to compensate for wear upon the parts.

29. A type bar having an enlarged ring-like hub divided into segmental sections, one of said sections being formed integrally with the shank of the type bar, and the other section being hinged thereto at a point opposite the junction of the hub and shank, and means for securing the unhinged end of the hinged section in such manner that pressure may be applied through said sections to parts which support them in order to compensate for wear upon the parts.

30. A type bar having an enlarged ring-like hub divided into segmental interiorly grooved sections, one of said sections being formed integral with the shank of the type bar and the other section being hinged thereto, and means for securing the unhinged end of the hinged section to said shank.

31. A type bar having a shank portion and an enlarged ring-like hub portion which is divided into two sections, one whereof is formed integrally with the shank portion, and the other whereof is hinged thereto and provided with a hasp which extends along said shank and is screwed to the latter.

32. A type bar having a shank portion and a segmental mortised hub portion integral therewith, and a second segmental portion hinged in said mortise and having a hasp extending along said shank portion and secured thereto by a screw, said sections also having interior ball bearing grooves.

33. In a type bar ball bearing joint, the combination of segmental section 12, hinged section 13, screw 16, pins 29, 30, 31 and 33, balls 26, 27 and 28, hinge abutment 32, grooves 6 and 22 and segmental groove 23 having abrupt ends 24 and 25.

34. In a type bar ball bearing joint, the combination of segmental section 12 having mortise 17 and segmental section 13 hinged in said mortise, said section 12 having an interior groove 22 and said section 13 having a segmental interior groove 23 having abrupt ends, balls 26, 27 and 28, and exterior bearing groove 6 encircled by said sections 12 and 13.

35. In a type bar ball bearing joint, the combination of a type bar and a hanger, one of said parts forming an incomplete ring and having means for drawing the ends thereof together, and the other of said parts having an exterior groove, balls working in the grooves, and means for limiting the excursions of the balls.

36. In a typewriting machine, the combination with a platen, of a type bar and a hanger, one of said parts being exteriorly grooved and the other of said parts having an interiorly grooved member encircling said exterior groove and composed of attached adjustable segments, balls being in said grooves, and means for limiting the excursions of the balls.

37. The combination of type 9, shank 8, section 12, section 13, hinge 14, hasp 15, screw 16, grooves 22 and 23, groove 6, pins 29, 30, 31 and 33, abutments 24 and 25, and abutment 32.

38. In a typewriting machine, the combination with a platen, of a plurality of integral offset converging bearings formed side by side, and type bars arranged side by side and having means for engaging said bearings the pivotal centers of said type bars being at substantially the same distance from the printing center.

39. In a typewriting machine, the combination with a platen, of a plurality of radial bearings arranged side by side and offset one from another, and type bars having eyes which encircle said bearings and are at substantially the same distance from the printing center.

40. In a typewriting machine, the combination with a platen, of a plurality of circu-

lar fixed bearings formed integral one with another and arranged side by side, said bearings converging and being also offset one from another, and type bars having hubs which encircle said bearings, balls being interposed between said hubs and said bearings.

41. In a typewriting machine, the combination with a platen, of a plurality of converging external annular bearing grooves arranged side by side and having a common support, one groove being offset from another, type bars having internally grooved hubs which encircle said external grooves, and balls arranged in said grooves.

42. In a typewriting machine, the combination with a platen, of a plurality of converging offset bearings having a common support, type bars having hubs which encircle said bearings, and means for adjusting the type bars to the bearings.

43. In a typewriting machine, the combination with a platen, of a circular bar-like support having two series of type bar ball bearing grooves alternately arranged and disposed radially of the printing point, two series of type bars provided with ball bearing grooves encircling said bearings, and sets of balls in said grooves.

44. In a typewriting machine, the combination with a platen, of a circular bar-like support having two series of type bar ball bearing grooves alternately arranged and disposed radially of the printing point, two series of type bars provided with ball bearing grooves encircling said bearings, said type bars being of equal length and when at rest having a staggering or alternating arrangement at their type ends, and sets of balls in said grooves.

45. In a typewriting machine, the combination with a platen, of a type bar, a bearing or hanger, one of said parts having an exterior annular groove and the other of said parts being composed of yieldingly attached segmental interiorly grooved sections and balls placed in the grooves.

46. In a typewriting machine, the combination with a platen, of a type bar, a bearing or hanger, one of said parts having an exterior groove and the other of said parts being composed of hinged interiorly grooved sections, adjustable means for yieldingly holding said sections together, and balls placed in the grooves.

47. A type bar having a shank portion and an enlarged ring-like hub portion which is divided into two segmental sections, one whereof is formed integrally with the shank portion and the other whereof is hinged thereto and provided with a yielding hasp which extends along said shank and is adjustably secured to the latter by a screw.

48. In a typewriting machine, the combination with a platen, of an exteriorly grooved circular bearing, a type bar having a shank portion and an interiorly grooved enlarged ring-like hub portion encircling said bearing, said hub portion being divided into two segmental sections, one whereof is formed integrally with the shank portion and the other whereof is hinged thereto and provided with a yielding hasp, which extends along said shank and is secured thereto, and balls placed in the grooves.

49. In a typewriting machine and in a ball bearing type bar, a two part type bar, and means for putting one of said parts under spring tension toward the axis of the type bar so as automatically to take up the wear of the ball bearing parts.

50. In a front-strike typewriting machine, the combination of a segment formed with integral, circular, staggered type bar bearings, and type bars of uniform length that are mounted on said segment and alternate in fore and aft arrangement on said segment.

51. In a typewriting machine, the combination of a type bar segment having ball bearings for the type bars formed thereon, and two series of segmentally arranged ball bearing type bars of uniform length which are staggered in the direction of the lengths of the bars when at rest, and the pivotal axes of said two series of bars being in two planes that are at angles to a horizontal plane.

52. In a front-strike typewriting machine, the combination of a type bar segment having ball bearings for the type bars formed thereon, and a series of segmentally arranged ball bearing type bars of uniform length and all of which are mounted to turn on the ball bearings on said segment, said type bars having their axes at substantially the same distance from the printing center, said axes alternating and occupying two vertical planes that extend transversely of the machine.

53. In a typewriting machine, the combination of a type bar segment having ball bearings for the type bars formed thereon, and a series of segmentally arranged ball bearing type bars of uniform length mounted to turn on the ball bearings on said segment, the pivotal centers of said type bars being situated in two vertical parallel planes fore and aft of the machine and at substantially the same distance from the printing center and alternating in their fore and aft arrangement.

54. In a typewriting machine, the combination of a vertically disposed segment with overlapping staggered type bar bearings formed peripherally thereon, and segmentally arranged upwardly and rearwardly striking type bars of uniform length mounted on said segment and having their pivotal centers situated in two vertical planes, and all of the pivotal centers of said bars being

at substantially the same distance from the printing center.

55. In a front-strike typewriting machine, the combination with a platen, of a plurality of segmentally arranged offset overlapping and converging type bar bearings located side by side and having peripheral grooved bearing surfaces, and upwardly and rearwardly striking type bars of uniform length arranged side by side and having means for engaging said bearings, the pivotal centers of all of said type bars being at substantially the same distance from the printing center.

56. A ball bearing type bar, the hub end of which comprises two transversely divided sections having internal substantially V-shaped grooves therein substantially in the plane of movement of said bar, and means for securing said sections together.

57. In a typewriting machine, the combination of a grooved bearing, a type bar having an eye formed of transversely divided sections and with internal substantially V-shaped grooves therein substantially in the plane of movement of said bar, means for uniting said sections, and rolling devices in said grooves.

58. In a typewriting machine, the combination of two sets of upwardly and rearwardly striking segmentally arranged type bars, and ball bearings on which said type bars are mounted, said ball bearings including grooved bearing surfaces on which the balls bear, the axes of the type bars of one set being situated in one plane and the axes of the type bars of the other set being situated in a different plane parallel with the first mentioned plane.

59. In a typewriting machine, the combination of two sets of upwardly and rearwardly striking segmentally arranged type bars, the axes of the type bars of one set being situated in one vertical plane and the axes of the type bars of the other set being situated in a vertical plane parallel with said first mentioned plane, and ball bearings on which said type bars are mounted, the balls for each type bar being arranged in a circular series, the plane of said series being coincident with the plane of movement of the associated type bar.

60. In a typewriting machine, the combination of two sets of segmentally arranged type bars, the type bars of one set alternating with the type bars of the other set and the axes of the type bars of one set being situated in one plane and the axes of the type bars of the other set being arranged in a single plane parallel with said first mentioned plane, and ball bearings for said type bars, the balls for each type bar being arranged in a circular series in a plane substantially coincident with the plane in which the associated type bar moves.

61. In a typewriting machine, the combination of two series of segmentally arranged upwardly and rearwardly striking type bars, the type bars being staggered so that the type bars of one set alternate in their arrangement fore and aft of the machine with the type bars of the other set, the axes of the type bars of one set being situated in one vertical plane and the axes of the type bars of the other set being situated in another vertical plane parallel with said first mentioned plane, and ball bearings for said type bars, said ball bearings including a series of circularly arranged balls for each type bar arranged in a plane substantially coincident with the plane of movement of the associated type bar.

62. In a typewriting machine, the combination of two sets of segmentally arranged upwardly and rearwardly striking type bars, the type bars of one set staggering or alternating fore and aft of the machine with the type bars of the other set and the hubs of both sets of type bars being provided with ball bearing grooves, two sets of peripheral ball bearing grooves, the centers or axes of which are arranged in arcs one back of the other and in parallel planes and with the grooves in one arc staggering or alternating with those in the other arc, and anti-friction balls for the two sets of type bars and their said peripheral bearing grooves.

Signed at Syracuse, in the county of Onondaga, and State of New York, this 8th day of May A. D. 1901.

ALEXANDER T. BROWN.

Witnesses:
J. L. THOLEUS,
W. S. HAUN.