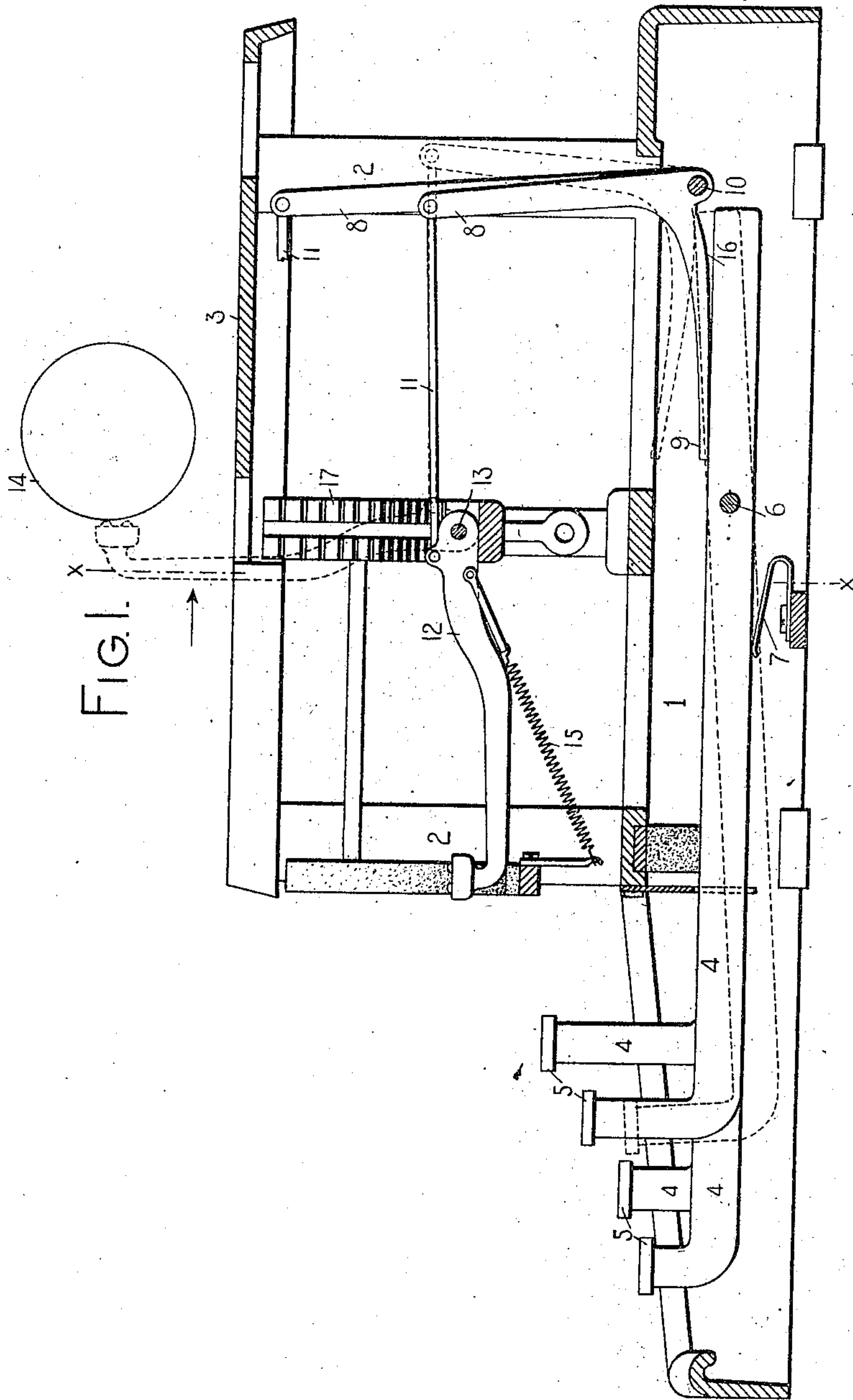


B. C. STICKNEY.
TYPE WRITING MACHINE.
APPLICATION FILED OCT. 14, 1903.

903,517.

Patented Nov. 10, 1908.

3 SHEETS—SHEET 1.



WITNESSES.
K. V. Donovan
M. F. Hammer.

INVENTOR.
Barnham C. Stickney
by Jacob Feldel
HIS ATTORNEY

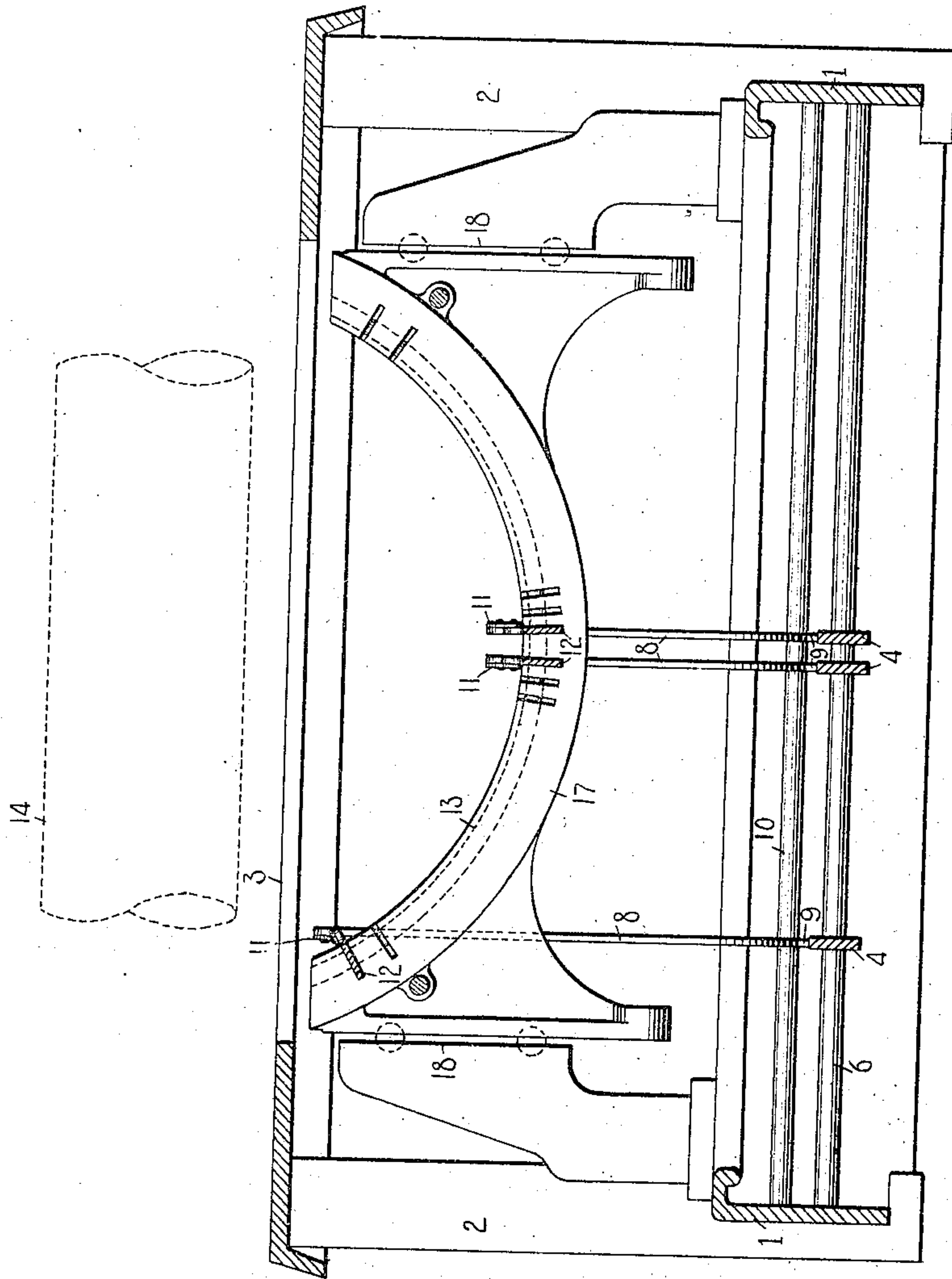
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3 SHEETS—SHEET 2

FIG. 2.



WITNESSES:

K. V. Donovan.
M. F. Hammer.

INVENTOR:

Burnham C. Stickney

by Jacob Felsch

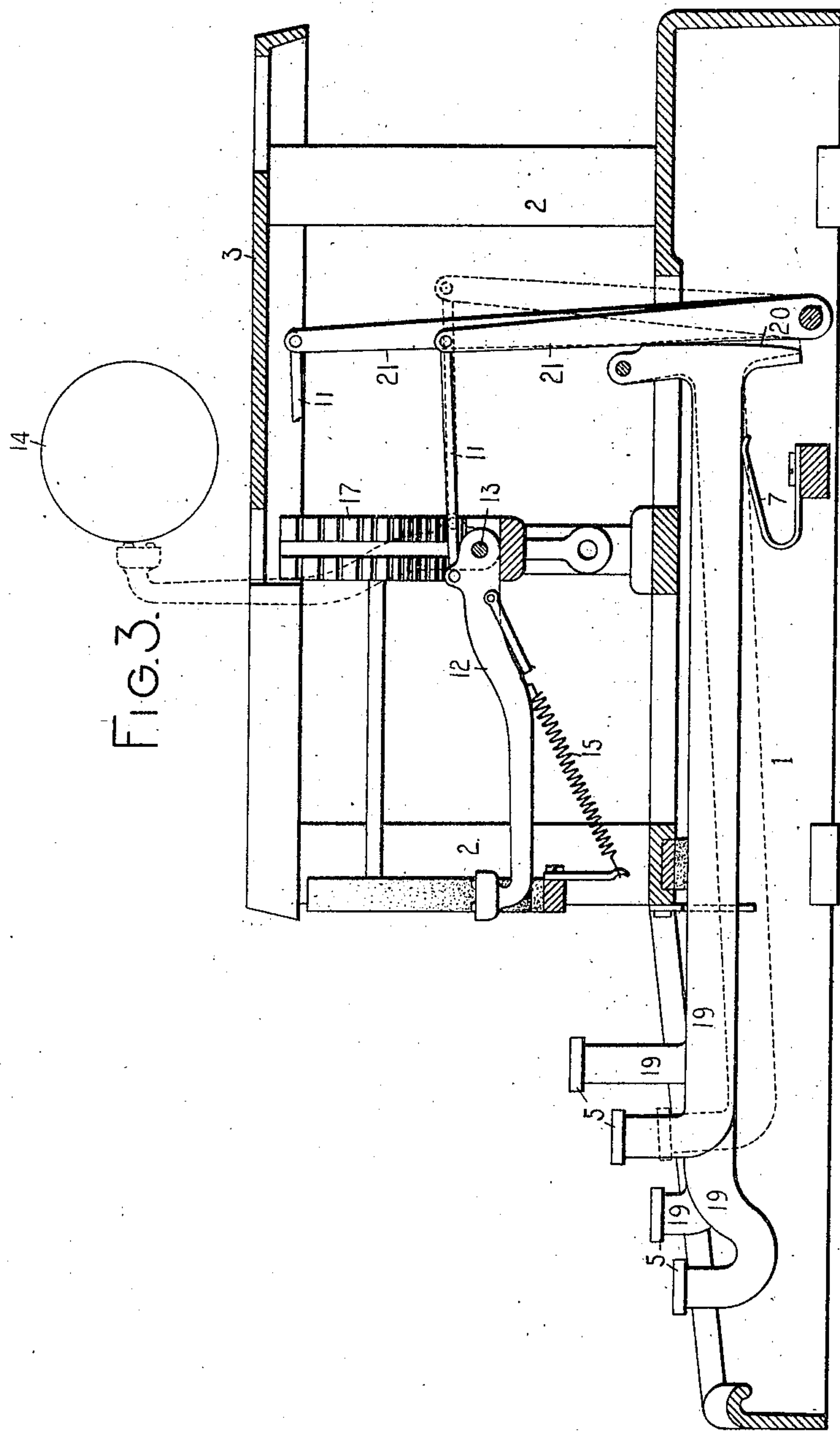
HIS ATTORNEY

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3 SHEETS-SHEET 3.



WITNESSES.

K. V. Donovan.

M. F. Hammer.

INVENTOR.

Burham C. Stickney

by Jacob Felsch

HIS ATTORNEY

UNITED STATES PATENT OFFICE.

BURNHAM C. STICKNEY, OF ELIZABETH, NEW JERSEY, ASSIGNOR TO UNION TYPEWRITER COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY.

TYPE-WRITING MACHINE.

No. 903,517.

Specification of Letters Patent.

Patented Nov. 10, 1908.

Application filed October 14, 1903. Serial No. 177,002.

To all whom it may concern:

Be it known that I, BURNHAM C. STICKNEY, citizen of the United States, and resident of Elizabeth, in the 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 the type actions of writing machines of the front strike class, and its object is to provide simple and effective connections between the keys and the type bars, such that the leverage of the keys upon the type bars is automatically decreased during the printing stroke, so as to cushion the blow of the finger at both beginning and end of the key movement, and also to insure a powerful blow of the type.

In the accompanying drawings, Figure 1 is a longitudinal vertical section taken about centrally of one form of front strike writing machines made in accordance with my present improvements; one type action being shown in normal position and one in printing position. Fig. 2 is a front vertical section taken about on the line $x-x$ of Fig. 1. Fig. 3 is a view similar to Fig. 1 but showing another form of connection between the key and type bar.

In the several views, like signs identify like parts.

In the base 1 of the machine frame, which also comprises corner posts 2 and a top plate 3, are mounted horizontal key levers 4 of the first order, bearing keys 5; said levers being fulcrumed between their ends upon a horizontal fulcrum rod 6, and being provided with returning springs 7.

Over the rear ends of the key levers is mounted a system of bell cranks or elbow levers, comprising upright arms 8 and forwardly extending arms 9; said elbow levers being fulcrumed upon a horizontal rod 10, and the arms 8 being connected by forwardly extending links 11 to type bars 12. The latter are mounted upon a curved fulcrum rod 13, strike rearwardly against a platen 14, and are provided with returning springs 15.

The elbow-lever arms 9 extend from their pivots towards the pivotal support 6 of the key levers, and the rear arms of the key levers extend from the rod 6 towards the rod 10; the arms in each set terminating between the

rods. Each of the arms 9 of the elbow levers is formed upon its underside with a curved tread 16 adapted to contact with and roll along the upper edge of the rear arm of its associated key lever 4, during the printing stroke, beginning at a point at the forward end of the arm 9, as indicated in full lines, and ending at a point at the rear end of the key lever, as indicated in dotted lines. The point of contact gradually shifts rearwardly between the two fulcrums 6 and 10, whereby the leverage of the key lever upon the elbow lever is gradually but materially diminished during the printing stroke of the type bar. The latter is caused to start slowly into action, and finishes with an accelerated movement, while the blow of the finger upon the key is eased both upon initial contact with the key and also at the completion of the key stroke.

It will be seen that the mounting of the type action is very compact, the key levers extending rearwardly beneath the type bars, and the sub-levers not only cooperating with the key levers to ease the finger action, but also serving to transmute the up and down key lever movement into a forward and back action adapted to actuate the rearwardly striking type bars. The upstanding arms 8 of the elbow levers are of graduated heights, being shortest in the middle of the system and of gradually increasing height from the middle to the sides of the system, to agree with the positions of the type bars, which are mounted in a curved bar or segment 17. The arms 9 of the elbow levers are of such relative proportions as to cause the dip of the keys to be substantially uniform. While in some cases the key lever springs may be omitted, still I prefer to use them in connection with the type bar springs, as tending to produce a more uniform tension of the keys than would be the case if the type bar springs alone were depended upon.

The type bar segment is preferably mounted to slide vertically between guides 18, to enable upper case types to print; and the links 11 swing idly about their points of connection to the arms 8 during the movements of the segment.

Referring now to Fig. 3, the key levers, designated as 19, are formed at their rear

ends with curved treads at 20, which extend about at right angles to the length of the levers. These treads are adapted to roll down along the front edges of upstanding levers 21, which are connected by links 11 to the type bars. The action of the key lever is similar to that of an elbow lever, and the effect of the rolling movement is the same as in the construction shown at Fig. 1.

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

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

1. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of upstanding sub-levers in rear of the type bars and connected thereto, and a series of key bearing levers of the first order extending beneath the type bars and having rolling contact with the sub-levers.

2. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order, and a series of elbow levers comprising arms extending longitudinally of the key levers and having rolling contact therewith, and also comprising upstanding arms which are connected to the type bars.

3. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars; a series of elbow levers having both forwardly extending arms, which have rolling contact with the key levers, and also upwardly extending arms; and links extending forwardly from the latter to the type bars.

4. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order, and a series of elbow levers comprising arms extending longitudinally of the key levers and having rolling contact therewith, and also comprising upstanding arms which are connected to the type bars; said upstanding arms being of graduated lengths, shortest at the middle of the system and of gradually increasing lengths from the middle to the sides of the system, to agree with the positions of the type bars.

5. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars; a series of elbow levers having forwardly extending arms, which have rolling contact with the key levers, and also having upwardly extending arms; and links extending forwardly from the latter to the type bars; said upstanding arms being shortest at the middle of the system and of gradu-

ally increasing length from the middle to the sides of the system, to agree with the positions of the type bars.

6. The combination with a type bar of a key lever of the first order and a sub-lever; the latter being operatively connected to the type bar and having an arm which extends along an arm of the key lever, and rolls thereon; each of said rolling arms extending from its own pivot towards the pivot of the other arm but terminating between the pivots.

7. The combination with a type bar of a key lever and a sub-lever; the latter being operatively connected to the type bar and having an arm which extends along an arm of the key lever, and rolls thereon; each of said rolling arms extending from its own pivot towards the pivot of the other arm but terminating between the pivots; said key lever being of the first order and extending rearwardly from the key-board, and said sub-lever having an upwardly extending arm which is connected to said type bar.

8. The combination with a type bar of a lever of the first order connected thereto; a key lever; said levers being mounted and formed for rolling contact; a spring for returning the type bar to normal position; and an independent spring for returning said key lever to normal position.

9. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars, a series of elbow levers having forwardly extending arms which override the rear arms of the key levers and which also have curved treads, said elbow levers also having upwardly extending arms, and links connecting the latter to the type bars.

10. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars, a series of elbow levers having forwardly extending arms which override the rear arms of the key levers and which also have curved treads, said elbow levers also having upwardly extending arms, links connecting the latter to the type bars, returning springs connected to said type bars, and returning springs for said key levers.

11. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars, a series of elbow levers having forwardly extending arms which override the rear arms of the key levers and which also have curved treads, said elbow levers also having upwardly extending arms, links connecting the latter to the type bars, returning springs connected to said type bars, returning springs for said key levers, and means for shifting the said type bars to enable different

types to print; said upwardly extending arms being of graduated lengths to agree with the positions of the type bars.

12. In a front strike writing machine, the combination with a series of rearwardly striking type bars, of a series of key levers of the first order extending rearwardly beneath the type bars, a series of elbow levers having forwardly extending arms which override the rear arms of the key levers and which also have curved treads, said elbow levers also having upwardly extending arms, and links connecting the latter to the type bars; said rolling arms being respectively of such lengths and proportions as to enable the dip of the keys to be substantially uniform.

13. The combination with a series of rearwardly striking type bars, of a series of key levers beneath the same, a series of elbow levers mounted in rear of and above the key levers and having upwardly extending arms and also having forwardly extending arms; links connecting said upwardly extending arms to the type bars, said key levers being levers of the first order and operating directly on said forwardly extending arms between the fulcra of the key levers and the fulcra of the elbow levers.

14. The combination with a series of rearwardly striking type bars, of a series of elbow levers mounted in rear thereof and mounted upon a transverse fulcrum rod and having upwardly extending arms connected to the type bars and also having forwardly extending arms; and a series of key levers of the first order mounted upon a transverse fulcrum rod extending beneath the type bars and adapted to contact with and actuate said forwardly extending arms, the contacting arms being of such relative proportions as to cause the dip of the keys to be substantially uniform.

15. In a typewriting machine, the combination of a series of upwardly and rearwardly striking type bars, a series of key levers, a series of upright sub-levers pivoted on fixed pivots in the rear of the type bars and extending to different heights, and forwardly extending links from said sub-levers to the type bars, each sub-lever having a rolling engagement with its associated key lever, the parts being proportioned so that the rolling engagement between the key lever and sub-lever is such that a uniform dip of the various key levers is provided.

16. In a typewriting machine, the combination of a series of upwardly and rearwardly striking type bars, a series of key levers, a series of upright sub-levers pivoted on a fixed pivot in the rear of the type bars and extending to progressively greater heights from the center to the sides of the system, a forwardly extending link from each sub-lever to the associated type bar, one of each of the sub-lever and key lever elements having a

cam surface for cooperating and rolling engagement with the other of said elements, the parts being proportioned so that the rolling engagement between the various key levers and sub-levers is such that a uniform dip of the key levers throughout the system is provided.

17. In a typewriting machine, the combination of an upwardly and rearwardly striking type bar, a key lever having a cam, and an upright sub-lever pivoted on a fixed pivot in the rear of the type bar and said sub-lever cooperating with the cam on said key lever.

18. In a typewriting machine, the combination of a series of upwardly and rearwardly striking type bars, a series of upright sub-levers which are movable on fixed pivots and extend to different heights, links connecting said type bars and sub-levers, one of each of said sub-lever and key-lever elements having a cam which cooperates with the other of said elements, the arrangement being such that the engagement between the key lever and sub-lever shall be nearest to the pivot of the key lever at the initial portion of the stroke and farthest from the pivot of the key lever at the last portion of the stroke, the parts being proportioned so that the rolling engagement between the various key levers and sub-levers is such that a uniform dip of the key levers throughout the system is provided.

19. In a typewriting machine, the combination of a series of type bars, a series of upright sub-levers for said type bars, said sub-levers extending different heights from the center to the sides of the system, and a series of key levers cooperating directly with said sub-levers, the arrangement of the parts and the contacting surfaces between the key levers and sub-levers being of such relative proportions as to cause the dip of the keys to be substantially uniform throughout the system and to effect a varying leverage during the key depressions.

20. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, an upright auxiliary lever operatively connected with the type-bar, and a bell-crank key lever having a vertical rolling contact with the auxiliary lever.

21. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, an upright auxiliary lever operatively connected to the type-bar, and a substantially horizontal key lever having an upright rocking face in direct rolling contact with the auxiliary lever.

22. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, a pivoted upright auxiliary lever operatively connected to the type-bar at its upper end, and a pivoted key-lever having an upright part adjacent its pivot in direct contact with the upright part of the auxiliary lever, and

acting to gradually shift the contact point between the two levers from a position near the key-lever pivot to a position near the auxiliary lever pivot as the key-lever is depressed.

23. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, a pivoted upright auxiliary lever operatively connected to the type-bar at its upper end, and a pivoted key-lever having an upright part in direct changeable contact with the upright part of the auxiliary lever, one of said contacting parts being curved and acting to cause the movement of either lever to be transmitted to the other with an accelerated motion.

24. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, an upright angular auxiliary lever pivotally supported at its lower end and operatively connected to the type-bar at its upper end, and a key-lever pivotally supported at its rear end having an upright part in direct contact with the front side of the auxiliary lever and acting to vibrate the auxiliary lever from its normal position with an accelerating motion.

25. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, a pivoted upright auxiliary lever operatively connected to the type-bar at its upper end, and a rearwardly extending key-lever pivotally supported at its rear end having an upright part in direct rolling contact with the

auxiliary lever and acting with the downward movement of the front end of the key-lever to swing the upper end of the auxiliary lever rearwardly with an accelerating motion.

26. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, an upright pivoted angular auxiliary lever operatively connected to the type-bar at its upper end, and an angular horizontal key-lever pivotally supported at its rear end and having a rocking connection with the auxiliary lever, the angular part of one lever working within the other to cause both levers to return to normal position at the same time.

27. In a typewriting machine, a type-bar arranged to swing upwardly and rearwardly, of an upright auxiliary lever operatively connected to the type-bar, and a key-lever having a part rocking against the auxiliary lever to vibrate the same, and having another part resting against the auxiliary lever when the parts are in their normal position and swinging clear of the same when the key-lever is depressed.

Signed at the borough of Manhattan, city of New York, in the county of New York, and State of New York, this 12th day of October A. D. 1903.

BURNHAM C. STICKNEY.

Witnesses:

E. M. WELLS,

M. F. HANNWEBER.