

929,259.

3 SHEETS—SHEET 1.



E. M. Wells.
D. A. Carpenter.

Herbert H. Steele

By Jacob F. Fitch
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H. H. STEELE.
TYPE WRITING MACHINE.
APPLICATION FILED FEB. 26, 1906.

929,259.

Patented July 27, 1909.

3 SHEETS—SHEET 2.

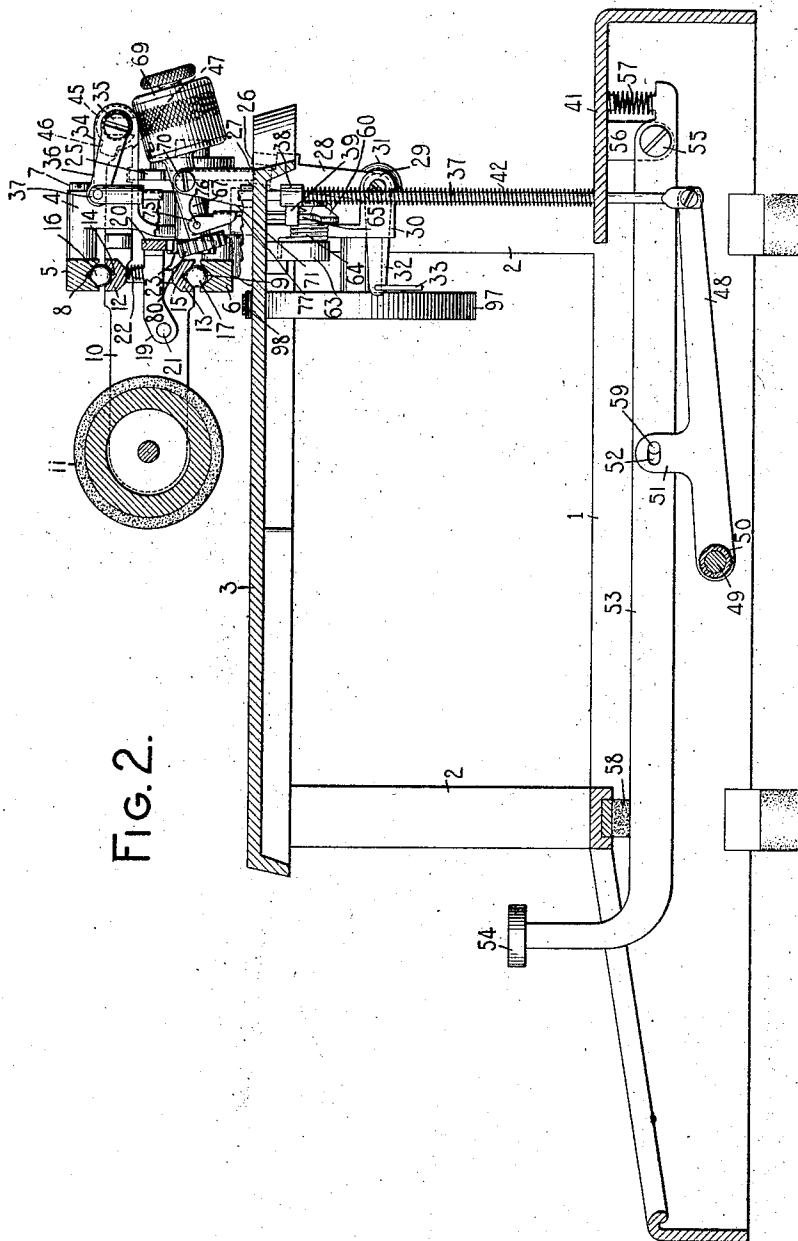


FIG. 2.

WITNESSES:

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INVENTOR:

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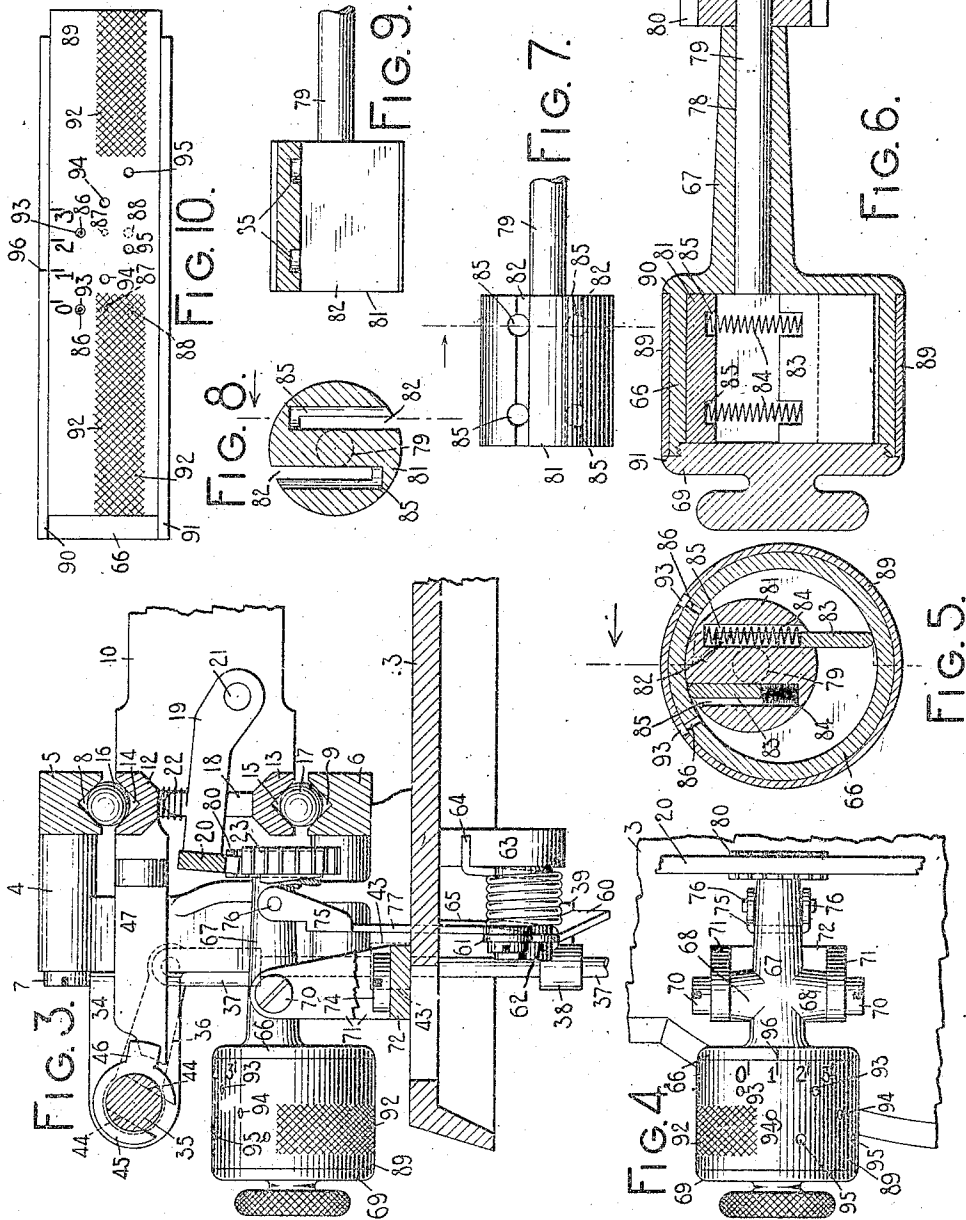
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3 SHEETS—SHEET 3.



WITNESSES:

E. M. Wells
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INVENTOR:

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UNITED STATES PATENT OFFICE.

HERBERT H. STEELE, OF SYRACUSE, NEW YORK, ASSIGNOR TO THE MONARCH TYPEWRITER COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

TYPE-WRITING MACHINE.

No. 929,259.

Specification of Letters Patent.

Patented July 27, 1909.

Application filed February 26, 1906. Serial No. 303,056.

To all whom it may concern:

Be it known that I, HERBERT H. STEELE, a 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 improvements in carriage-retarding devices for typewriting machines, and consists of the features of construction and combinations and arrangements of parts which are hereinafter described and specified in the claims.

In the accompanying drawings in which like reference numerals designate like parts in different views, Figure 1 is a rear and sectional elevation of the frame and parts of the mechanism of a Monarch typewriting machine to which carriage-retarding apparatus embodying the invention is applied; Fig. 2, a vertical section, on the plane indicated by the broken line near the left of Fig. 1, of said frame and parts of the mechanism of the machine, the sectional plane being seen from the right side of the machine. Fig. 3, an enlarged vertical section of the upper rear part of the machine, the section being at right angles to the axis of the platen, and the sectional plane being seen from the left side of the machine; Fig. 4, a plan of a fragment of the top-plate and of a hollow device mounted thereon which forms part of the carriage-retarding apparatus; Fig. 5, a cross-section of said hollow device and another cooperative rotary device confined therein; Fig. 6, a longitudinal section of said device on planes containing the broken lines on Fig. 5, the direction of the view being indicated by an arrow; Fig. 7, a side view of said rotary device; Fig. 8, a cross-section thereof on the plane containing the broken line on Fig. 7; Fig. 9, a longitudinal section thereof on the plane containing the broken line on Fig. 8, the direction of the view being indicated by an arrow; and Fig. 10, a view of the exterior of said hollow device developed.

Although the drawings illustrate this invention applied to a Monarch machine, it is to be understood that it is also applicable to numerous other machines, including such as are called "under-stroke" machines, as well as "visible-writing" machines.

The carriage-retarding mechanism or ap-

paratus in which the invention is embodied is attached to the top plate of the machine near its rear edge and on the right, preferably, of a vertical plane containing the axis of the escapement pinion. The frame of the machine is composed of the base 1 and four posts 2, only three of which are shown, and the top plate 3. On the back part of the top-plate are two standards 4, which are fastened to the top-plate and to which upper and lower guide-rails 5 and 6 are attached by screws 7, these guide-rails having in them grooves 8 and 9 extending throughout the length of the rails. The carriage 10, in which is mounted the platen 11, has formed on it grooved guides 12 and 13, which extend from end to end of the carriage, the grooves 14 and 15 of these guides forming with the grooves 8 and 9 of the rails 5 and 6, ball or roller channels in which are shown anti-friction balls 16, 17. The carriage is thus supported by the rails 5 and 6 and is movable on the balls in opposite directions over the top-plate 3. The guides 12 and 13 are connected together by webs 18, and between these guides extend arms 19 which are pivoted to the ends of the carriage, and to whose rear ends are affixed the carriage rack 20 which is movable up and down on the pivots 21 of the arms 19. Springs 22, acting on the arms of the rack, tend to keep the rack in the position in which it is shown in Fig. 2, that being its normal position.

The rack 20 normally engages a pinion 23 which is fast on a shaft, having a bearing in a bracket 24, affixed to the top plate 3, and on the rear end of this shaft is an escapement wheel 25, arranged to co-act with the feed-dogs 26 and 27 (shown in dotted lines in Fig. 2) which are mounted on a dog-rocker 28, whose rock-shaft 29 is pivoted at its ends between lugs on a bracket 30 affixed to and extending downward from the top-plate 3. On the rock-shaft 29 is a spring 31 which tends to keep the stepping-dog 27 in engagement with a tooth of the escapement wheel 25. An arm 32, fast on the dog-rocker, extends in front of the rock-shaft 29, and to the front end of this arm is secured a link 33 which extends downward therefrom to the universal bar of the machine. Whenever the universal bar is actuated by depressing a character-key or space-key, the front end of the arm 32 is drawn downward by the link 33, the stepping dog 27 is swung forward

free from the escapement-wheel, and the holding dog 26 is moved into engagement with the escapement-wheel, and when the universal bar rises after the key has been released, the stepping dog 27 reengages with the escapement wheel and the carriage advances a letter-space distance. But if desired a reverse-feed escapement may be used instead of that above described.

To the standards 4 are rigidly attached rearwardly extending arms 34, in which a stop-bar 35 is journaled at its ends. On the right end of this stop-bar, outside of the adjacent bracket 34, is a crank-arm 36 which normally extends both forward and upward from the stop-bar and to which is pivoted at its front end a rod or link 37, which extends downward from the crank-arm, through the top-plate and into the base 1 of the machine. A collar 38, having on it a projection 39, is fastened by a screw 40 to the rod 37, and on the rod 37, between the collar 38 and the part 41 of the base, is a coil-spring 42 which presses upward against the collar, and on the rod 37 above the top-plate 3 is a collar 43 which is fast on the rod. The collar 38 is so attached to the rod 37 that the projection 39 of the collar extends forward from the collar and rod. The stop-bar 35 has cut in it on opposite sides slots or recesses 44 at letter-space distances apart, and on this bar are tabulator-stops 45 which fit in these recesses and which are adjustable on the bar, each tabulator-stop being formed to engage a recess at the back of the bar and another at the front of the bar. Each tabulator-stop has a lug 46 which extends forward and upward from the body of the stop secured to the stop-bar, when the bar is in its normal position, in which it is ordinarily held by the upward pressure of the spring 42 against the collar 38 on the rod 37. A stop 47, which is rigidly attached to the back of the carriage 10 about midway between the ends of the carriage, extends backward nearly to the stop-bar 35, its rear end being out of alinement with the lugs 46 of the tabulator-stops when the stop-bar is in its normal position, and then being movable by the carriage past the stops 45 and under the lugs 46.

The rod 37 is pivoted at its lower end to a lever 48, whose fulcrum is a screw 49 passing through its front end and into a boss 50 formed on the frame of the machine. On this lever is an upwardly extending ear 51 in which is a slot 52. A key-lever 53, having on it a tabulator key 54, is pivoted at its rear end by a screw 55 to a lug 56 formed on the under side of the roof 41 of the base and extending downward therefrom, there being behind this lug a coil-spring 57 bearing against the key-lever and the part 41 of the base and tending to keep the key lever in its normal position in contact with the

pad 58 near its front end. A pin 59 fixed on the key-lever 53 extends through the slot 52 in the ear 51 of the lever 48. The construction is such that when the key 54 is depressed the rear end of the lever 48 is forced downward and the link 37 rocks the bar 35, bringing the lugs 46 into the path of the stop 47.

A lever having arms 60-61 is pivoted by a shouldered screw 62 to a lug 63 on the under side of the top-plate 3, and on the screw 62 is a coil-spring 64 which bears at one of its ends against the lug 63 and at its other end against the lower edge of the arm 60 of the lever, this arm of the lever extending in front of the rod 37 and under the projection 39 of the collar 38, and having on its upper edge a stop 65 which makes contact with the under side of the top-plate when the lever is in its normal position, where the spring 64 tends to keep it. A lever substantially the same as this has been used in the Monarch machine to actuate a rack-lifting device, operative to raise the carriage-rack out of engagement with the escapement-pinion, and thus to release the carriage from the control of the escapement. Since, however, a part of the carriage-retarding mechanism herein shown is operative through the lever 60-61 to lift the carriage-rack from the pinion 23, the lifting device heretofore employed is not necessary in a machine provided with this carriage-retarding mechanism.

The retarding-mechanism proper consists of pneumatic apparatus in the nature of an air-pump, said apparatus comprising two coöperative devices, one of these being arranged to be rotated by the carriage, and one of them containing an air-chamber whose wall surrounds and makes contact with the other device. The pneumatic apparatus is preferably constructed and arranged as it is shown herein, although it is apparent that for this particular apparatus a modification thereof might be substituted. The rotary device of the apparatus shown in the present instance is confined in the other device. The latter consists of a hollow cylindrical part 66 having on it an extension 67 on which are formed bosses 68, the cylindrical part 66 being closed at its rear end by a screw plug 69. This device is pivoted by shouldered screws 70 to and between the sides 71 of a support whose base 72 rests on the top plate 3 and is attached thereto by a screw 74, the screws 70 extending into the bosses 68 and the whole device being movable on the axis which coincides with the axes of the screws 70. To the extension 67 near its front end a yoke 75 is pivoted by pins 76, this yoke being on the upper end of a link 77 which extends through the top-plate and is pivoted at its lower end to the arm 61 of the lever 60-61. In the extension 67 of this pivoted device is a round hole 78 in which is a shaft

79, the extension 67 forming a bearing for this shaft whose axis is above and parallel to that of the cylindrical part 66 of the device. On the front end of this shaft is a pinion 80 which is fast on the shaft. When the lever 60—61 is in its normal position, the pinion 80 is below and out of engagement with the carriage-rack 20 which then engages the escapement-pinion 23, and the hollow device described is in the position shown in Fig. 2, this being its normal position. It is movable from this position by the lever 60—61 acting on it through the link 77 and yoke 75 to the position shown in Fig. 3, and when it is thus moved the pinion 80 engages with the carriage-rack and lifts this rack out of engagement with the escapement-pinion, so that the pinion 80 and shaft 79 may then be rotated by the action of the carriage rack.

The rotary device includes a cylindrical part 81 which is contained in the cylindrical part 66 of the other device and which is fast on the shaft 79, its axis coinciding with that of the shaft, and its cylindrical surface being tangent to the internal cylindrical surface of the part 66 of the other device, and these cylindrical surfaces receding from each other on opposite sides of the line along which they meet. The ends of the cylindrical part 81 of the rotary device fit against the ends of the cylindrical part 66 of the other device. The rotary cylinder 81 has two deep slots 82 cut therein longitudinally thereof, said slots being on opposite sides of the axis of the cylinder, parallel to each other, and opening on opposite sides of the cylinder. In each of these slots there is seated a blade or wing 83, of a length substantially equal to the length of the cylinder, the wing being adapted to slide in and out as the cylinder is rotated. Said wings are pressed outward to keep their outer edges constantly pressed against the inner cylindrical surface of the part 66 by coil-springs 84 contained in holes 85 drilled in the part 81, the holes extending through one face of each slot but not through the other face, as appears in Fig. 7, for it is essential that each wing 83 should so fit one face of the slot containing the wing as to prevent air from passing freely from one side of the wing to the other. In the cylindrical wall of the part 66 are two small air-passages or ports 86, two others 87 larger than the passages 86, and two others 88 larger than the passages 87, these passages being arranged in pairs and one of each pair being on one side and the other on the opposite side of the plane which contains both the axis of the shaft 79 and the line along which the cylindrical part 81 of the rotary device meets the internal cylindrical surface of the part 66 of the other device. A thin endless band or sleeve 89 surrounds and is secured on the part 66 of the hollow

device between the flange 90 at the front end thereof and a similar flange 91 formed on the plug 69. This sleeve closely fits the external surface of the part 66 but is movable on it. Portions 92 of the sleeve are roughened or knurled to enable it to be easily turned with the hand. In this sleeve are three pairs of holes 93, 94 and 95, and on the sleeve close to the front edge are marks designated "0", "1", "2" and "3", and on the flange 90 is a similar mark 96, these marks being so arranged that when the mark "0" registers with the mark 96 all of the air-passages in the wall of the cylinder 66 are closed by the sleeve 89, and that when the mark "1" registers with the mark 96 then the holes 93 in the sleeve 89 register with the holes 86 in the hollow cylinder, and that when the mark "2" registers with the mark 96 the holes 94 in the sleeve register with the holes 87 in the cylinder; and that when the mark "3" registers with the mark 96 the holes 95 in the sleeve register with the holes 88 in the cylinder, and that only two of the holes in the sleeve register with holes in the cylinder at the same time.

The machine contains a spring drum 97 which is connected by a strap 98 with the carriage, so that when the escapement is actuated, or the carriage rack is raised out of engagement with the pinion 23, the carriage will be moved toward the left by the action on it of the spring drum and strap.

When the tabulator-key 54 is depressed the stop-bar 35 is turned on its axis by the action of the lever 53 on the lever 48 and of the latter lever and the rod 37 on the crank-arm 36, the lugs 46 on the tabulator-stops 45 being moved downward into alinement with the stop 47 on the carriage. At the same time the projection 39 on the collar 38 fixed to the rod 37 forces downward the arm 60 of the lever 60—61, and the link 77 is raised by the arm 61 of this lever, so that the device 66—67 is moved on its pivotal axis to the position in which it is shown in Fig. 3. The carriage-rack then engages the pinion 80, and is out of engagement with the escapement-pinion from which it has been raised by the action of the other pinion on the rack. The rod 37 is drawn downward until the collar 43 meets the top-plate 3, and while this collar is held by pressure on the tabulator-key in contact with the top-plate, the lugs 46 on the stops 45 are kept in the path of the stop 47, and the device 66—67 and the pinion 80 and the carriage-rack are kept in the positions shown in Fig. 3. As soon as the rack 20 is thus disengaged from the escapement-pinion the carriage is drawn toward the left by the spring-drum 97, and the pinion 80, shaft 79 and the rotary device contained in the hollow cylinder 66 are turned together on the axis of the shaft by

the action of the rack on the pinion 80. The carriage continues to travel and to so actuate said rotary device until the stop 47 meets the lug 46 of one of the tabulator-stops 45. Then the tabulator-key is released whereupon the key and stop-bar are restored to their normal positions by the springs 57 and 42, and as the collar 38 on the rod 37 rises, the spring 64 restores the lever 60-61 to its normal position, the front end of the device 66-67 and the pinion 80 being drawn downward by the link 77 to the positions shown in Fig. 1, and the carriage rack descends to the escapement-pinion 23 with which it re-engages just before the tabulator-stop leaves the stop 47.

When the rotary device of the pneumatic apparatus is actuated as described, air is compressed in front of and rarefied behind each of the wings 83 during every rotation of the shaft 79, and the compressed air reacting on the wings offers a yielding resistance to the movement of the carriage. The carriage is retarded most when all of the air-passages 86, 87, 88 are closed, it then being necessary for the air to leak from one side of each wing to the other as the outer edge of the wing approaches and recedes from the line along which the cylindrical surfaces of the parts 66 and 81 meet, and since the cylindrical part and wings of the rotary-device fit closely against the end and cylindrical wall of the other device, the air leaks so slowly past the wings that, if all of the air passages are closed, a strong and slowly yielding resistance opposes the motion of the carriage. If the air-passages 86 are opened, air is forced through one of them from the cylinder 66, and air enters this cylinder through the other, and the motion of the carriage is then less affected than it is under the conditions previously stated. By opening the air-passages 87 or 88 the resistance offered to the carriage may be further reduced. Air issues from and enters the cylinder 66 through the passages 87 and 88 as it does through the passages 86, and obviously air is compressed less if the passages 88 are open than it is if the passages 87 are open, and less if the passages 87 are open than it is if the passages 86 are open, so that the larger the opened passages are the less the carriage is retarded.

By means of the apparatus described the carriage may be so retarded, whatever distance it may travel free from the control of the escapement-mechanism, as to prevent the machine from being injured and to render the shock and noise slight when the carriage is arrested by tabulator-stops or other similar devices.

It is to be understood that the invention claimed herein may be embodied in mechanism differing in details of construction or arrangement of parts from that which has

been specifically described above, and that it may be applied to machines containing denominational or decimal tabulating mechanism, instead of the particular tabulating mechanism shown herein, or other forms of column-spacing mechanism.

While the rotary device herein shown and described includes a pair of wings, it will be seen that the retarding apparatus would be operative, although its action would be more impulsive, if one of these wings should be removed from it, and that a single wing extending through the cylindrical part 81 of the rotary device and bearing at its outer edges against the wall of a chamber containing said device, might be substituted for this pair of spring-pressed wings. Moreover, the wall of the hollow device might have in it only a single air-passage through which air could issue from the air-chamber near the line along which the cylindrical surfaces of the two devices meet, and on that side of the line on which the air is compressed, for enough air would enter the hollow part through such a passage and leak past the wing or wings to render the apparatus effective to retard the carriage to some extent.

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

1. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two co-operative air-compressing devices, one of these devices being arranged to be rotated by the carriage, and one of them containing an air-chamber whose wall surrounds and makes contact with the other device at the ends and from end to end of each of said devices, said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

2. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two co-operative air-compressing devices, one of these devices being arranged to be rotated by the carriage, and one of them including a wing movable inward and outward on the body of the device and in contact with the other device, and one of said devices containing an air-chamber in which the other device is confined, said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

3. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another device co-operative therewith to compress air, said rotary device being arranged to be rotated by the carriage, and one of said devices containing an air-chamber in which the other device is confined, the ends of the last mentioned device

being in contact with the ends of said air-chamber, and said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

4. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another device coöperative therewith to compress air, said rotary device being arranged to be rotated by the carriage, and the other device containing an air-chamber whose wall surrounds said rotary device and makes contact therewith at the ends and from end to end of each of said devices and contains an air-passage communicating with said air-chamber, said apparatus also comprising means adjustable by hand and effective to obstruct the flow of air through said passage.

5. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage, and one of said devices containing an air-chamber and an air-passage leading from said chamber, the wall of the chamber surrounding the other device and making contact therewith at the ends and from end to end of each of said devices.

6. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage, and one of said devices containing an air-chamber and air-passages of different sizes leading from said chamber, and having means for closing some or all of said air-passages.

7. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two coöperative devices, one of these devices being arranged to be connected with and actuated by the carriage and one of them containing an air-chamber and air-passages of different sizes leading from said chamber, the wall of the chamber surrounding and making contact with the other device, and the device containing said chamber having on it means for closing some or all of said air-passages.

8. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage, and one of said devices containing an air-chamber and air-passages of different sizes leading from said chamber, the wall of the chamber surrounding and making contact with the other device, and the device containing said chamber having on it means for closing some or all of said air-passages.

9. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two coöperative devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including a part with a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line, and one of said devices being arranged to be connected with and actuated by the carriage.

10. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage and one of said devices including a part which has a cylindrical surface, and the other device containing an air-chamber in which the device with said cylindrical surface is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line.

11. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage, and one of said devices including a part which has a cylindrical surface, and the other device containing an air-chamber in which the device with said cylindrical surface is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said rotary part.

12. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two coöperative devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including relatively movable parts, one of which has a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line, and one of said devices being arranged to be rotated by the carriage.

13. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising a rotary device and another coöperative device, said rotary device being arranged to be rotated by the carriage, and one of said devices including a slotted part which has a cylin-

- drical surface and including a wing movable inward and outward in the slot of said slotted part, and the other device containing an air-chamber in which the device including the slotted part is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said rotary device.
14. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage and one of them including a pair of spring-pressed wings movable inward and outward on the body of the device and in contact with the other device, and one of said devices containing an air-chamber in which the other device is confined.
15. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage, and one of them including slots and a pair of spring-pressed wings arranged to slide in said slots, and the other containing an air-chamber whose wall surrounds and makes contact with the device including said wings.
16. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including a slotted part with a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line and including a pair of spring-pressed wings movable inward and outward in the slots of said slotted part, and one of said devices being arranged to be rotated by the carriage.
17. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including a slotted part with a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line and including a pair of spring-pressed wings movable inward and outward in the slots of said slotted part, and one of said devices being arranged to be rotated by the carriage, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of the rotary device.
18. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative air-compressing devices, one of these devices being arranged to be rotated by the carriage and each of them including a cylindrical part, one of said cylindrical parts being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact and said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.
19. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage and each of them including a cylindrical part, one of said cylindrical parts being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact, and the wall of said hollow part having in it an air-passage.
20. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage and each of them including a cylindrical part, one of said cylindrical parts being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact, and the wall of said hollow part having in it an air-passage on each side of said line of contact.
21. In a typewriting machine, the combination with the carriage, of pneumatic carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage and each of them including a cylindrical part, one of said cylindrical parts being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact, and the wall of said hollow part having in it an air-passage, and the device which includes said inner cylindrical part also including slots and a pair of wings movable inward and outward in said slots.
22. In a typewriting machine, the combination with the carriage, of pneumatic

carriage-retarding apparatus comprising two cooperative devices, one of these devices being arranged to be rotated by the carriage and each of them including a cylindrical part, one of said cylindrical parts being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact, and the wall of said hollow part having in it an air-passage on each side of said line of contact, and the device which includes said inner cylindrical part also including slots and a pair of wings movable inward and outward in said slots.

23. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two cooperative air-compressing devices, one of these devices including a part which is fast on said shaft, and one of them containing an air-chamber whose wall surrounds the other device and makes contact therewith at the ends and from end to end of each of said devices, said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

24. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a part which is fast on said shaft, and one of said devices containing an air-chamber and an air-passage leading from said chamber, the wall of the chamber surrounding the other device and making contact therewith at the ends and from end to end of each of said devices.

25. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a part which is fast on said shaft and one of said devices containing an air-chamber and air-passages of different sizes leading from said chamber, the wall of the chamber surrounding and making contact with the other device, and the device containing said chamber having on it means for closing some or all of said air-passages.

26. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two cooperative devices, one of these devices being connected with and movable by said shaft, and one of them containing an air-chamber and air-

passages of different sizes leading from said chamber, the wall of the chamber surrounding and making contact with the other device, and the device containing said chamber having on it means for opening and closing said air-passages.

27. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two cooperative air-compressing devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including a part with a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line, and one of said devices being connected with and movable by said shaft and said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

28. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a part which is fast on said shaft and has a cylindrical surface, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said shaft.

29. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a part which is fast on said shaft and has a cylindrical surface, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it a plurality of air-passages of different sizes communicating with said air-chamber on each side of the plane containing said straight line and the axis of said shaft, and the device containing said chamber having on it means for closing some or all of said air-passages.

30. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be

rotated by the carriage, and pneumatic apparatus comprising two coöperative air-compressing devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including relatively movable parts, one of which has a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line, and one of said devices being connected with and movable by said shaft, said apparatus also comprising means adjustable by hand and effective to vary the resistance exerted on the carriage.

31. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another coöperative device, said rotary device including a slotted part which is fast on said shaft and has a cylindrical surface and including a wing movable inward and outward in the slot in said slotted part, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said shaft.

32. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another coöperative device, said rotary device including a slotted part which is fast on said shaft and has a cylindrical surface and including a wing movable inward and outward on the slot of said slotted part, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it a plurality of air-passages of different sizes communicating with said air-chamber on each side of the plane containing said straight line and the axis of said shaft, and the device containing said chamber having on it means for closing some or all of said air-passages.

33. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two coöperative devices, one of these devices including a part which is fast on said shaft, and one of them in-

cluding a pair of spring pressed wings movable inward and outward on the body of the device and in contact with the other device, and one of said devices containing an air chamber in which the other device is confined.

34. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two coöperative devices, one of these devices including a part which is fast on said shaft, and one of them containing an air-chamber whose wall surrounds and makes contact with the other device, and one of them including slots and a pair of spring-pressed wings arranged to slide in said slots, and in contact with the other device.

35. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two coöperative devices, one of these devices containing an air-chamber, and the other being confined in said chamber and including a slotted part with a cylindrical surface which makes contact along a straight line with the wall of said chamber and which is out of contact with said wall on opposite sides of said straight line and including a pair of spring-pressed wings movable inward and outward in the slots of said slotted part, and one of said devices being connected with and movable by said shaft.

36. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another coöperative device, said rotary device including a slotted part which is fast on said shaft and has a cylindrical surface and including a pair of spring-pressed wings movable inward and outward in the slots of said slotted part, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said shaft.

37. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another coöperative device, said rotary device including a slotted part which is fast on said shaft and has a cylindrical surface

and including a pair of spring-pressed wings movable inward and outward in the slots of said slotted part, and the other device containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it a plurality of air passages of different sizes communicating with said air-chamber on each side of the plane containing said straight line and the axis of said shaft, and the device containing said chamber having on it means for closing some or all of said air passages.

38. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft, a pinion fast on said shaft, and pneumatic apparatus comprising a rotary device and another co-operative device, said rotary device including a part which is fast on said shaft, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and containing an air-chamber whose wall surrounds and makes contact with said rotary device at the ends and from end to end of each of said devices and being movable on its pivotal axis to engage said pinion with and to disengage it from the carriage.

39. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft, a pinion fast on said shaft, and pneumatic apparatus comprising a rotary device and another co-operative device, said rotary device including a part which is fast on said shaft, and a wing movable inward and outward on the other part of the rotary device, and the other device being pivoted to a fixed support and

tion with the carriage, of carriage-retarding means including a shaft, a pinion fast on said shaft, and pneumatic apparatus comprising a rotary device and another co-operative device, said rotary device including a part which is fast on said shaft and has a cylindrical surface, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and being movable on its pivotal axis to engage said pinion with and to disengage it from the carriage and containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line.

42. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft, a pinion fast on said shaft, and pneumatic apparatus comprising a rotary device and another co-operative device, said rotary device including a part which is fast on said shaft and has a cylindrical surface, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and being movable on its pivotal axis to engage said pinion with and to disengage it from the carriage and containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides of the plane containing said straight line and the axis of said shaft.

43. In a typewriting machine, the com-

movable inward and outward in the slot of said slotted part, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and being movable
 5 on its pivotal axis to engage said pinion with and to disengage it from the carriage and containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line
 10 with the wall of said chamber and being out of contact with said wall on opposite sides of said straight line, and the wall of said chamber having in it air-passages communicating with said chamber on opposite
 15 sides of the plane containing said straight line and the axis of said shaft.

45. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft, a pinion
 20 fast on said shaft, and pneumatic apparatus comprising a rotary device including a slotted part which is fast on said shaft and has a cylindrical surface and including a pair of spring pressed wings movable inward
 25 and outward in the slots of said slotted part, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and being movable on its pivotal axis to engage said pinion with and to disengage
 30 it from the carriage and containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall of said chamber and being out of contact with
 35 said wall on opposite sides of said straight line, and said wings also making contact with the wall of said chamber.

46. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft, a pinion
 40 fast on said shaft, and pneumatic apparatus comprising a rotary device including a slotted part which is fast on said shaft and has a cylindrical surface and including a pair of
 45 spring pressed wings movable inward and outward in the slots of said slotted part, and the other device being pivoted to a fixed support and having in it a bearing for said shaft and being movable on its pivotal axis
 50 to engage said pinion with and to disengage it from the carriage and containing an air-chamber in which said rotary device is confined, said cylindrical surface making contact along a straight line with the wall
 55 of said chamber and being out of contact with said wall on opposite sides of the straight line, and said wings also making contact with said wall, and the wall of said chamber having in it air-passages communicating with said chamber on opposite sides
 60 of the plane containing said straight line and the axis of said shaft.

47. In a typewriting machine, the combination with the carriage, of carriage-re-

tarding means including a shaft arranged
 65 to be rotated by the carriage, and pneumatic apparatus comprising two cooperating air-compressing devices, each including a cylindrical part, one of said cylindrical parts being fast on said shaft, and one of them being
 70 hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line of contact, said apparatus also comprising means adjustable by
 75 hand and effective to vary the resistance exerted on the carriage.

48. In a typewriting machine, the combination with the carriage, of carriage-retarding
 80 means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising two cooperative devices, each including a cylindrical part, one of said cylindrical parts being fast on said shaft,
 85 and one of them being hollow and containing the other, and the inner cylindrical surface of the outer part being tangent to the cylindrical surface of the inner part and receding therefrom on opposite sides of the line
 90 of contact, and the wall of said hollow part having in it an air-passage.

49. In a typewriting machine, the combination with the carriage, of carriage-retarding
 95 means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a cylindrical part which is fast on
 100 said shaft and whose axis coincides with that of the shaft, and including a pair of wings movable inward and outward on said cylindrical part, and the other device including a hollow cylindrical part in which the rotary device is confined, the inner cylindrical
 105 surface of the outer device being tangent to the cylindrical surface of the rotary device and receding therefrom on opposite sides of the line of contact and being in contact with said wings, and the wall of
 110 said hollow part having in it an air-passage.

50. In a typewriting machine, the combination with the carriage, of carriage-retarding
 115 means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another cooperative device, said rotary device including a cylindrical part which is fast on said shaft and whose axis coincides with
 120 that of the shaft, and including a pair of wings movable inward and outward on said cylindrical part, and the other device including a hollow cylindrical part in which the rotary device is confined, the inner cylindrical surface of the outer device being tangent
 125 to the cylindrical surface of the rotary device and receding therefrom on opposite sides of the line of contact, and being in

contact with said wings, and the wall of said hollow part having in it an air-passage on each side of said line of contact.

51. In a typewriting machine, the combination with the carriage, of carriage-retarding means including a shaft arranged to be rotated by the carriage, and pneumatic apparatus comprising a rotary device and another coöperative device, said rotary device including a cylindrical part which is fast on said shaft and whose axis coincides with that of the shaft, and including a pair of wings movable inward and outward on said cylindrical part, and the other device including a hollow cylindrical part in which the rotary device is confined, the inner cylindrical surface of the outer device being tangent to the cylindrical surface of the rotary device and receding therefrom on opposite sides of the line of contact and being in contact with said wings, and the wall of said hollow part having in it a plurality of air-passages of different sizes on each side of said line of contact, and said hollow part having on it means for closing some or all of said air-passages.

52. In a typewriting machine, the combination with the carriage, of carriage-retarding means including pneumatic apparatus having inlet and outlet air-passages or ports of different sizes, and a sleeve surrounding a portion of said apparatus and having apertures adapted to register with said ports, said sleeve being adjustable to different positions so as to open or close said ports.

53. In a typewriting machine, the combination with the carriage, of carriage-retarding means including pneumatic apparatus having a cylindrical part containing inlet and outlet air-passages or ports, and a sleeve surrounding said cylindrical part and having apertures adapted to register with said ports, said sleeve being adapted to be turned by hand so as to open and close said ports.

54. In a typewriting machine, the combination with the carriage, of carriage-retarding means comprising pneumatic apparatus including a hollow cylinder and a smaller cylinder inclosed within said hollow cylinder, said smaller cylinder having two slots opening substantially on opposite sides of said cylinder, and wings mounted in said slots and adapted to slide in and out therein so as to keep their outer edges in contact

with the inner cylindrical surface of the outer cylinder.

55. In a typewriting-machine, the combination with the carriage, of carriage-retarding means comprising pneumatic apparatus including an outer hollow cylinder and a smaller cylinder inclosed within said hollow cylinder, said smaller cylinder having two slots substantially parallel and on opposite sides of the axis of the cylinder and opening on substantially opposite sides of the cylinder, and sliding wings mounted in said slots.

56. In a typewriting machine, the combination with the carriage, of carriage-retarding means comprising pneumatic apparatus including an outer hollow cylinder and a smaller cylinder inclosed within said outer cylinder, said smaller cylinder having a slot therein, and a hole of a diameter greater than the width of the slot, and so positioned with reference to the slot that it cuts one wall of said slot but not the other, a slide mounted in said slot, and a coiled spring mounted in said hole and pressing on said slide.

57. In a typewriting machine, the combination with the carriage, of carriage-retarding means comprising pneumatic apparatus having a cylindrical part, one or more air-passages or ports in said cylindrical part, a sleeve surrounding said cylindrical part and adjustable thereon and having one or more apertures adapted to register with said port or ports, and a screw plug closing one end of said cylinder and retaining said adjustable sleeve in position.

58. In a typewriting machine, the combination with the carriage, of carriage-retarding means comprising pneumatic apparatus having one or more ports, a sleeve adjustable by hand and having one or more apertures adapted to register with said port or ports in order to vary the resistance offered by said apparatus, and a scale and pointer to indicate the different positions to which said sleeve may be adjusted.

Signed at Syracuse, in the county of Onondaga, and State of New York, this 23rd day of February A. D. 1906.

HERBERT H. STEELE.

Witnesses:

W. J. LOGAN,
JOHN S. MITCHELL.