No. 697,384. Patented Apr. 8, 1902.

J. W. PAUL.

TYPE WRITER.

(Application filed May 1, 1901.)

(No Model.) 4 Sheets—Sheet 1.

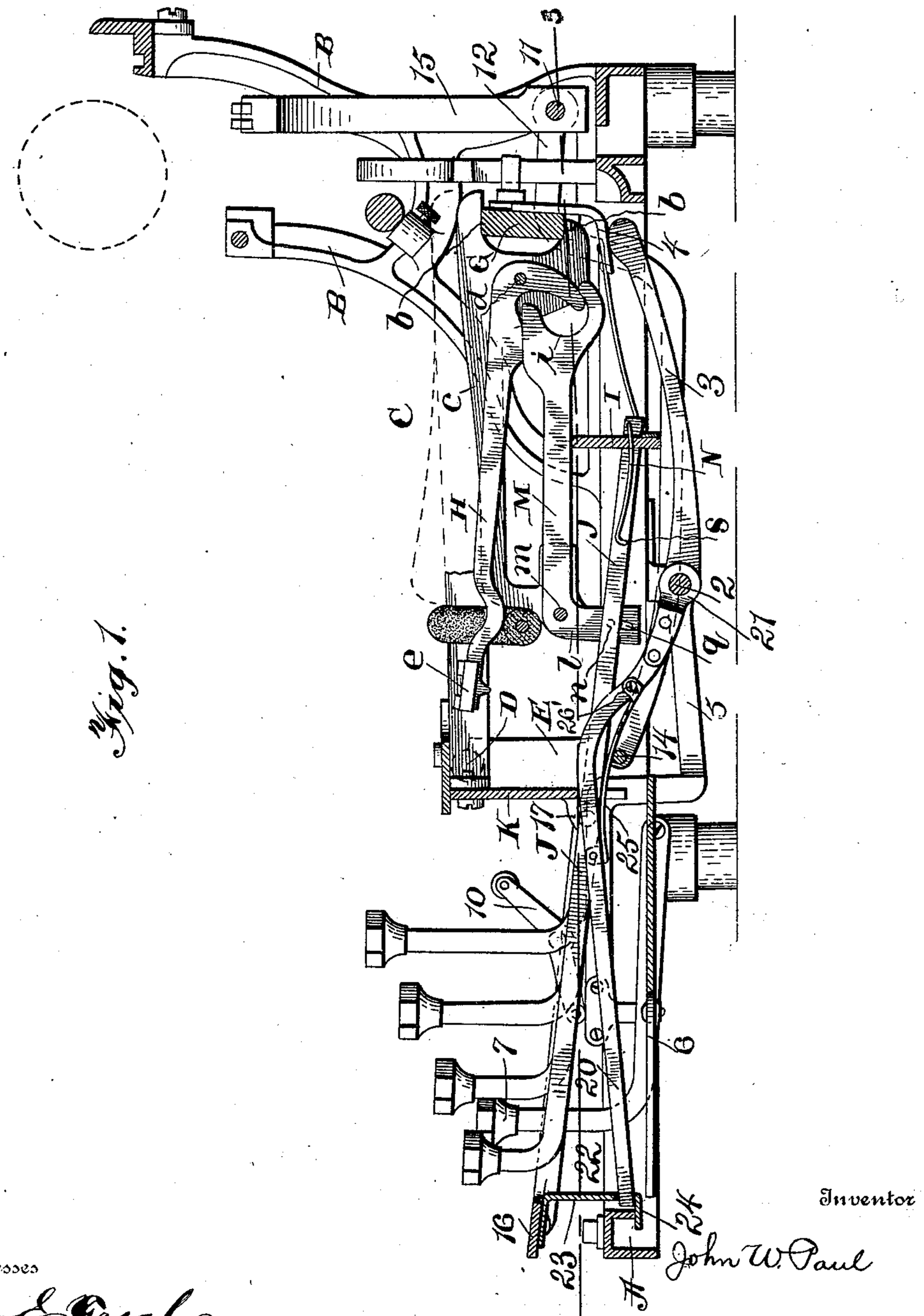

Fig. 1.

Witnesses
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4 Sheets—Sheet 2.

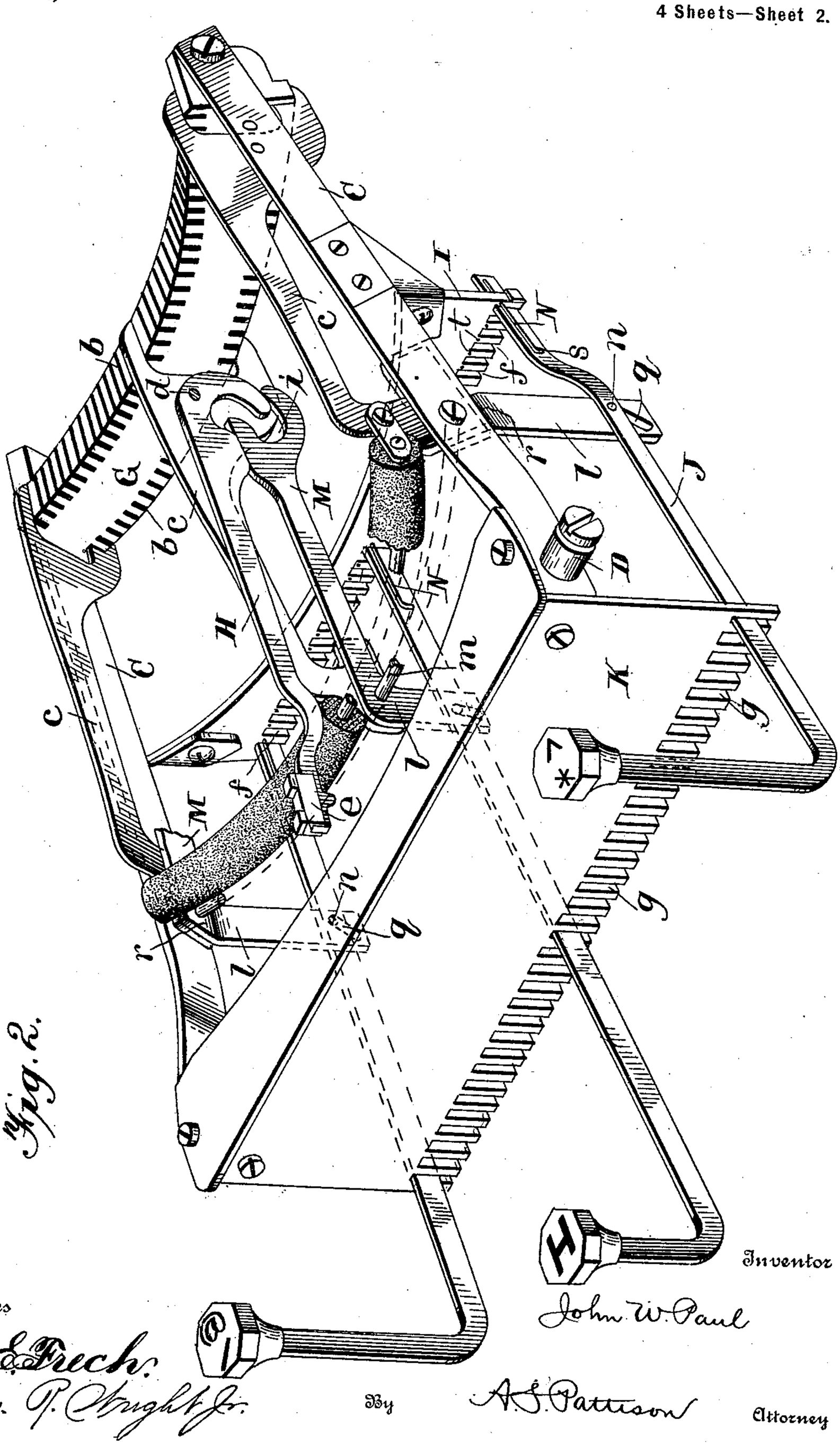

Fig. 2.

Witnesses

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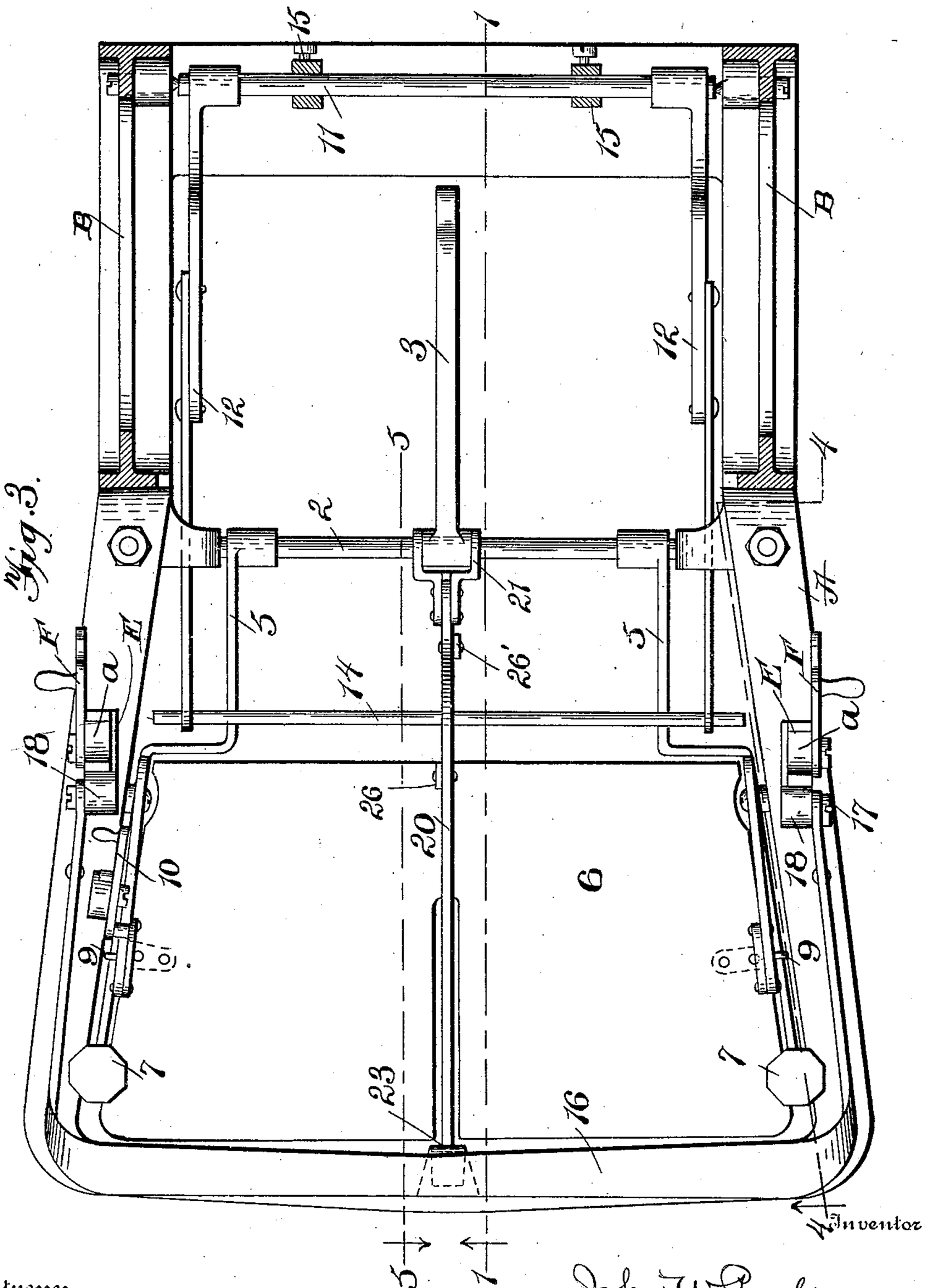
(No Model.) 4 Sheets—Sheet 3.

Fig. 3.



Witnesses

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4 Sheets—Sheet 4.

Fig. 4.

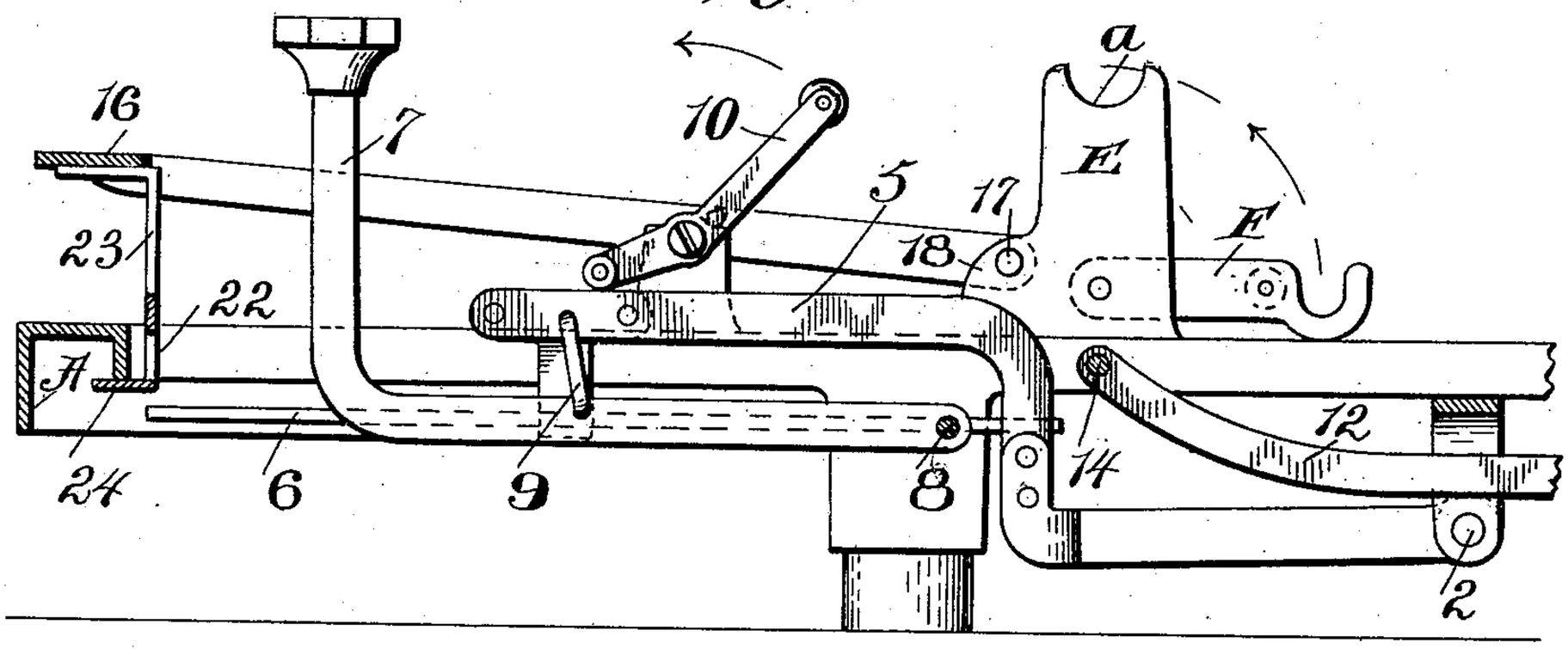


Fig. 5.

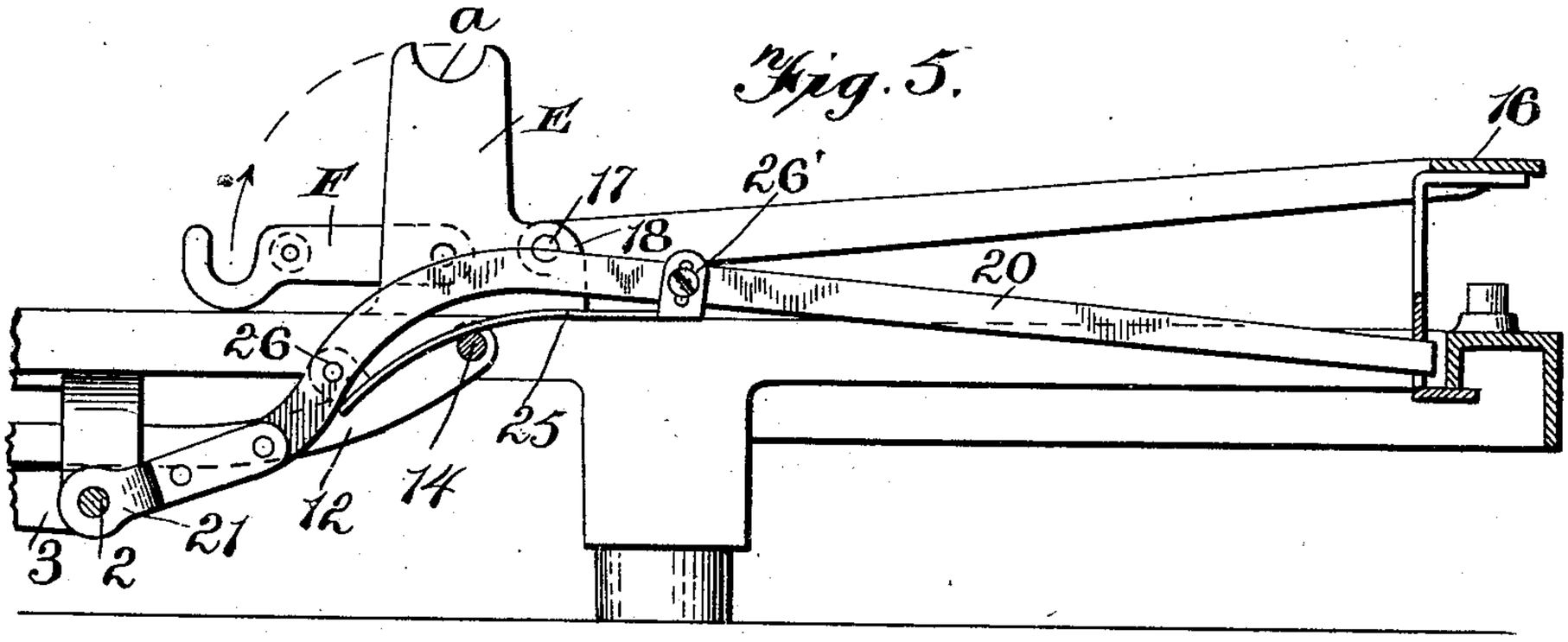
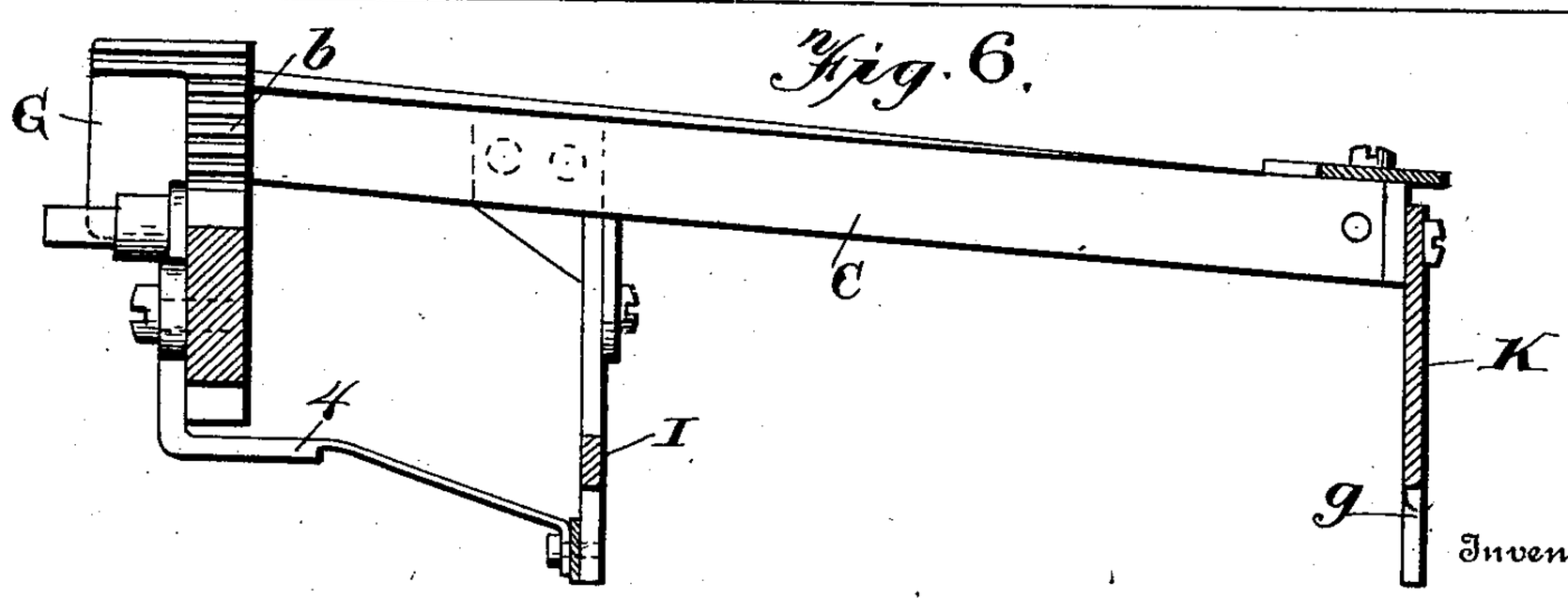


Fig. 6.



Witnesses

Geo. E. Frech.

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UNITED STATES PATENT OFFICE.

JOHN W. PAUL, OF KITTANNING, PENNSYLVANIA, ASSIGNOR TO PITTSBURG WRITING MACHINE COMPANY, OF PITTSBURG, PENNSYLVANIA.

TYPE-WRITER.

SPECIFICATION forming part of Letters Patent No. 697,384, dated April 8, 1902.

Application filed May 1, 1901. Serial No. 58,377. (No model.)

To all whom it may concern:

Be it known that I, JOHN W. PAUL, a citizen of the United States, residing at Kittanning, in the county of Armstrong and State of Pennsylvania, have invented new and useful Improvements in Type-Writers, of which the following is a specification.

My invention relates to improvements in type-writers, and pertains to a machine of the "visible-writing" type and wherein the type-bars are arranged in a substantially horizontal basket.

The primary object of this invention is to provide a simple arrangement and construction of the type-bar action whereby a straight, easy, and practically uniform touch is effected.

A further object of my invention is to so construct the shifting mechanism for the vertically-movable type-bar basket that a quick-acting and easy-touch shift is provided.

A further object of this invention relates to the construction and arrangement of the several parts of the mechanism hereinafter shown and described whereby an improved machine of the visible-writing type is produced.

In the accompanying drawings, Figure 1 is a central longitudinal vertical sectional view of the machine embodying my invention, the carriage and the carriage mechanism being omitted, as that forms no part of my present invention. Fig. 2 is a detached perspective view of the type-bar basket with only a portion of the type-bars shown in position therein to more clearly disclose the specific construction of the basket and the arrangement of the type-bars. Fig. 3 is a top plan view on line 3 3 of Fig. 1, the type-basket being omitted to disclose the type-basket-shifting mechanism and the universal-frame mechanism for effecting the feed of the carriage. Fig. 4 is a sectional view on the line 4 4 of Fig. 3 and looking in the direction indicated by arrow. Fig. 5 is a sectional view on the line 5 5 of Fig. 3 and looking in the direction indicated by arrow. Fig. 6 is a central vertical longitudinal sectional view through the type-bar basket, the type-bars and key-levers being omitted.

In a machine of the character herein shown there is essentially a horizontal frame A, having at one end the vertically-arranged standard B, upon which is supported a suitable carriage, and situated within the horizontal frame A below the carriage is a vertically-shifting type-bar basket C, in which are arranged the type-bars and the key-levers.

The combined type-bar and key-lever basket C is pivotally supported upon suitable trunnions D, which are adapted to rest in grooves *a*, formed in the upper ends of the standards E, which project upward from the horizontal portion A of the frame, and these trunnions are removably held within the said grooves through the medium of any suitable locking devices, the locking device here shown being in the form of hooks or latches F.

Referring now to the construction and arrangement of the type-bar basket, the type-bars, and the key-levers, it will be noticed that one end of the type-bar basket consists of a block G, having grooves *b* in its upper and lower sides, and located within these grooves are the type-bar division-plates *c*. Located between these division-plates are the type-bars H, which are pivotally supported at their inner ends through the medium of a suitable rod *d* and carrying at their outer ends the type-bar block *e*, which contains the caps and small letters, as is well understood by those skilled in the art.

Projecting downward from the under side of the basket C at a point intermediate its ends is a vertically-arranged plate I, having in its under side a plurality of slots *f*, thus constituting a comb. The inner ends of the L-shaped key-levers J rest in these slots *f*, and the outer portions of the key-levers are guided and moved in vertically-arranged slots *g*, formed in a downwardly-projecting plate K, located at the opposite or outer end of the basket to that at which the type-bars H are pivoted.

In a type-writer of the character here shown it is necessary that the type-bars be arranged in the arc of a circle and radially in respect thereto, and it is the primary object of my present invention to so construct and arrange the key-levers and the intermediate mechan-

ism between the key-levers and the type-bars that although the type-bars travel in radii to the arc of a circle in which they are arranged, yet the key-levers will move in a vertical plane. This result is accomplished through the medium of the intermediate essentially L-shaped levers M, carrying at their inner ends suitable sockets *i*, adapted to receive and act upon the pivotal ends of the type-bars in a manner which is well known to those skilled in the art and need not be specifically described. At the intersection of the vertical portion *l* of the L-shaped levers M a pivotal rod or other suitable pivotal support *m* passes for the purpose of forming a pivotal connection for the said L-shaped levers. The key-levers J are located at one side of the lower ends of the vertical portions *l* of the levers M, and the key-levers are provided with laterally-projecting pins *n*, which project into suitable cam-slots *q*, formed in the lower ends of the said vertical portions of the L-shaped levers M. By means of this construction when a key-lever is depressed the pin *n* thereof will by its engagement with the cam-slot *q* of the intermediate lever M cause its inner free end to move upward, and this upward movement will cause the type-bar H to be thrown up and against the printing-roller, as will be readily understood.

As before stated, the type-bars are arranged in the arc of a circle, and hence the intermediate levers M must be arranged to correspond with the type-bars. They are likewise arranged in the arc of a circle. The key-levers are arranged in a common horizontal plane, and owing to this arrangement of the key-levers it will be at once appreciated that the length of the vertical portions *l* of the levers M will vary according to its location in order to reach the key-levers. On account of this construction the L-shaped intermediate levers M lying at or near the center of the type-bar basket have their vertical portions *l* short; but owing to the circular arrangement of the type-bars and these intermediate levers M it is necessary that the vertical portions *l* of the levers M situated at opposite ends thereof be longer and be deflected at a suitable point—for instance, at the point *r*—to cause them to extend in a vertical plane.

Owing to the fact that the vertical portions of the levers M are of varying lengths and the desirability of having a uniform downward movement to the key-levers the inclination of the cam-slots *q* in the vertical portions of the intermediate levers M must of necessity vary. For instance, by referring to Fig. 2 it will be seen that the said slot *q'* in the central lever M is but slightly inclined, while the slots *q* in the end intermediate levers M are at a considerable angle. This is so for the reason that the longer vertical portions of the intermediate levers M must travel farther than the short portions of some of the other levers M in order to give the inner free ends of the said levers a uniform movement and in turn to contribute that uniform movement to the type-bars H.

By means of a type-bar basket and the arrangement of the key-levers and the intermediate levers here shown and described I am enabled to produce a type-action in which the key-levers have an accurate movement in a vertical plane and of practically a uniform and easy touch.

For the purpose of sustaining the weight of the key-levers and assisting in the quick return to their normal positions I provide a spring for each of the key-levers. As here shown the form of spring consists of a doubled wire N, which passes through an opening *s* in the inner end of the key-lever, the ends of the said wire passing through the openings *t*, formed in the comb or plate I, the tension of the said spring serving to lift the outer free ends of the key-levers and to hold them in their normal positions.

The means for shifting the basket vertically for the purpose of writing in caps consists of a transversely-arranged pivotal bar 2, which has rigidly secured thereto an outwardly-projecting arm 3. The free end of this arm 3 engages the under side of a suitable shoe 4, which is attached to the block G and extends downward and inward and has its opposite end connected with the downwardly-projecting comb or plate I and serves the additional function of assisting in supporting the plate. Rigidly connected to opposite ends of the said pivotal rod 2 and extending forward are the arms 5, which are rigidly connected with a suitable counterweight 6. This counterweight 6 is here shown in the form of a flat sheet or plate of lead or similar material and serves, through the medium of the arm 3, which is in engagement with the inner free end of the vertically-movable type-bar basket C, to lighten the heft of the inner end of the said type-bar basket.

Preferably I provide two shift-keys 7, the same being located at opposite sides of the machine, though, if desired, but one shift-key may be used. The inner ends of these shift-keys 7 are pivotally connected to the horizontal frame A in any suitable manner at the points 8 and are intermediately connected with the outer ends of the arms 5 through the medium of suitable wire or other links 9.

When the type-bar basket is in position, its inner end, being in engagement with the inner free end of the arm 3, lifts the outer free ends of the arms 5 and in turn the counterweight 6, which is rigidly connected therewith, and through the medium of the links 9 also lifts the shift-keys 7 to their normal positions. A downward pressure upon either one of the shift-keys 7 will cause a corresponding downward movement of the counterweight and the free ends of the arms 5, and this in turn will lift the inner free end of the arm 3 and cause the lifting of the inner free end of the vertically-shifting type-bar basket.

For the purpose of enabling the type-bar basket to be locked in its shifted position when writing a word or a sentence in caps I provide any suitable form of locking lever or latch. As here shown I provide a lever 10, intermediately pivoted to the frame A, which has its lower end adapted to engage the upper edge of the free end of one of the arms 5 of the shifting frame, whereby when the said lever is moved in the direction indicated by arrow in Fig. 4 it will cause a downward movement of the outer end of the shifting frame and a corresponding upward movement of the inner end of the shifting frame, and thus serve to lock the type-bar basket in the position to write in caps.

The carriage-feed mechanism involves a universal frame, as is usual in all type-writers, and this universal frame as here shown is comprised of a pivotal rod 11, located at one end of the frame and below the carriage, outwardly-extending arms 12, which are rigidly connected with the said rod 11, and a straight horizontally-arranged bar 14, which extends directly under the key-levers J and adapted to be engaged thereby when the key-levers are depressed for the purpose of oscillating the rod 11, to which is rigidly connected the dog-supporting frame 15. From this description it will be noticed that the universal feeding-frame is of a rectangular character and presents a perfectly-horizontal surface to the under side of the key-levers J and that there is no lateral or grinding action between the key-levers and the universal frame in the movement of the type-action of the machine.

The space mechanism here shown consists of a U-shaped frame 16, which has its ends pivotally connected at the points 17 to suitable ears 18, which project from the frame A. The means whereby the movement of the space-bar 16 is transferred to the universal feed-frame consists of an arm 20, which has its inner end 21, as shown in Fig. 3, loosely pivoted upon the rod 2 and movable independent thereon. This bar 20 curves upward and has its outer end loosely inserted into an opening 22 of a depending arm 23, extending from the space-frame 16. The lower end of this arm 23 has an outwardly-extending lip 24, adapted to engage the under side of the end of the frame A for the purpose of limiting the upward movement of the spacing-frame 16, and to thereby limit the movement of the universal frame of the carriage-feeding mechanism, which has before been described.

It is desirable to provide an adjustable means by which the feed of the carriage can be regulated relatively to the movement of the key-levers, as some operators desire an earlier feed of the carriage in respect to the movement of the key-levers and the type-bar than others. This is accomplished through the medium of a bearing strip or plate 25, which has one end 26 pivotally connected to the said arm 20 and its opposite end 26′ constructed to be vertically adjustable in respect to the said arm or lever 20 through the medium of a slot and screw, as here shown at 26. The vertical movement of this bearing strip or plate 25 will cause a corresponding movement through the engagement therewith of the bar 14, constituting the inner end of the universal feeding-frame, and thus cause a corresponding adjustment of the feed-dogs in relation to the carriage-rack. This vertical movement of the rod 14 will cause it to be nearer to or farther from the key-levers, thus regulating the period at which the feed of the carriage occurs relative to the movement of the type-bars and key-levers.

I do not limit myself to the specific construction and specific arrangement of the parts herein enumerated, as these may be varied by those skilled in the art without materially affecting the spirit or scope of my invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, a key-lever located thereunder, a substantially horizontally arranged member located between said key-lever and type-bar, the intermediate member operatively connected with said type-bar and a direct cam connection between the key-lever and said horizontal member.

2. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, having a projection at its pivotal end, a key-lever located thereunder, and a rigid pivoted intermediate horizontal member having a socket at one end receiving the type-bar projection, and a connection at its opposite end with said key-lever.

3. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar having a projection at its pivoted end, a key-lever, and a pivoted intermediate member having at one end a socket receiving said type-bar projection, and a cam connection between its opposite end and said key-lever.

4. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, a key-lever, an essentially L-shaped intermediately-pivoted lever having horizontal and vertically-projecting arms, the horizontal arm having at its end a socket engaging the pivoted end of the type-bar, and its vertical end operatively connected with the key-levers.

5. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar having a projection at its pivoted end, a key-lever, a substantially horizontally-arranged L-shaped intermediately-pivoted lever located thereunder, the said lever having horizontal and vertically-extending arms, the end of the horizontal arm provided with a socket receiving

the type-bar projection, and the vertical arm operatively connected with the key-lever.

6. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, an intermediate lever located under the type-bar, the said intermediate lever having an inwardly-extending horizontal arm operatively connected with the pivoted end of the type-bar, a key-lever located below the said intermediate lever, the intermediate lever having at its pivoted end a depending arm operatively connected with the key-lever.

7. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, an intermediate lever pivoted at one end near the free end of the type-bar, the free end of the intermediate lever directly operatively connected with the type-bar, and a key-lever located below the intermediate lever and directly operatively connected with the said intermediate lever.

8. In a type-writer, a type-bar action comprising a substantially normally horizontally arranged pivoted type-bar, an intermediate lever pivoted near but below the free end of the type-bar, the free end of the lever being operatively connected with the pivoted end of the type-bar, a key-lever below the intermediate lever and pivoted at a point below and between the end of the type-bar and the said lever, the pivoted end of the said intermediate lever being connected with the key-lever at a point intermediate the ends of the latter.

9. In a type-writer, a type-bar action comprising a plurality of substantially normally horizontal pivoted type-bars arranged in the arc of a circle, a plurality of key-levers, a plurality of essentially L-shaped pivoted levers having horizontal and vertically-extending portions their horizontal portions operatively connected with the type-bars, and their vertical portions of various lengths, and cam connections of various pitches between the key-levers and the vertical portions of the said L-shaped levers.

10. In a type-writer, a type-bar action comprising a plurality of pivoted type-bars arranged in the arc of a circle, a plurality of pivoted L-shaped levers located therebelow and arranged in a corresponding arc, the vertical portions of the L-shaped levers at either side of the central one increasing in length, a plurality of key-levers arranged in a common horizontal plane, and operative connections between the ends of said L-shaped levers, the type-bars and key-levers repectively.

11. In a type-writer, a type-bar action comprising a plurality of pivoted type-bars arranged in the arc of a circle, a plurality of pivoted L-shaped levers located therebelow and arranged in a corresponding arc, a plurality of key-levers located below the L-shaped levers, connections between the vertical portions of the L-shaped levers and the key-levers, all of said connections arranged in substantially the same horizontal plane, and connections between the horizontal ends of the said L-shaped levers and the type-bars.

12. In a type-writer, a type-bar action comprising a plurality of pivoted type-bars arranged in the arc of a circle, a plurality of pivoted L-shaped levers therebelow and arranged in a corresponding arc, the downwardly-projecting arms of the L-shaped levers at opposite sides of the central one being deflected and arranged in substantially a true vertical plane, a plurality of key-levers having a movement in substantially a true vertical plane, and operative connections between opposite ends of the L-shaped levers.

13. In a type-writer, a type-bar action comprising a plurality of pivoted type-bars arranged in the arc of a vertical circle, a plurality of L-shaped levers located therebelow and arranged in a corresponding arc, the said L-shaped levers pivoted at the junction of the arms of the L, a plurality of key-levers, cam connections between the vertical arms of the L-shaped levers and the said key-levers, the cam connection consisting of cam-slots and pins engaging therein.

14. In a type-writer, the combination of a plurality of type-bars arranged in the arc of a vertical circle, a plurality of L-shaped levers having horizontal and vertically-projecting arms located therebelow, pivotal supports for the said levers at the junction of the arms constituting the L-shaped levers, an operative connection between the free ends of the horizontal arms and the type-bars, the vertical arms of the L-shaped levers provided with cam-shaped slots all of which are located in the same horizontal plane, and a plurality of key-levers located in a corresponding horizontal plane and provided with projections engaging the said cam-slots.

15. In a type-writer, a type-bar action comprising a frame, a plurality of type-bars pivoted therein and arranged in the arc of a vertical circle, a plurality of key-levers having their inner ends loosely connected with the said frame at a point below and between the ends of the type-bars, a plurality of L-shaped levers pivoted at the junction of the arms constituting the L-shaped levers, the said pivotal point located below and adjacent the free ends of the type-bars, and direct operative connections between the ends of the L-shaped levers and the type-bars and key-levers respectively.

16. In a type-writer, a type-bar action comprising a vertically-movable frame, a plurality of type-bars pivoted in one end thereof and arranged in the arc of a vertical circle, a plurality of L-shaped levers arranged in a corresponding arc and pivotally supported in the said frame at the junction of the arms constituting the L-shaped levers, the pivotal point located at a point between the ends of the said frame, a plurality of key-levers located below the L-shaped levers and having their inner ends loosely connected with the

frame at a point between the ends of the horizontal portions of the L-shaped levers, and operative connections between the ends of the L-shaped levers and the type-bars and key-levers respectively.

17. In a type-writer, a vertically-shifting type-bar action comprising a frame, a plurality of type-bars pivotally supported in one end of the frame and arranged in the arc of a vertical circle, a plurality of key-levers supported in the same frame and having their inner ends loosely connected therewith, and a plurality of intermediate connecting members having one end connected with the pivotal ends of the type-bars and their opposite ends connected with the key-levers at points between the ends of the key-levers.

18. In a type-writer, a type-bar action comprising a vertically-shifting frame, a plurality of type-bars pivoted at one end of the frame and arranged in the arc of a vertical circle, a plurality of key-levers located below the type-bars and having their inner ends loosely supported by the said frame at a point intermediate the ends of the frame, the end of the frame opposite the pivotal point of the type-bars provided with a depending key-lever-guiding comb, and intermediate connections between the key-levers and the type-bars.

19. In a type-writer, the combination of a vertically-shifting type-bar action, and a counterweight operatively connected therewith and of less heft than the heft of the type-bar action and serving to assist in moving the type-bar action vertically.

20. In a type-writer, the combination of a substantially horizontally arranged vertically-shifting type-bar action having a pivotal support at one side of the center thereof, a key-lever for moving the said type-bar action upward, and a counterweight connected therewith and serving to assist the key-lever in moving the type-bar action upward.

21. In a type-writer the combination of a substantially horizontal vertically-shifting type-bar action including type-bars, a pivotal connection therefor located at one side of its center, and a counterweight operatively connected with the heavier portion of said type-bar action, and serving to counterbalance it.

22. In a type-writer the combination of a substantially horizontal vertically-shifting type-bar action, a pivotal support for one end of the said type-bar action, and a counterweight operatively connected with the free end of said type-bar action, and exerting an upward pressure thereon.

23. In a type-writer the combination of a substantially horizontal vertically-shifting type-bar action, a counterweight connected therewith, a key-lever, and a connection between the type-bar action and the key-lever at a point intermediate the latter.

24. In a type-writer the combination of a substantially horizontal vertically-shifting type-bar action pivotally supported at its outer portion, a counterweight operatively connected therewith to exert an upward tension on the free end thereof, and a compound key-lever connection for shifting the free end of said type-action.

25. In a type-writer the combination of a substantially horizontal vertically-shifting type-bar action pivotally supported at its outer portion, and a compound key-lever connected therewith and constructed to lift the type-action when the key-lever is depressed.

26. In a type-writer the combination of a substantially horizontal vertically-shifting pivoted type-bar action, an intermediately-pivoted member having one end operatively connected with the free end of said type-action, a shifting lever pivoted at one end and having an intermediate connection with the opposite end of said intermediately-pivoted member.

27. In a type-writer the combination of a substantially horizontal vertically-shifting pivoted type-bar action, an intermediately-pivoted member having one end operatively connected with the free end of said type-bar action, an inwardly-extending shift-lever having its inner end independently pivotally supported, and a connection between the opposite end of the intermediately-pivoted member and the shift-lever at a point intermediate the ends of the latter.

28. In a type-writer, the combination of a substantially horizontal vertically-shifting pivoted type-bar action, an intermediately-pivoted member having one end operatively connected with the free end of the said type-action, a shift-lever pivoted at one end to an independent support, and a link connected to the opposite end of the intermediate member and to the shift-lever at a point intermediate the ends of the latter.

29. In a type-writer the combination of a substantially horizontal vertically-shifting pivoted type-bar action, an intermediately-pivoted member having one end operatively connected with the free end of said type-action, and a counterweight connected with the opposite end of said intermediately-pivoted member and serving to depress the end of said lever with which it is connected.

30. In a type-writer the combination of a substantially horizontal vertically-shifting pivoted type-action, an intermediately-pivoted member having one end operatively connected with the free end of said type-action, a counterweight in the form of a sheet attached to and extending substantially parallel the opposite end of said intermediately-pivoted member.

31. In a type-writer the combination of a type-action including a plurality of key-levers, a universal carriage-feed member, a space-bar, and a lever pivoted at its inner end intermediately engaging said universal-feed member and its opposite end connected with the space-bar.

32. In a type-writer the combination of a frame, a type-action including a plurality of

type-bars, a universal carriage-feed member adapted to be engaged thereby, a space-bar pivotally connected with said frame, a lever extending over said universal feed member and pivotally supported at its inner end, the outer end of said lever connected with the space-bar.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

JOHN W. PAUL.

Witnesses:
R. L. RALSTON,
P. E. WHITNEY.