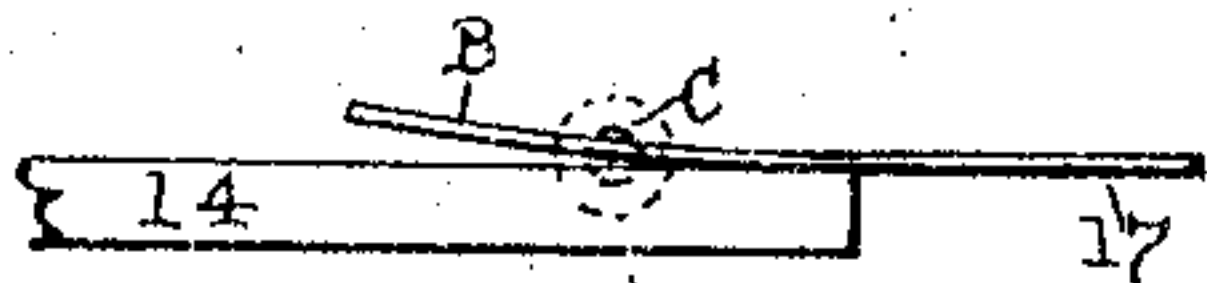
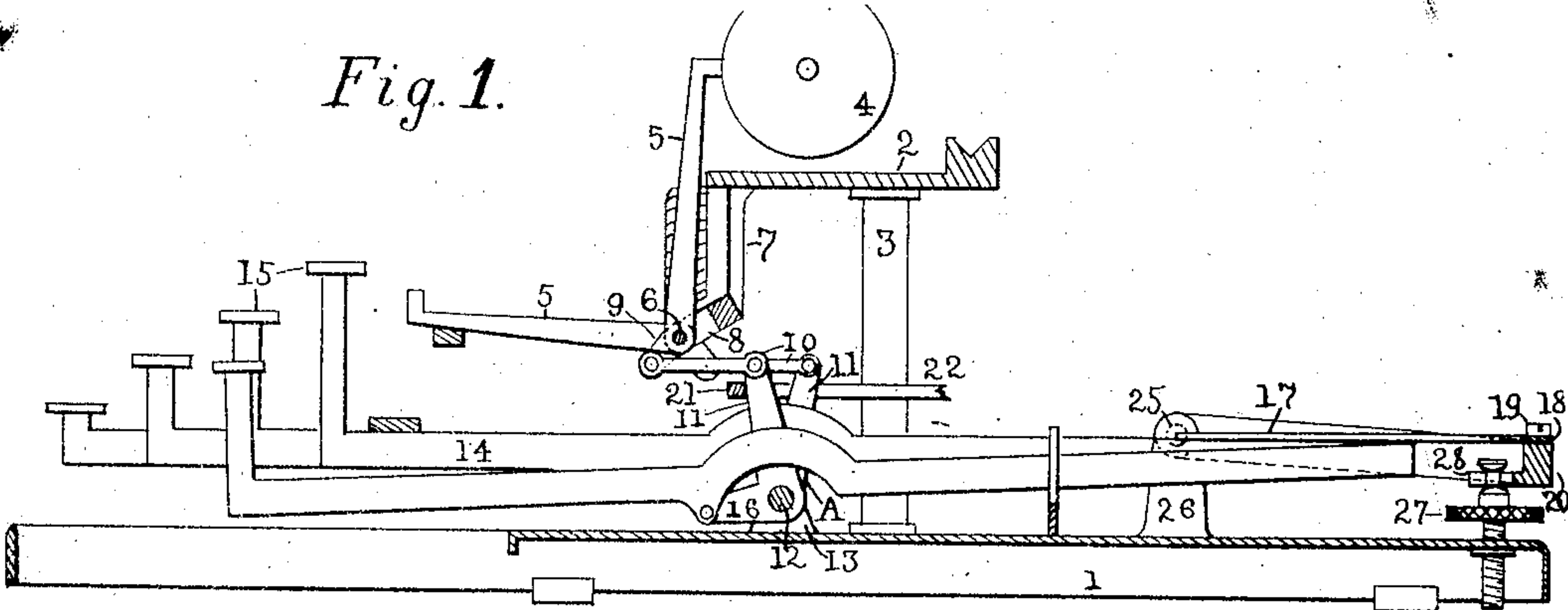


B. C. STICKNEY.  
TYPE WRITING MACHINE.  
APPLICATION FILED JUNE 17, 1902.

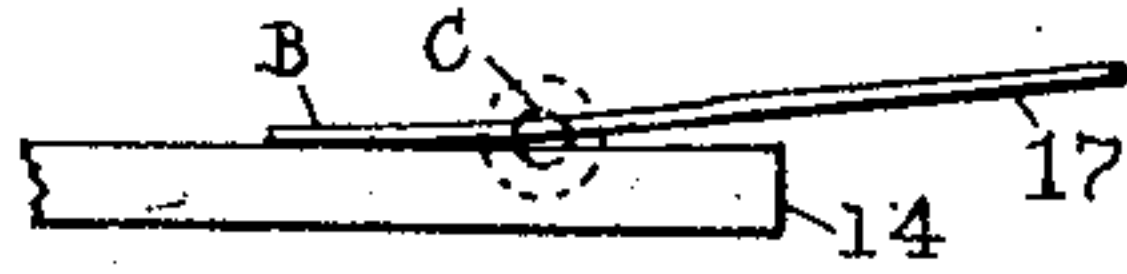
990,169.

Patented Apr. 18, 1911.

*Fig. 1.*

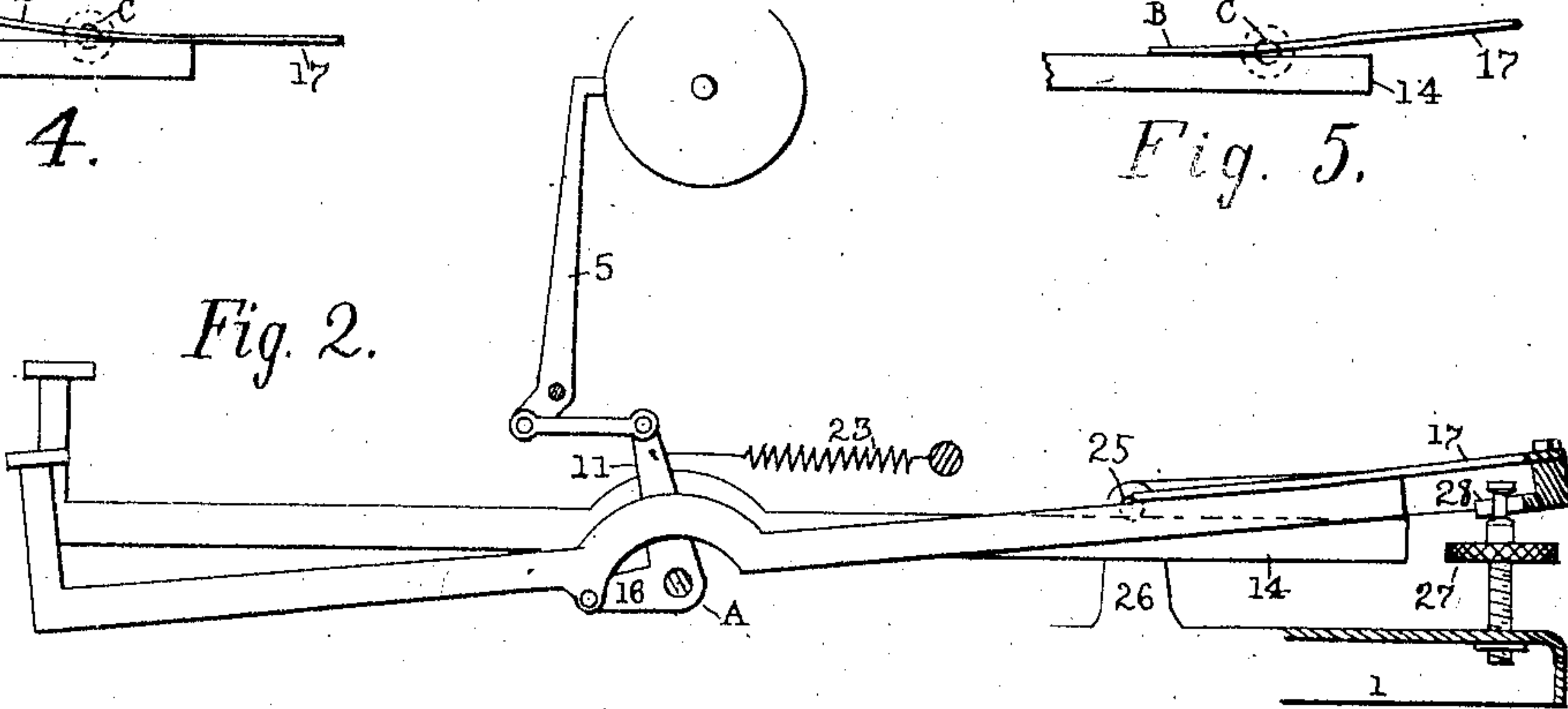


*Fig. 4.*

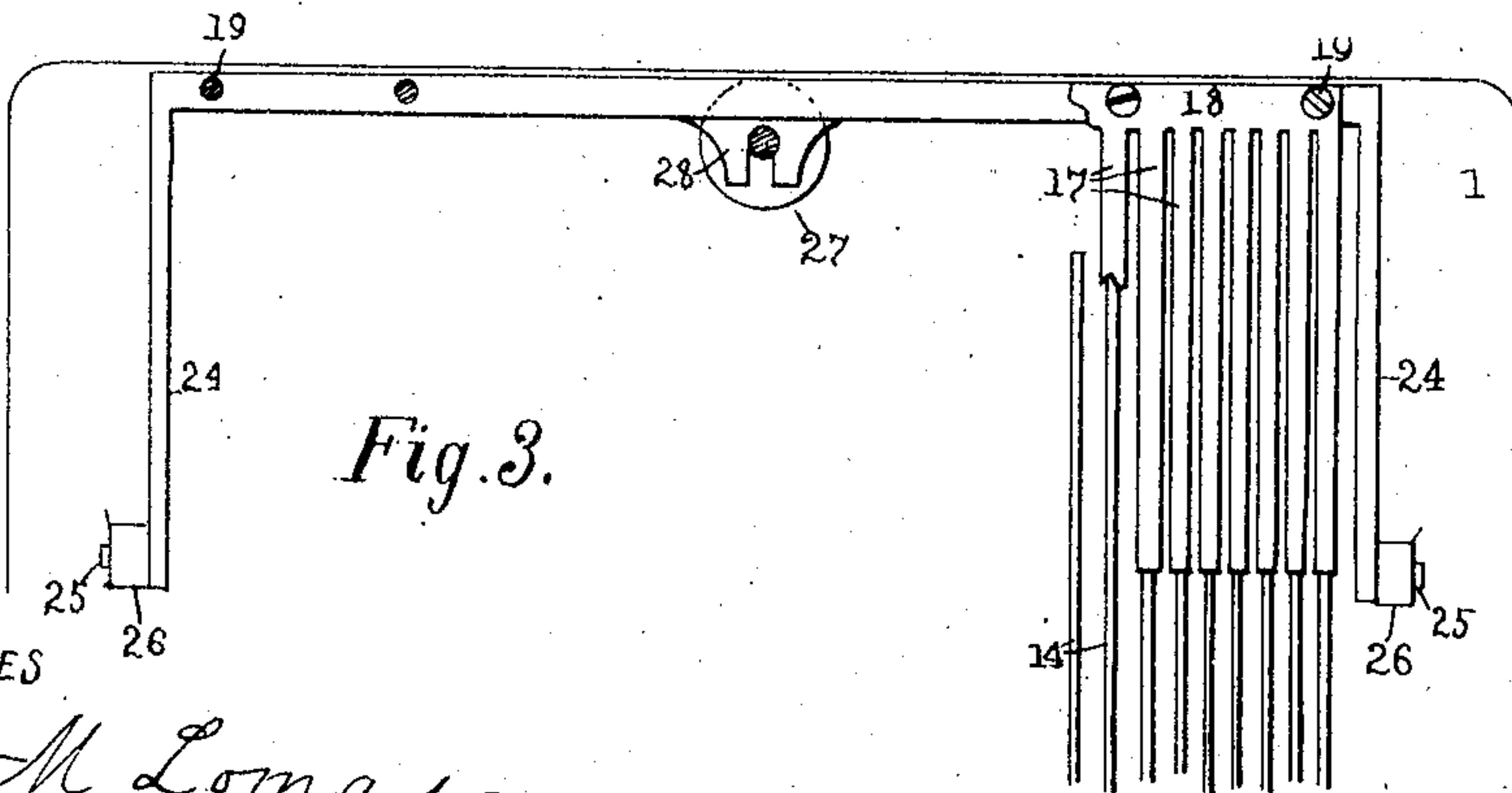


*Fig. 5.*

*Fig. 2.*



*Fig. 3.*



WITNESSES

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# UNITED STATES PATENT OFFICE.

BURNHAM C. STICKNEY, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO UNDERWOOD TYPEWRITER COMPANY, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE.

## TYPE-WRITING MACHINE.

990,169.

Specification of Letters Patent.

Patented Apr. 18, 1911.

Application filed June 17, 1902. Serial No. 112,031.

*To all whom it may concern:*

Be it known that I, BURNHAM C. STICKNEY, a citizen of the United States, and resident of the city of Elizabeth, county of Union, and State of New Jersey, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

This invention relates to writing machines, especially those of the "front strike" variety; and its object is to improve the touch of the keys, and also to enable a wide adjustment of the touch, thereby adapting the machine for all operators.

My invention consists in certain combinations of devices, features of construction, and arrangements of parts, all as will be hereinafter fully explained, and particularly pointed out in the concluding claims.

In the accompanying drawings, Figure 1 is a longitudinal sectional elevation of a front strike writing machine embodying my improvements, the devices being set to secure a stiff or resisting key touch, and one type bar and its connections being shown in printing position. Fig. 2 is a skeleton view similar to Fig. 1, but showing the machine adjusted for a very soft touch; one type bar and key lever being shown in printing position, and one key lever being shown in normal position. Fig. 3 is a partial plan of the rear portion of the machine, showing particularly the key lever spring-fulcrums and the adjustable frame or support whereon they are secured. Fig. 4 shows a curved fulcrum spring set for a stiff key touch. Fig. 5 shows the same set for a yielding key touch.

In the several views portions are omitted or broken away for the sake of clearness, and similar parts are designated by similar characters of reference.

The framework of the machine includes a base 1 and a top plate 2, the latter supported upon columns 3. Over the top plate runs a carriage (not shown) having a platen 4. Rearwardly striking type bars 5 are pivoted at their rear ends upon a curved fulcrum wire 6, mounted in a segment 7, the latter being radially slotted at 8 for the type bar hubs. To downwardly extending short arms 9 of the type bars are attached below the type-bar pivots the forward ends of horizontal thrust links 10, which connect said arms to the upper ends of upstanding long arms 11 of a system of bell cranks A,

the latter extending across the base of the machine and being mounted upon a common fulcrum rod 12, which is supported in ears 13 at opposite sides of the base. Horizontal key levers 14 of the second order, provided with keys 15, are pivoted beneath the type bars directly upon short forwardly extending arms 16 of said bell cranks, the key levers preferably overlying the fulcrum rod 12 as illustrated, to secure compactness. The key levers extend back from the keyboard and at their rear ends bear up against overlying flat springs 17, which are free at their front ends, and preferably consist of forwardly projecting horizontal fingers formed upon a plate 18, which is secured by screws 19 upon a transverse bar 20.

The movements of the paper carriage may be controlled by a universal bar 21 operated by the bell crank arms 11, a portion of the connection from the universal bar to the usual spacing mechanism being indicated at 22.

In operation, upon the depression of a key and lever, the short arm 16 of the bell crank is carried down, and the upright arm 11 thereof vibrated forwardly, and through the thrust link 10 the type bar is caused to swing to the platen. Upon relief of the key from pressure, the parts are returned to normal position by the assistance of a suitable spring, as at Fig. 2, where a draw spring 23 is illustrated as connected to the bell crank arm 11.

At Fig. 1 the rear tip of the depressed key lever is shown bearing up against its spring fulcrum at a point near the rear end or root thereof, the spring not being appreciably flexed, although it will be understood that if the key is given a hard blow, the spring will yield slightly, thereby cushioning the key touch to some extent. At this figure the spring fulcrum is straight and horizontal, and coincides throughout with the top edge of the key lever, so that the working bearing of the latter is entirely at its tip.

To enable a variation to be produced in the touch, the spring-supporting bar 20 is provided at its ends with forwardly extending arms 24, which are pivoted at 25 upon opposite lugs 26 provided upon the base, thus forming a hinged bail, the axis of the hinge in this instance coinciding with the tips of the spring fulcrums, as at Figs. 1, 2 and 3. By tipping up the bar 20, which



movement may be effected by a thumb-screw 27 threaded into the base and having a suitable engagement at its upper end with a slotted ear 28 formed upon the bar, the 5 spring fulcrums are raised off from the tips of the key levers, and contact therewith only at the forward ends of the springs, as will be understood by reference to Fig. 2, so that at least the first part of the work of each 10 key lever during a printing stroke is accomplished while bearing upon the forward point or portion of the spring; whereby the touch of the key is rendered softer, not only by reason of the increased leverage afforded, 15 but also because the spring at this point is more yielding; so that at its initial portion the key stroke is very soft. The key lever as it moves down contacts with the fulcrum spring at points more and more remote from 20 its load point, thereby automatically decreasing the leverage of the key upon the type, and simultaneously bringing into use stiffer portions of the spring, whereby the resistance of the key to the touch is increased, 25 thus cushioning the hand-stroke of the operator, and also accelerating the speed of the type bar as it nears the platen.

If desired, the fulcrum springs may have a slight upward curve at their forward ends, 30 as at B, Fig. 4, and the bail arms 24 may be shortened, bringing the hinge axis back, as at C, so that the springs may be tipped upon said axis, as at Fig. 5, while in contact with the key levers 14 and without creating undue disturbance thereof; and by this means 35 the rolling movement of the key lever may be more fully developed, as will be understood from Fig. 5.

By making the spring fingers of proper 40 stiffness, and so proportioning the parts that the dip of the key may be rendered shallow, the key-touch may be rendered much stiffer than is usually practicable; and may also, at the pleasure of the operator, be rendered 45 softer than is usually practicable, as well as deeper; or the touch and dip may be adjusted to some intermediate point.

It will be observed that each of the key levers is provided with a straight tread portion at its rear end, each of the fulcrums 17 50 or B being elongated so as to permit considerable rolling movement of the lever therealong; that the yielding construction of the fulcrum enables it to flex during the 55 actuation of the type by the key lever; that the purchase of the lever upon the yielding fulcrum automatically diminishes as the tread rolls along the fulcrum; that the portion B of the fulcrum is convexly curved; 60 that the springs in their normal or untensioned condition are stiff, so as to offer sufficient opposition to the thrust of the key levers; and that during the printing strokes the key levers roll toward the fixed ends of 65 the springs.

It will also be seen that an adjustable device is common to all of the keys for regulating the yielding action of the spring fulcrums, and also adjusting the leverage of the keys upon the types and thereby varying the normal dip of the keys; that owing to the flexure of the springs 17, the keys have an extra yielding action when given sharp blows, this yielding action being regulated by the screw 27; that while the terminal resistance of the springs 17 to the key lever thrust is the same at all adjustments, still the initial resistance thereof may be greatly varied, thus securing a great range of variation in the quality of the touch of 80 the keys, especially since it is also possible to vary the dip of the keys and their purchase upon the type bars; that the spring fingers are adjusted simultaneously about a point or axis (as 25 or C) substantially coincident with one of the points of contact between the levers and the spring fingers whereon the levers roll; and that the bar 20 may be swung upwardly on its hinge while the springs remain in contact with the key 90 levers.

Variations may be resorted to in the construction and arrangement of the levers and the yielding fulcrums, and in other particulars, within the scope of my improvements; 95 and portions of my improvements may be used without others.

What I claim as new, and desire to secure by Letters Patent of the United States, is as follows: 100

1. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said levers being provided with a tread, and an elongated fulcrum along which each lever 105 rolls; one of said tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the lever.

2. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said levers being provided with a tread, and an elongated fulcrum for each lever; one of 110 said tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the lever, and the relation between the lever and the fulcrum being such that during the printing stroke of the type bar the purchase 120 of the lever thereon automatically diminishes as the tread rolls along the fulcrum.

3. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said 125 levers being provided with a tread, and an elongated fulcrum for each lever; one of said tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the 130



lever, and one of said tread and fulcrum elements being convexly curved so that the lever may roll along the fulcrum.

4. In a typewriting machine, the combination with a series of type bars and a series of levers connected thereto, of a yielding fulcrum whereon each of said levers roll.

5. In a typewriting machine, the combination with a series of type bars and a series of levers connected thereto, of a series of fulcrums whereon said levers roll, each fulcrum consisting of a spring fixed at one end and extending along the associated levers so that its free end may normally engage the lever.

6. In a typewriting machine, the combination with a series of type bars, of a series of key levers of the second order connected thereto, and a series of curved springs overlying and extending along the rear ends of said levers and serving as fulcrums upon which said levers roll.

7. In a typewriting machine, the combination with a series of type bars, of a series of levers, a series of connections between the type bars and levers; and a series of stiff springs whereon said levers roll, said springs extending along said levers and each being fixed at one end, and said levers during the printing strokes rolling upon said springs toward said fixed ends.

8. In a typewriting machine, the combination of a series of types; a series of keys; means for enabling the keys to operate the types; said operating means comprising a device associated with each key whereby the leverage of the keys upon the types is automatically diminished during the printing strokes, and a part of said operating means having a yielding construction, and an adjustable device common to all of the keys for regulating the yielding action of said part.

9. In a typewriting machine, the combination of a series of types; a series of keys; means for enabling each key to operate a type; said operating means comprising a device whereby the leverage of the key upon the type is automatically diminished during the printing stroke, and a part of said operating means having a yielding construction; and an adjustable device common to all of the keys for regulating the yielding action of said part and also adjusting the leverage of the keys upon the types.

10. In a typewriting machine, the combination of a series of types; a series of keys; means for enabling each key to operate a type; said operating means comprising a device whereby the leverage of the key upon the type is automatically diminished during the printing stroke, and a part of said operating means having a yielding construction; and an adjustable device common to all of the keys for increasing the resistance of said yielding parts to the key touch and

simultaneously diminishing the leverage of the keys upon the types.

11. In a typewriting machine, the combination with a series of type bars and a series of keys connected thereto, of means for enabling the keys to have an extra yielding action, and means common to the keys for regulating said yielding action and also for varying the leverage of the keys upon the type bars.

12. In a typewriting machine, the combination with a series of type bars and a series of keys, of a series of levers between the keys and the type bars; a series of fulcrums for said levers, one of said fulcrum and lever elements having a yielding construction; and means for effecting such a change in the relative positions of said levers and said fulcrums, as to vary the purchase of the levers upon the fulcrums.

13. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of levers between the keys and the type bars, a series of yielding fulcrums whereon said levers roll, and means for adjusting said fulcrums.

14. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of levers between the type bars and the keys, a series of yielding fulcrums whereon the levers roll, and a support whereon said fulcrums are carried; said support being adjustable so as to vary the relation between said fulcrums and said levers.

15. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of levers between the keys and type bars, a series of spring fingers whereon the levers roll, and a movable support for said spring fingers.

16. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said levers being provided with a tread, and an elongated fulcrum for each lever; one of said tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the lever; and means for adjusting the fulcrum so as to vary the key touch.

17. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said levers being provided with a tread; an elongated fulcrum for each lever; one of said tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the lever, and the relation of the lever to the fulcrum being such that during the printing stroke the purchase of the lever upon the type bar automatically diminishes as the tread rolls along the fulcrum; a support whereon said fulcrums are carried; and means for adjusting said support so as to



vary the purchase of said levers upon the type bars and also vary the resistance offered by the yielding members to the key touch.

5 18. In a typewriting machine, the combination with a series of type bars of a series of levers connected thereto, each of said levers being provided with a tread; an elongated fulcrum for each lever; one of said  
10 tread and fulcrum elements having a yielding construction such that it may flex during the actuation of the type bar by the lever, and one of said tread and fulcrum elements being convexly curved, so that the  
15 lever may roll along the fulcrum; and means for tipping said fulcrums.

19. In a typewriting machine, the combination with a series of type bars and a series of key levers connected thereto, of a set of  
20 yielding fulcrums whereon said levers roll, and means for adjusting said fulcrums so as to vary the action of the levers.

20. In a typewriting machine, the combination with a series of type bars and a series  
25 of key levers connected thereto, of a fulcrum whereon each of said levers rolls, said fulcrum consisting of a spring fixed at one end and extending along its lever so that its free end may normally engage the lever, a  
30 support whereon said fulcrums are mounted, and means for adjusting said support so as to vary the action of the levers.

21. In a typewriting machine, the combination of a series of type bars, a series of  
35 levers connected thereto, a fulcrum member comprising a series of curved spring fingers whereon said levers roll, a pivot or hinge for said fulcrum member, and means, including a screw, for turning said fulcrum  
40 upon its hinge.

22. In a typewriting machine, the combination with a series of type bars, of a series of levers; a series of springs whereon said  
45 levers roll; said springs extending along said levers and each being fixed at one end, and said levers during the printing strokes rolling upon said springs toward said fixed ends; and a support whereon said springs  
50 are mounted; said support being adjustable for varying the purchase of the levers upon the type bars and altering the initial resistance of the springs to the lever action.

23. In a typewriting machine, the combination with a series of type bars of a series  
55 of keys, a series of levers between the keys and type bars, a series of spring fingers whereon the levers roll, and means for adjusting all of said spring fingers simultaneously about a point or axis substantially  
60 coincident with one of the points of contact of the levers with the spring fingers.

24. In a typewriting machine, the combination of a series of type bars, a series of key levers of the second order connected  
65 thereto, a series of springs whereon the rear

ends of said levers roll, a transverse bar to which said springs are connected at their rear ends, and arms extending from the ends of said bar and hinged upon the framework.

25. In a typewriting machine, the combination with a series of type bars of a series  
70 of rearwardly extending key-operated levers connected thereto, a series of forwardly extending spring fingers whereon the rear ends of said levers roll, a bar to which the  
75 rear portions of said springs are secured, and means for swinging said bar upwardly while the levers remain in contact with the spring fingers.

26. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks connected thereto; a series of levers provided with keys and pivoted upon said bell cranks,  
80 so as to be wholly supported thereby; means independent of said key levers for supporting said bell-cranks upon the framing of the machine; and individual yielding bearings  
85 against which the rear ends of said key levers bear, the pivotal connection of the key levers to said arms serving to prevent longitudinal displacement of the levers in both forward and backward directions.

27. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks connected thereto, fixed fulcrums for said bell  
90 cranks; a series of levers provided with keys and pivoted upon said bell cranks; and independent fulcrums whereon said key levers roll.

28. In a front strike writing machine, the combination of a series of rearwardly striking type bars, a series of bell cranks connected thereto and provided with fulcrums;  
105 a series of levers provided with keys and pivoted upon said bell cranks; and independently yielding fulcrums along which said key levers roll.

29. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks connected thereto and provided with fulcrums;  
110 a series of levers provided with keys and pivoted upon said bell cranks; yielding bearings for the rear ends of said key levers; and means common to said bearings for effecting adjustment thereof.

30. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks connected thereto and provided with fulcrums;  
120 a series of levers provided with keys and pivoted upon said bell cranks; independently yielding fulcrums along which said key levers roll; and means for adjusting said fulcrums.

31. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks having  
125



upwardly extending arms which are connected to the type bars; fixed pivots or fulcrums for said bell cranks, key levers extending rearwardly beneath the type bars and above the bell crank pivots or fulcrums, and pivoted upon said bell cranks so as to be wholly supported thereby; and a fulcrum for said key levers, the pivotal connection of the key levers to said arms serving to prevent longitudinal displacement of the levers in both forward and backward directions.

32. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks having upwardly extending arms which are connected to the type bars, and also having forwardly extending arms; key levers extending rearwardly beneath the type bars and pivoted upon said bell cranks so as to be wholly supported thereby; and a transverse fulcrum rod for said bell cranks; said fulcrum rod underlying said key levers, the pivotal connection of the key levers to said arms serving to prevent longitudinal displacement of the levers in both forward and backward directions.

33. In a typewriting machine, the combination of a series of type bars, a series of keys, means for enabling each key to operate a type bar, a part of said operating means being yielding, and means for varying the initial resistance of said yielding part to the action of the key; the final resistance of said yielding part being the same at all adjustments.

34. In a typewriting machine, the combination of a series of type bars, a series of keys, means for enabling each key to operate a type bar, a part of said operating means being yielding, and means for varying the leverage of the key upon the type bar and for varying the initial resistance of said yielding part to the action of the key; the final resistance of said yielding part being the same at all adjustments of dip and resistance.

35. In a type writing machine, the combination with key levers, of fulcrums flexible more at some points than at others, and type-bars connected to the key-levers, the latter bearing against the most flexible portions of the levers at the beginning of the type-bar strokes, and against the least flexible portions of the fulcrums at the terminal portions of the printing strokes of the type-bars.

36. In a typewriting machine, the combination with type-operating levers, of fulcrums for said levers which flex at the printing strokes so as to form curved treads along which the levers roll.

37. In a typewriting machine, the combination with key levers, of fulcrums flexible more at some points than at others, and

type-bars connected to the key-levers, the latter bearing against the most flexible portions of the levers at the beginning of the type-bar strokes, and against the least flexible portions of the fulcrums at the terminal portions of the printing strokes of the type-bars, and means for adjusting all the levers simultaneously to alter the initial point of bearing of the fulcrums thereon.

38. In a typewriting machine, the combination with a series of type-operating levers, of fulcrums along which the levers roll, said fulcrums being sufficiently yielding so that the levers form curved surfaces along which they roll during the type-strokes.

39. In a typewriting machine, the combination with a series of type-bars and a series of keys, of intervening levers, and yielding fulcrums curvable by the action of the levers thereon, and means for tilting the fulcrums to different angles so as to vary the resistance at the keys.

40. In a typewriting machine, the combination with a system of type-operating levers, of a bail comprising arms and an intervening bar and hinged at the free ends of its arms, springs extending from said bar to the levers, and means for slanting said bail about said hinge to vary the action of the springs.

41. In a front strike writing machine, the combination with a system of type-bars, of key-levers of the second order extending back from the keyboard beneath the type-bars, elbow-levers comprising forwardly extending short arms to which said key-levers are directly pivoted, and upstanding long arms, and links extending forwardly from said upstanding arms and connected to the type-bars below their pivots, said key-levers provided with adjustable yielding fulcrums, and a universal bar operated by said upstanding arms so as not to be affected by variations in the key-lever strokes.

42. In a type-writing machine, the combination with type-bars and keys, of devices including a series of resistance-springs, and adjustable means for calling into action at will either little-resisting or greatly resisting portions of said springs, to vary the touch of the keys.

43. In a typewriting machine, the combination with a system of front strike type bars, of links extending rearwardly from said type bars, bell cranks having upstanding arms to which said links are pivoted at their rear ends and also having forwardly extending arms, key-levers pivoted directly upon the forward ends of said forwardly extending arms, said key-levers loosely bearing upon supports or fulcrums, and a universal bar operated by said bell cranks.

44. The combination with a series of type-bars of a series of keys, of means for simultaneously decreasing the leverage of the key



on the type during the printing stroke and enabling the key to yield in advance of the movement of the type bar.

45. The combination with a series of type-bars of a series of keys, of means for simultaneously decreasing the leverage of the key on the type during the printing stroke and enabling the key to yield in advance of the

movement of the type bar, and means for regulating the extent of the yielding action of the key.

BURNHAM C. STICKNEY.

Witnesses:

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