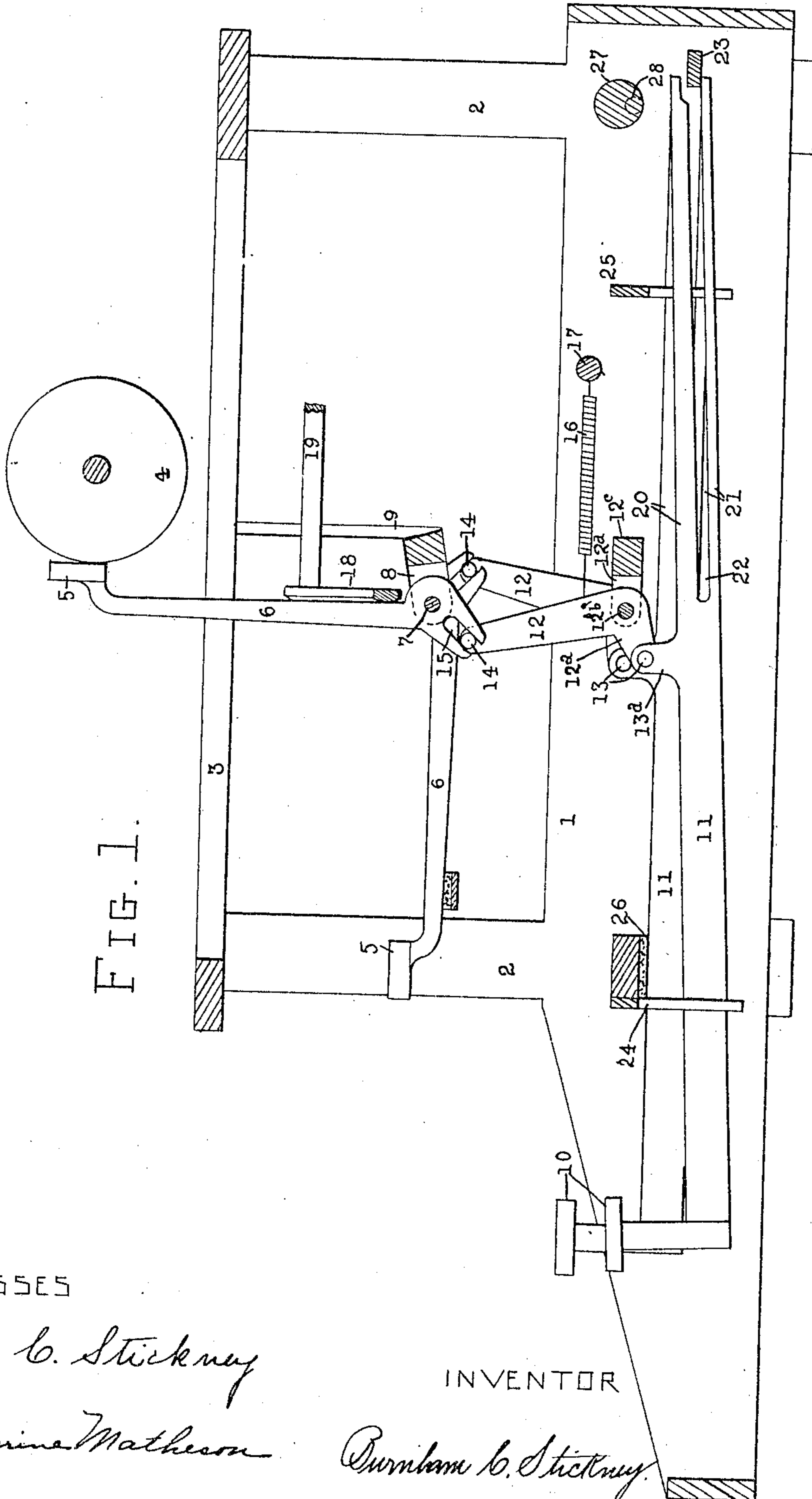


No. 871,151.

PATENTED NOV. 19, 1907.

B. C. STICKNEY.
TYPE WRITING MACHINE.
APPLICATION FILED FEB. 12, 1902.

2 SHEETS—SHEET 1



WITNESSES

Emily C. Stickney

Katherine Matheson

INVENTOR

Burnham C. Stickney

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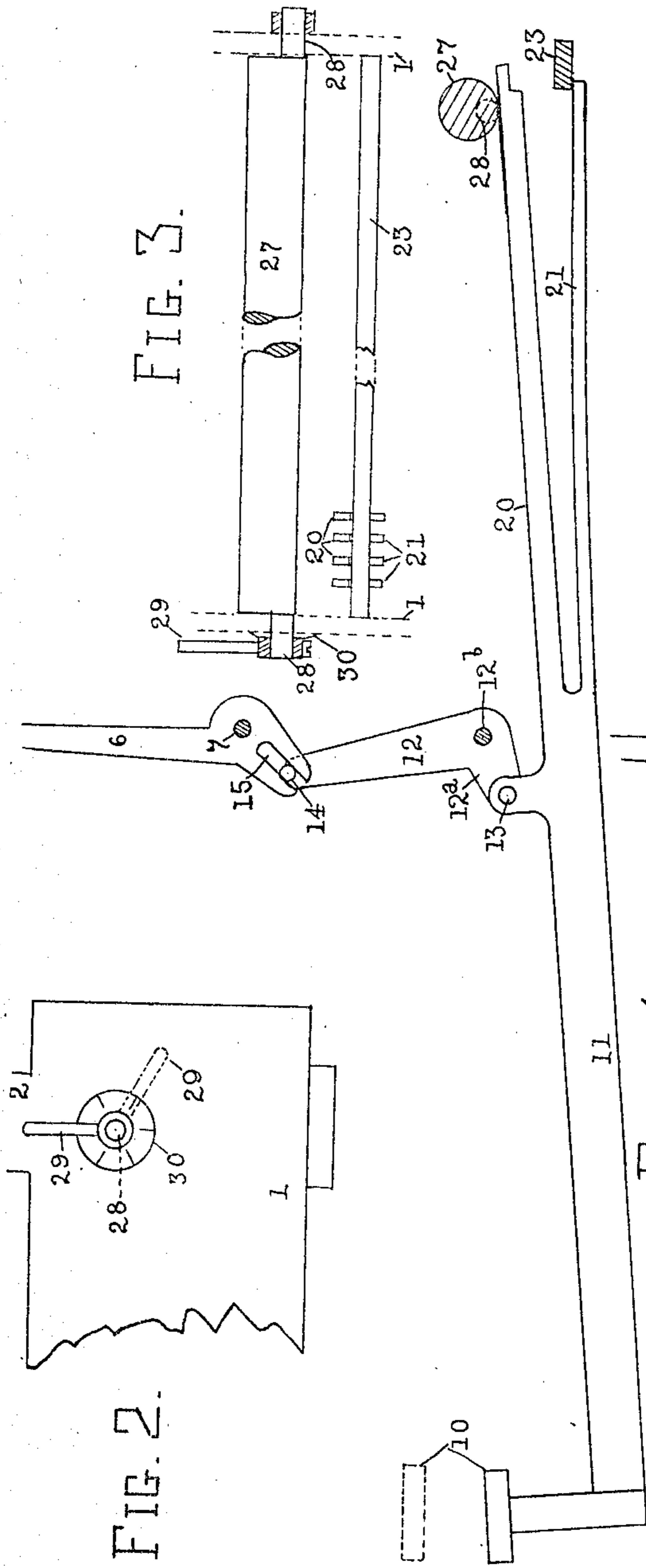


FIG. 4

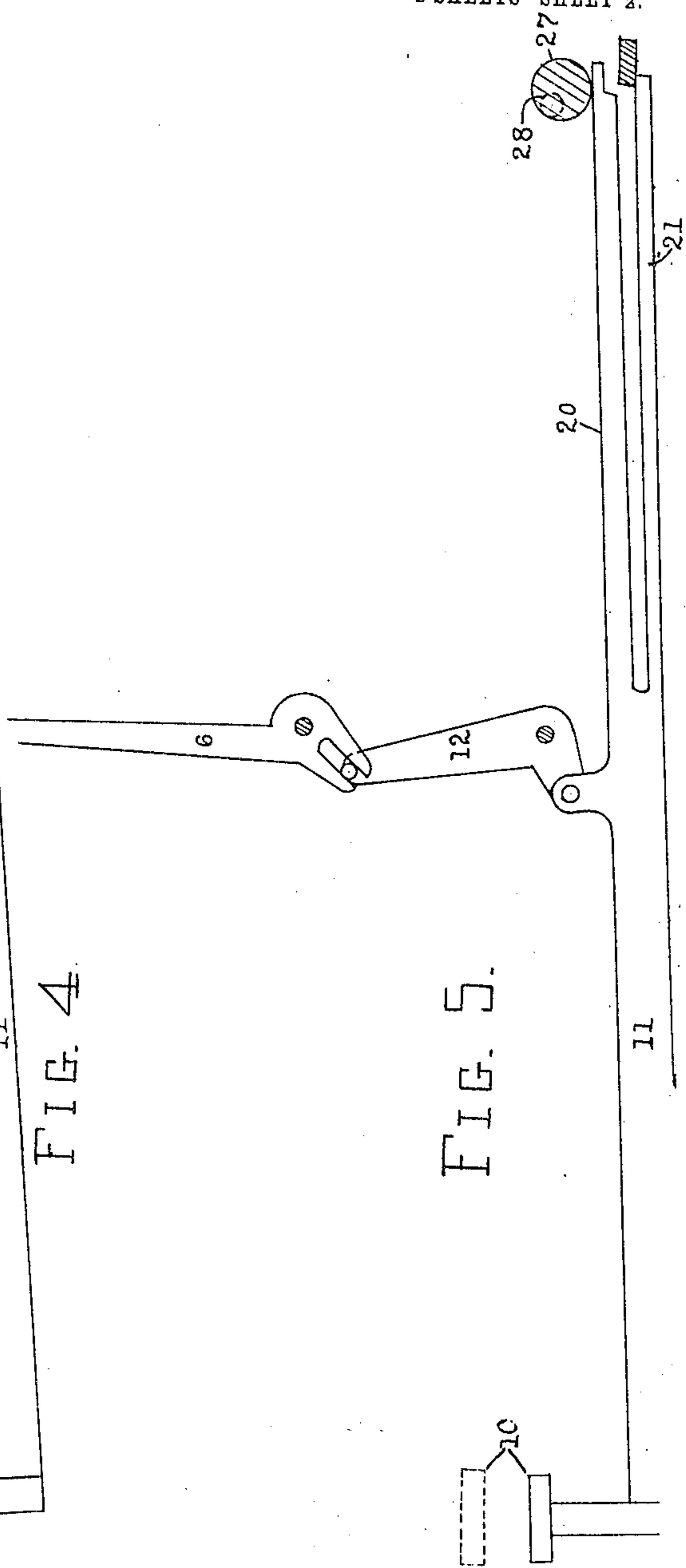


FIG. 5

WITNESSES

Emily C. Stickney
Katherine Matheson

INVENTOR

Burham C. Stickney

UNITED STATES PATENT OFFICE.

BURNHAM C. STICKNEY, OF ELIZABETH, NEW JERSEY.

TYPE-WRITING MACHINE.

No. 871,151.

Specification of Letters Patent.

Patented Nov. 19, 1907.

Application filed February 12, 1902. Serial No. 93,698.

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 the type-actions of writing machines, especially those in which type bars strike upon the front side of a platen.

The chief object of the invention is to render the key touch more agreeable and the operation of the machine less fatiguing, and especially to make it practicable to vary from an exceedingly stiff, resisting action of the keys to a very elastic action, so as to suit the requirements of all classes of operators.

I am aware that it is customary to provide an adjustable "key tension," but the range of such adjustment is small, owing to the necessity of applying sufficient tension to return the keys and operated parts promptly to normal position. According to my present improvements, the so-called "key tension" or "finger tension" may be adjusted as heretofore, so as to effect the requisite prompt action of the parts, while it is also possible, by means of a separate adjustment, to effect wide variations in the key resistance, preferably without disturbing the said adjustment of the usual "key tension," and so that the machine is caused to respond promptly, whether the touch of the keys be either extremely light, medium, or extremely hard.

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

In the accompanying drawings, Figure 1 is a vertical section taken longitudinally of a front strike writing machine embodying my present improvements. Fig. 2 is a detail of the rear portion of the machine base, showing a key for effecting adjustment of the finger touch. Fig. 3 is a diagram in cross section illustrating the touch-adjustment mechanism, and showing the relation of the rear ends of the key levers thereto. Fig. 4 is a diagram illustrating the yielding or elastic action of a key when given a quick touch. Fig. 5 is similar to Fig. 4, but illustrates the action of the key when the mechanism is adjusted to give a highly resisting touch.

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

The machine frame may consist of a rectangular base 1, corner posts 2, and top plate 3. Over the last may run a carriage (not shown), having a platen 4; and types 5 may be carried by a curved system of horizontal type bars 6, pivoted at their rear ends upon a curved fulcrum wire 7, so as to strike rearwardly against the front side of the platen. The hubs of the type bars may work in slots 8 cut radially in a segment 9, secured at its ends to the top plate 3. Keys 10 may be connected to the type bars by means of horizontal levers 11 of the second order, extending rearwardly beneath the type bars, and bell cranks 12, whose forwardly extending short arms 12^a are pivoted directly at 13 to upwardly extending key-lever ears 13^a. Said bell cranks work in slots 12^b and vibrate upon a fulcrum rod 12^c carried by a transverse bar 12^d; and are provided at their upper ends with wrist-pins 14 working in slots 15 formed in the short arms of the type bars. The bell cranks and type bars may, if desired, be formed and arranged as illustrated in U. S. Patent No. 559,345, in connection with the key-levers shown herein; or other type systems may be otherwise connected to keys.

In operation, a key is depressed, forcing down the key lever 11, and through the bell crank 12 swinging the type bar up to print. The parts may be returned to normal position by a draw-spring 16, with which each bell crank is in this instance provided, the rear ends of the springs being hooked over a bar 17 extending across the base in rear of the bell cranks. The movements of the paper carriage may be controlled by a curved universal bar 18, actuable by any type bar, and having a suitable connection, as indicated at 19, whereby it may operate the usual letter-spacing dogs (not shown). Said universal bar may as usual be provided with a returning spring (not shown), to cooperate with the spring 16 in returning the type bar and key to normal position; and both the universal-bar spring and the spring 16 may be adjusted as required, to secure prompt action of the type bar and carriage-feeding mechanisms.

In the preferred manner of practicing my invention, the key lever 11 is cleft at its rear portion to form flanges 20 and 21, preferably by cutting a longitudinal open slot 22 in the lever. The upper flange 20 is preferably

wider and hence stiffer than the lower tine 21, although it is not essential in all cases that one tine be stronger than another, nor that the tines be of equal length, nor formed integral with the lever, nor placed edge to edge one above the other as illustrated. One of the tines, preferably the lower, may bear at its tip against the under side of a fulcrum bar 23 extending transversely at the rear of the system of key levers (Figs. 1 and 3). Fore and aft displacement of the lever is prevented in this instance by its attachment at 13 to the sub-lever 12, and lateral displacement and tipping are prevented by forward and rear guide-combs 24 and 25, the latter guiding the levers at their cleft portions. The spring 16, through the bell crank 12, tends normally to hold the key lever up at its rear end against said fulcrum bar 23, its forward portion bearing up against a fixed pad 26.

The lower tine 21, which is subjected to a bending stress when pressure is applied at the key, is preferably so stiff that when the key is depressed with moderate speed the type bar is carried to the platen and makes an impression thereon without flexing said tine, as illustrated at Fig. 1, the upper tine 20 being idle; but when the key is struck sharply, said tine 21 flexes or yields, as at Fig. 4, thus avoiding a jar to the finger, or cushioning the touch of the key. It will also be understood from said figure that the upper tine 20, by acting as a guard or fender, prevents undue flexure or total collapse of the weak tine 21, since the tip of said tine 20 when thrown up contacts with a stop 27, whereby the key lever as a whole is stiffened, and excessive bending of the lower tine is prevented, although the movement of the key lever and type bar is not obstructed. Thus it will be perceived that the touch of the keys is rendered always soft and agreeable, and that there is no jar to the fingers when operating the keys rapidly.

The response of the mechanism may be made very prompt by putting suitable tension upon the springs 16 and the usual universal-bar spring, without rendering the touch harsh, since such spring adjustment does not affect the yielding property of the key lever.

The stop 27, which extends across the machine above the key levers, is preferably cylindrical in form and mounted eccentrically in the side walls of the base upon pintles 28, upon which said stop bar may be turned and hence adjusted up and down with relation to the key levers. One of the pintles may be provided with a lever or key 29, for facilitating adjustment of the stop bar; and a friction washer 30 or other means may be added for holding the latter where adjusted. The position of said stop-bar determines the extent to which the lower tine 21 may flex

before the upper tine or fender 20 is arrested by contact with the under side thereof. At Fig. 5 the stop bar is shown adjusted to a low position, so that very little such flexure is permitted, and the key action is accordingly rendered much stiffer to the touch, although cushioned at the initial portion thereof. By adjusting the stop bar to different positions, the touch may be rendered very soft, as at Fig. 4, or very stiff, as at Fig. 5, or set to some intermediate point, according to the desire of the operator, without, however, altering the tension of the usual key lever springs 16 or the usual universal-bar spring, so that the spring may be caused to act as promptly as desired for both hard and soft key strokes. Moreover this variation in the touch may be effected by the operator without liability of deranging the action of the delicate carriage-feeding mechanism, and without the necessity of employing mechanical judgment and skill. By properly proportioning the tension of the springs 16, the universal-bar spring, and the stiffness of the tines 20 and 21, and properly adjusting the stop bar 27, an exceedingly agreeable key touch may be obtained, variable to suit different tastes, and not tending to fatigue the operator.

It will be observed that a transverse adjustable stop bar 27 is common to the key levers, for variably limiting or regulating the yielding action thereof while permitting the keys to carry the types to the printing point; that each of the key levers has a yielding construction, preferably at the fulcrum portion or end thereof; that each lever is preferably cleft from its load point to its fulcrum point, and preferably so as to form tines of unequal stiffness, the weaker tine preferably serving as a fulcrum arm for the lever; that the body portion of the lever, or from the load point to the key, is preferably stiffer than either of the tines 20, 21; that a plurality of devices, as 23 and 27, common to said levers, are engaged by the plurality of sets of tines; that the limiting stop 27 is preferably near the lever fulcrums; that said device 27 enables the tines 20 and 21 to cooperate to stiffen the lever; that means are provided upon the framework of the machine for limiting the yielding action of the key levers while permitting the actuation of the type by the key; and that the yielding action of each lever is independent of the other levers, so that the latter are in no wise disturbed.

I am aware that it has been proposed to employ a yielding construction between the key and type bar; but such devices have proven unsatisfactory in practice, and are not capable of performing the functions of my invention. One of the leading features of my improvements consists in the provision of means for securing a wide range of

adjustment of the finger touch, especially where the adjustment is effected simultaneously for all the keys by means of a single finger-piece, requiring no mechanical skill upon the part of the operator, so that he may readily adjust the machine to suit his individual touch, or may vary it from time to time to adapt the machine for particular kinds of work or conditions of operation.

While I prefer to employ a tined lever, still my invention may be carried out without using levers of this nature, certain features of invention, broadly considered, being independent of the construction of the key lever, or of any lever which transmits the key movement to the type, so long as provision is made for the specified action of the keys.

Many variations in construction and arrangement may be resorted to within the scope of my invention, which is applicable also to other styles of writing machines. Portions of my improvements may be used without others.

Having described my invention, I claim:

1. In a typewriting machine, the combination with a system of type bars of a system of keys, a system of levers between the keys and the type bars, each of said levers having a yielding construction, and a stop common to said levers for limiting the yielding action thereof while permitting the keys to carry the types to the printing point.

2. 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, the fulcrum portion of each of said levers having a yielding construction, and a stop common to said levers for limiting the yielding action thereof.

3. In a typewriting machine, the combination with a type of a key, a lever between the key and the type, the fulcrum portion of said lever comprising two members one whereof is yielding, and a stop with which the other of said members contacts for limiting the yielding movement of the first of said members.

4. In a typewriting machine, the combination with a series of type bars of a series of keys, a fulcrum bar, a series of levers between the keys and the type bars, the fulcrum portion of each of said levers being cleft to form tines, one whereof is mounted upon or in contact with said fulcrum bar, and a stop wherewith the other of said tines may contact.

5. 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, each of said levers comprising a body portion and a portion cleft to form tines, a fulcrum whereon one tine of each lever bears, and a stop wherewith the other tine of each lever contacts.

6. In a typewriting machine, the combination with a series of type bars of a series of rearwardly extending key levers of the second order arranged on edge, each of said levers being cleft at its rear end to form tines, a fulcrum with which the lower tines engage, and a stop with which the upper tines contact.

7. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of levers each having a plurality of bearing tines, and a plurality of devices common to said key levers, wherewith said tines engage.

8. 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, the fulcrum portion of each of said levers having a yielding construction, and means at or near the fulcrum of said levers for limiting the yielding action of said levers.

9. In a typewriting machine, the combination with a series of type bars of a series of rearwardly extending key levers of the second order arranged on edge, each of said levers being cleft at its rear end to form tines, a fulcrum with which the lower tines engage, a stop with which the upper tines contact, and a guide comb for the cleft portions of the levers.

10. In a typewriting machine, the combination with a series of type bars of a series of key levers, a series of devices to which said key levers are pivoted and whereby said levers are prevented from endwise displacement, each of said key-levers being cleft or divided into two portions, whereof one is yielding, a fulcrum engaged by said yielding portion of each lever, and a stop wherewith the other of said portions engages, so as to limit the flexure of said yielding portion upon the printing stroke.

11. In a typewriting machine, the combination with a series of type bars of a series of key levers, a series of levers pivoted thereto and connected to the type bars, each lever in one of the sets of levers being cleft to form two portions, whereof one is a yielding fulcrum portion, a fulcrum with which said yielding portion of each lever engages, and means for limiting the flexure of said yielding portions; said limiting means cooperating with the other of said two portions.

12. 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 said type bars and also having forwardly extending arms; a series of key levers of the second order pivoted to said forwardly extending arms and cleft at their rear portions; a fulcrum for one set of key-lever tines; a stop for the other set of tines; and a guide-comb for the cleft portions of the key levers.

13. 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 said type bars and also having forwardly extending arms; a series of key levers of the second order pivoted to said forwardly extending arms and cleft at their rear portions; a fulcrum for one set of key-lever tines; a stop for the other set of tines; a guide-comb for the cleft portions of the key levers; and returning springs connected to said bell cranks.

14. In a typewriting machine, the combination with a type bar and a lever connected thereto and having a cleft fulcrum portion or end, of means for enabling the tines to cooperate to stiffen the lever.

15. In a typewriting machine, the combination with a type bar and a lever connected thereto and having a cleft fulcrum portion or end, of means for enabling the tines to cooperate to stiffen the lever, and a returning spring for said lever.

16. In a typewriting machine, the combination with a type bar and a key of an intermediate movable member having a yielding construction and serving to transmit movement from said key to said type bar, and means upon the framework for limiting the yielding action while permitting actuation of the type by the key.

17. In a typewriting machine, the combination with a series of type bars and a series of levers, each of said levers comprising a fulcrum arm, of means supported upon the framework whereon each of said fulcrum-arms may bear, each of said levers having a yielding action independently of the other levers, due to a yielding construction of one of said fulcrum-arms and supporting elements; and means for limiting such yielding action while permitting actuation of the type by the key.

18. 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, each of said levers having a yielding arm, and adjustable means common to said levers for determining the extent to which said arms may yield.

19. 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, each of said levers comprising a stiff body portion and a yielding fulcrum-arm, and adjustable means common to said levers for determining the extent to which said arms may yield.

20. In a typewriting machine, the combination of a series of type bars, a series of key-operated levers connected thereto, a support for each of said levers, each lever having an individual yielding action, due to the yield-

ing construction of one of said lever and supporting elements, and adjustable means for regulating the yielding action of all of said levers simultaneously.

21. 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, each of said levers having a yielding construction, and an adjustable stop bar mounted upon the framework transversely of said levers for regulating the yielding action thereof while permitting the full actuation of the type bars by the keys.

22. 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, the fulcrum portion of each of said levers having a yielding construction, a stop bar arranged transversely of said levers, and a finger-piece connected to said stop bar for adjusting the same to different positions to regulate the yielding action of said levers.

23. 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, the fulcrum portion of each of said levers comprising two members one whereof is yielding, and adjustable means wherewith the other of said members contacts, for limiting the yielding action of said yielding members.

24. 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, the fulcrum portion of each of said levers comprising two members one whereof is yielding, and an adjustable transverse bar wherewith the other of said members contacts.

25. In a typewriting machine, the combination with a series of type bars of a series of keys, a fulcrum bar, a series of levers between the keys and the type bars, the fulcrum portion of each of said levers being cleft to form tines, one whereof is mounted upon or contacts with said fulcrum bar, and adjustable means wherewith the other of said tines contacts.

26. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of cleft levers between the keys and the type bars, each of said levers comprising a body portion and tines integral therewith, a fulcrum bar whereon one of said tines of each lever bears, and a stop bar wherewith the other of said tines in each lever may contact; and means for effecting a relative adjustment between said fulcrum bar and said stop bar.

27. In a typewriting machine, the combination with a series of type bars of a series of rearwardly extending key levers of the second order, each of said levers being cleft at its rear end to form tines, a fulcrum where-

with the one tine of each lever engages, and an adjustable stop wherewith the other tine of each lever contacts.

28. In a typewriting machine, the combination with a series of type bars of a series of keys, a series of levers each having a plurality of bearing tines, and a plurality of devices common to said key levers, wherewith said tines engage; at least one member of said plurality being adjustable.

29. 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, the fulcrum portion of each of said levers having a yielding construction, and adjustable means at or near the fulcrums of said levers for limiting the yielding action of said levers.

30. In a typewriting machine, the combination with a series of type bars of a series of key levers, a series of devices to which said key levers are pivoted and whereby said levers are prevented from endwise displacement, each of said key-levers being cleft to form a yielding portion, a fulcrum with which a yielding portion of each lever engages, and an adjustable stop with which another portion of each lever engages, so as to limit the flexure of said cleft portion upon the printing stroke.

31. In a typewriting machine, the combination with a series of type bars of a series of key levers, a series of levers pivoted thereto and connected to the type bars, each lever in one of the sets of levers being cleft to form a yielding fulcrum portion, a fulcrum with which said yielding portion of each lever engages, and adjustable means for regulating the flexure of said yielding portion.

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 said type bars and also having forwardly extending arms; a series of key levers of the second order pivoted to said forwardly extending arms and cleft at their rear portions; to form tines; a fulcrum for one set of key-lever tines; a transverse adjustable stop bar for the other set of key-lever tines; and returning springs.

33. In a typewriting machine, the combination with a type bar and a lever connected thereto and having a cleft fulcrum portion or end, of adjustable means for enabling the tines to cooperate to stiffen the lever.

34. In a typewriting machine, the combination with a series of type bars and a series of levers connected thereto and each having a cleft fulcrum portion or end, of a fulcrum common to said levers, and means also common to said levers for enabling the tines to cooperate to stiffen the levers.

35. In a typewriting machine, the combi-

nation with a type bar and a key of a yielding device whereby movement is transmitted from said key to said type bar, and adjustable means upon the framework for limiting the yielding action while permitting actuation of the type by the key.

36. In a typewriting machine, the combination with a series of type bars and a series of levers, each of said levers comprising a fulcrum arm, of means supported upon the framework whereon each of said fulcrum-arms may bear, each of said levers having a yielding action independently of the other levers, due to a yielding construction of one of said fulcrum-arm and supporting elements; and adjustable means for limiting such yielding action while permitting actuation of the type by the key.

37. In a typewriting machine, the combination with a series of type bars of a series of levers of the second order connected thereto, each of said levers being cleft at its fulcrum end; a fulcrum whereon one tine on each key-lever bears; and an eccentrically mounted rotatable stop-rod for limiting the movement of the other tines upon the levers.

38. In a typewriting machine, the combination with a series of type bars of a series of levers of the second order connected thereto, each of said levers being cleft at its fulcrum end; a fulcrum whereon one tine on each key-lever bears; an eccentrically mounted rotatable stop-rod for limiting the movement of the other tines upon the levers; a finger piece connected to said rod; and means for maintaining the adjustment of said rod.

39. In a front strike writing machine, the combination of a series of rearwardly striking type bars; a series of bell cranks pivoted below said type bars and swinging in vertical planes and at their upper ends provided with pins which engage open slots in said type bars; a straight fulcrum rod whereon said bell cranks are pivoted; a transverse bar supported at its ends upon the base of the machine and carrying said rod and also having slots for said bell cranks; rearwardly extending draw springs connected to the upright arms of said bell cranks; a transverse rod to which said springs are connected; a series of fore-and-aft key levers pivoted between their ends to forwardly extending arms of said bell cranks; guides for the forward ends of said key levers; guides for the rear portions of said key levers; each of said key levers being cleft substantially from its load point to its fulcrum point so as to form a narrow under tine and a wide top tine; a fixed transverse bar with which the under tines engage; a cylindrical rod arranged transversely over the rear ends of said upper tines and at its ends mounted in the base of the machine by

means of eccentric pintles; a finger lever upon the projecting end of one of said pintles; and a friction washer between said finger lever and the base.

5 40. In a typewriting machine, the combination with a type and a key of an intermediate lever having tines; and adjustable means for enabling said tines to cooperate or not at will.

10 41. In a typewriting machine, the combination with a type and a key of an intermediate unbroken lever, and adjustable means for varying the stiffness of the lever.

15 42. In a typewriting machine, the combination with a series of types, a series of keys, and a series of levers, of adjustable means for enabling said levers to have an extra yielding action or not at will.

20 43. In a typewriting machine, the combination with a series of type bars, a series of keys, and a series of levers, of adjustable

means common to said levers for enabling said levers to have an extra yielding action or not at will.

44. In a typewriting machine, the combination with a type and a key of a lever cleft at its fulcrum portion to form tines, and a fulcrum with which one of said tines normally contacts; said tine yielding during the printing stroke of the lever, and the other tine cooperating therewith during the latter portion of such stroke to stiffen the lever. 25 30

45. The combination with a type bar and a key of a divided yielding member communicating movement from the key to the type bar and means at the fulcrum for regulating the extent of the yielding action. 35

BURNHAM C. STICKNEY.

Witnesses:

EMILY C. STICKNEY,

KATHERINE MATHESON.