

No. 679,674.

Patented July 30, 1901.

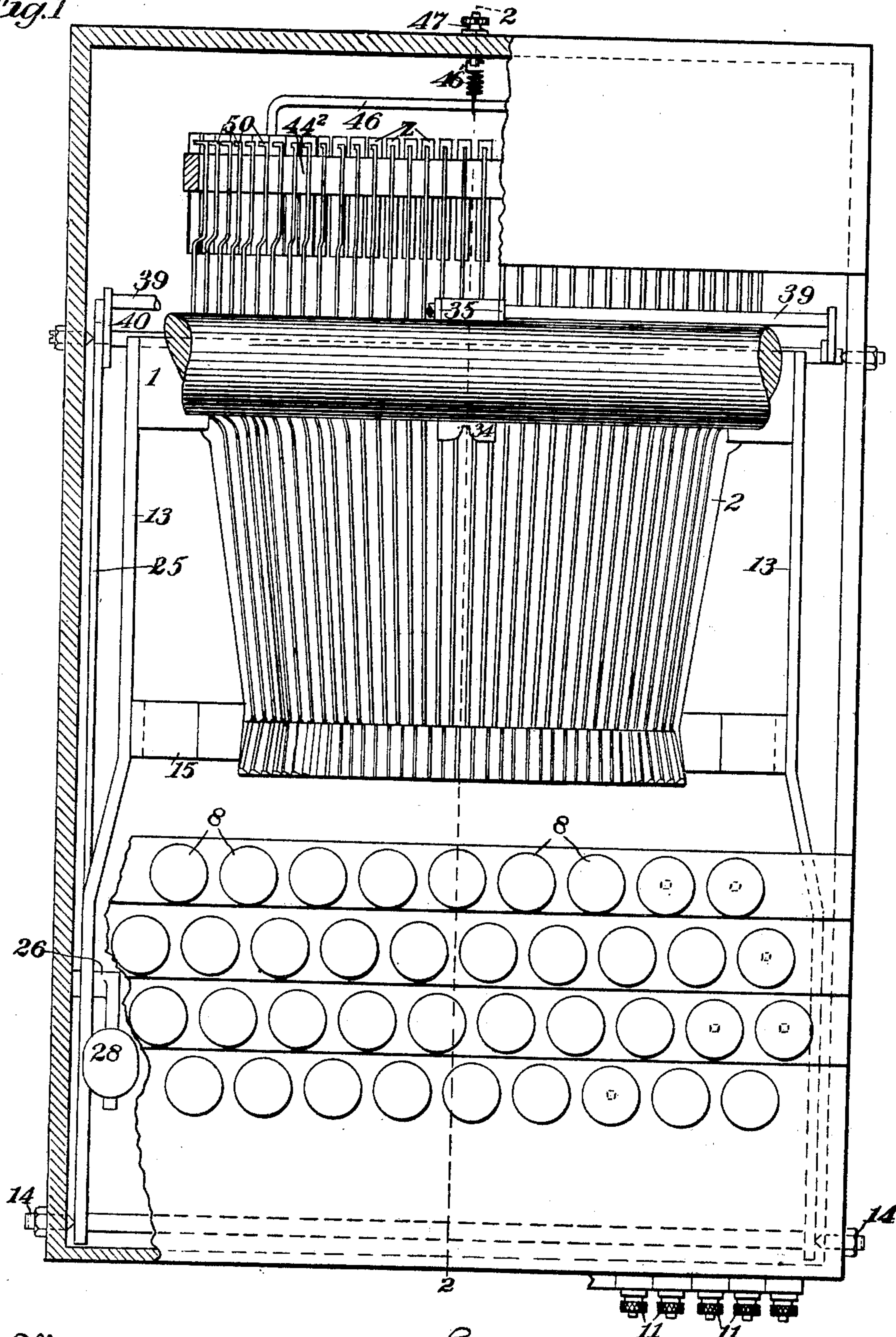
E. B. HESS & J. M. STOUGHTON.
WRITING MACHINE.

(No Model.)

(Application filed May 13, 1901.)

3 Sheets—Sheet 1.

Fig. 1



Witnesses
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3 Sheets—Sheet 2.

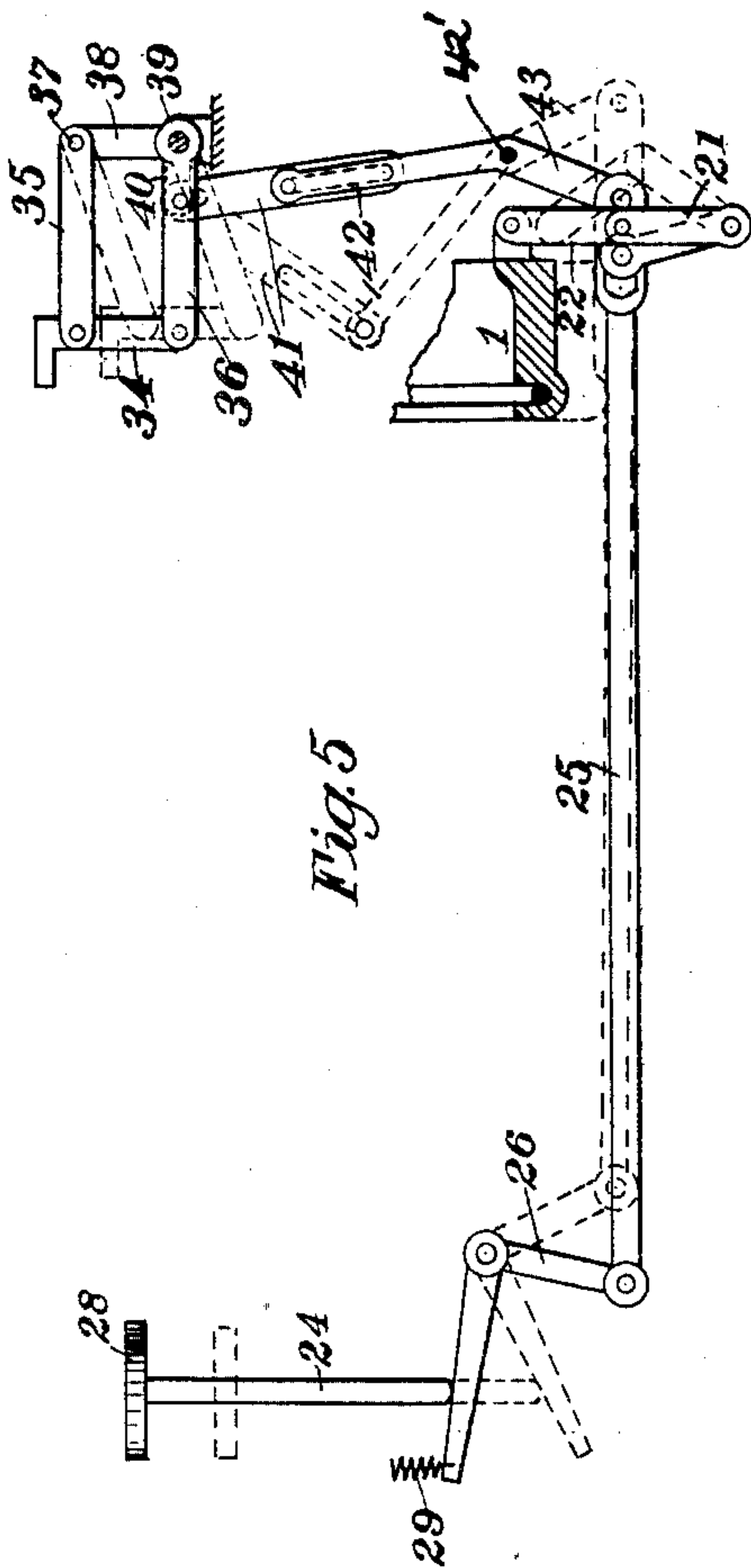


Fig. 5

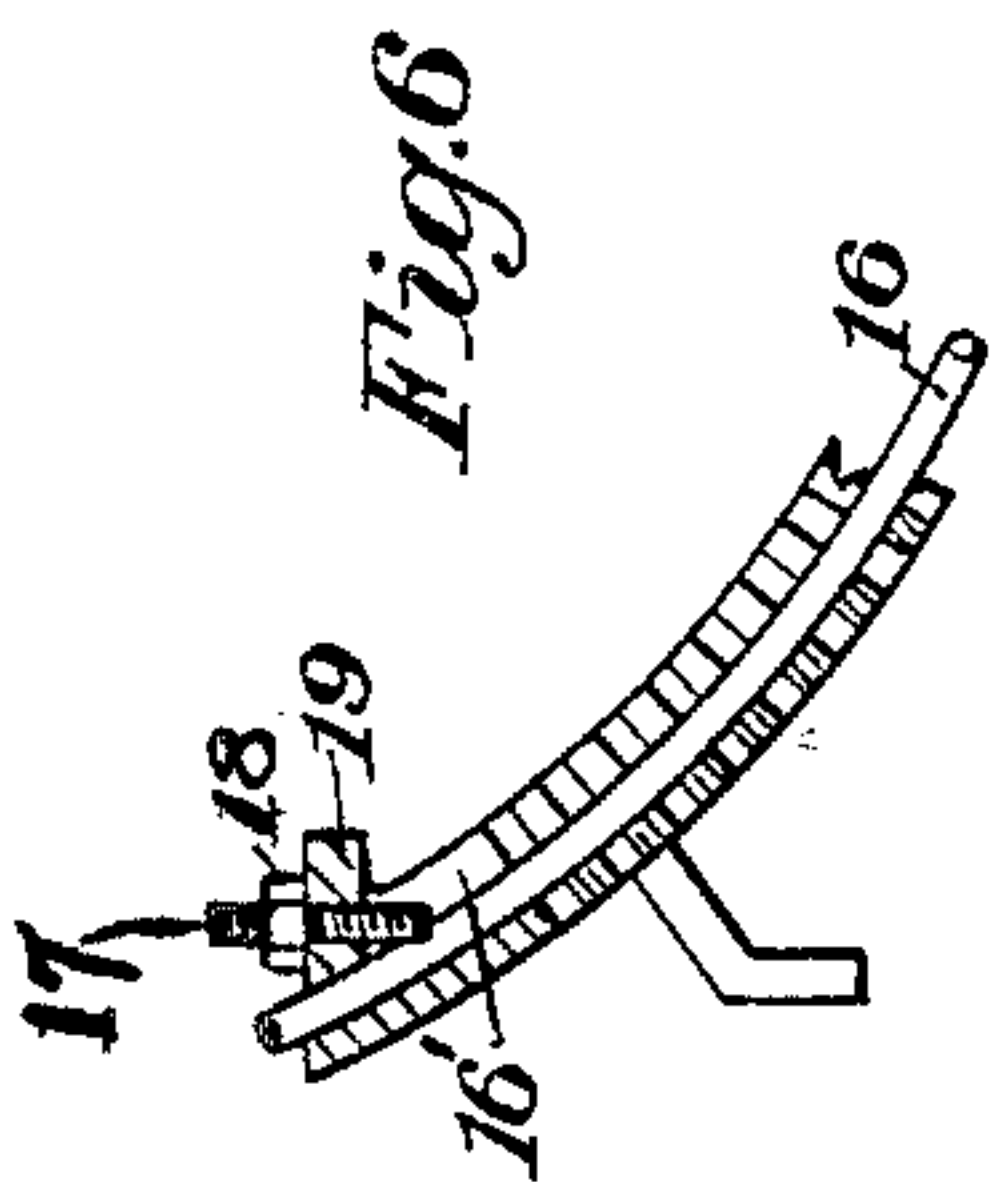


Fig. 6

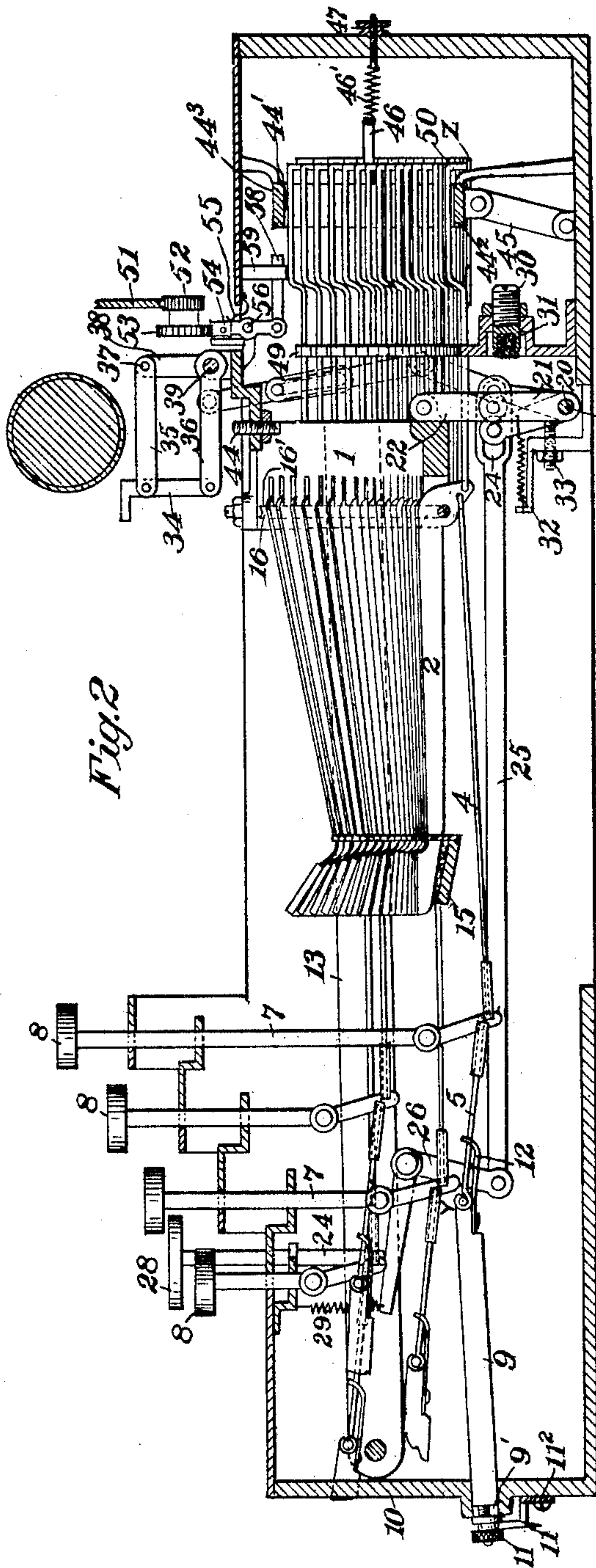


Fig. 2

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Patented July 30, 1901.

WRITING MACHINE.

(Application filed May 13, 1901.)

(No Model.)

3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

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WRITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 679,674, dated July 30, 1901.

Application filed May 13, 1901. Serial No. 59,948. (No model.)

To all whom it may concern:

Be it known that we, EDWARD B. HESS, a resident of the city and county of New York, and JOSEPH M. STOUGHTON, a resident of Yonkers, county of Westchester, State of New York, citizens of the United States, have invented certain new and useful Improvements in Writing-Machines, of which the following is a specification.

10 This invention relates to a type-bar-actuating mechanism or movement and associated parts of the machine relating to a shifting type-bar support for upper or lower case printing, a universal-bar organization, and a movable-type-bar guide, all as hereinafter set forth in detail.

15 In the accompanying drawings so much only of the machine has been illustrated as seems desirable to disclose the several features of the invention.

20 The drawings show a front-stroke machine constructed and organized in a manner deemed by us to be an efficient and desirable form in which the invention may be embodied. The invention, however, is applicable wholly or in part to machines other than so-called "front-stroke" machines and may be embodied in other forms than the special construction illustrated.

25 Figure 1 is a plan view; Fig. 2, a vertical longitudinal section therethrough on the line 2 2; Fig. 3, a front elevation, partly broken away and in section; Fig. 4, a detailed view illustrating the type-bar-actuating mechanism and the universal bar and the mode of operation; Fig. 5, a similar view illustrating the shift mechanism for moving the type-bar guide and the type-bar support relatively to the platen, and Fig. 6 a detailed vertical sectional view showing the manner of pivoting the type-bars in their supports.

The type-bar-actuating mechanism will first be described.

30 In an application for Letters Patent of the United States filed by Edward B. Hess, one of these applicants, on the 26th day of April, 1901, Serial No. 57,588, is shown a type-bar-actuating mechanism or movement having the general mode of operation of that herein

disclosed and upon which the present invention constitutes an improvement.

35 In the segment or support 1 the type-bars 2 are pivoted as shown or otherwise. They normally lie substantially horizontally toward the front of the machine and are adapted to strike upon the front face of the platen. From the heel or projection 3 on each type-bar, beyond its pivot, a flexing connection extends forward under the type-bars and is hinged to a fixed point Y. As shown, this connection consists of two links 4 5, united at their adjacent ends and respectively connected at their opposite ends to the type-bar at 3 and the fixed point Y. The flexing connection may, however, be embodied in other forms. The hinge connection between their adjacent ends is in the present construction formed by hinging the ends of the links 4 5 to another or third link 6, arranged transversely to the links 4 5 and operated upon by the stem 7 of a finger-piece 8, mounted to move vertically in bearings in the frame, the link 6 being preferably hinged to the stem or part actuated by the finger-piece. The flexing connection is so disposed that its point of flexure will lie in or below or beyond a straight line connecting the fixed point Y and the point of attachment of the opposite or rear end of the connection, so that when the connection is flexed, as indicated by the dotted lines in Fig. 4, its parts respectively in front and rear of the point of flexure will be subjected to tensile strain and the type-bar thrown to the printing-point by a pull.

40 The operation is clearly disclosed in Fig. 4 and is as follows: The link 6, operated by a connecting device actuated on the depression of a finger-piece, flexes the connection and is normally so disposed in the construction shown as to incline from the vertical axis of the finger-piece rearwardly. As the finger-piece is depressed the swing of the front link about the fixed point Y will carry the hinge or point of flexure toward the front of the machine. The link 6 will follow this movement and will finally pass into a position parallel with the vertical axis of the finger-piece or inclined somewhat toward the front of the

machine. A characteristic feature of this movement is that the finger-piece, moving in a true vertical line, opposes a minimum resistance to the touch of the operator at the beginning of the depression, and the resistance increases somewhat during the downward excursion of the finger-piece, there being a correspondingly slow movement of the type-bar as its inertia is overcome and it commences its movement and an increase in its velocity as it approaches the printing-point. The angular relation of the link changes as the connection is flexed, and as its lower end moves toward the front the link swings on the hinge connection of its upper end and follows the front link in successive stages of the depression substantially or approximately at right angles thereto. Power exerted in depressing the finger-piece is therefore efficiently applied to the flexing connection, and the "touch" of the finger-piece even in the final stage of its depression is soft and light.

In an organization such as has been described or one having the mode of operation thereof the touch of the key is very light, and there is a marked acceleration of the type-bar in its excursion to the printing-point.

The adjacent ends of the links 4 5 are formed like snap-hooks, which engage apertures in the lower part or end of the link 6, the construction being such as shown in the application of Hess before mentioned and at Z in Fig. 4.

Of course any appropriate form of hinge, pivot, or swiveling connection may be adopted.

The fixed points Y are at the ends of flat rods or anchor-pieces 9 passed through apertures 9' in the front plate 10 of the frame, Fig. 2, and are secured therein, as shown, clamping-nuts 11 being applied to the threaded ends of the anchor-pieces on each side of the ends of arms 11' of a bracket-plate 11², applied to the front plate of the frame. At the rear end of the anchor-piece is a pin or projection constituting the fixed point Y, and adjacent thereto the under face of the bar is cut away and a plate-spring 12 attached thereto. The rear end of the spring is bifurcated to embrace the link 5 and tends to raise the flexing connection and seat the type-bar in its back-stop. The aperture 9' in the front plate, in which the bar is seated, is of such dimensions as to permit of the bar, spring 12, and link 5 being inserted or withdrawn.

The type-bar support 1 is segmental in shape, its radial plane being vertical in the construction shown, and it constitutes the rear cross-bar of a frame having side bars 13 13; pivotally mounted by pivot-screws 14 14 near the front of the machine. In front of the type-bar support 1 and carried by the side bars 13 13 is the back stop or rest 15, upon which the heads of the type-bars normally lie. The front edge of the type-bar support is formed as a comb, and between the teeth or projections thereof the type-bars are pivoted by means of a curved wire or rod 16,

Fig. 6, passing through apertures in the type-bars and lying in a curved groove or slot 16', formed in the upper concave face of the segment. When in position, the rod 16 is firmly held and pressed against its seat in the slot 16' by a clamping-screw 17, impinging obliquely upon its side, provided with a nut 18 and working in a threaded seat in a horizontally-disposed projection 19 at the end of the support 1. Two such screws are employed, one on each side of the group of type-bars. It is only necessary to loosen up the screws 17 to permit of the withdrawal of the rod, and yet when in position it is held accurately in place.

The type-bar support or segment is held in normal position and adjusted in the following manner: Extending between the sides of the frame and below the type-bar support is a transverse rock-shaft 20, upon which the type-bar segment 1 is supported by two links 21 22, disposed in the center-line of the machine and pivotally united at their adjacent ends. The upper end of the link 22 is pivoted to a projection on the type-bar segment, and the lower end of the link 21 is attached to the rock-shaft 20, and normally the two links standing in line vertically support the segment. At the left side of the machine a radial arm 23 extends upwardly from the rock-shaft 20, and a pin thereon enters an elongated slot 24 in an endwise-movable bar 25, hinged at its front end in the downwardly-extending arm of the bell-crank lever 26, pivoted on the side of the frame, and whose other end extends substantially horizontally and is normally drawn against the stem 27 of the shift-finger key 28 by a spring 29. On depression of the finger-piece the rod 25 is moved endwise toward the rear of the machine. During the first part of this movement the pin on the arm 23 travels in the slot 24, and the arm 23 is not actuated; but when the pin comes against the front wall of the slot the arm 23 is moved rearwardly, the shaft 20 is rocked, and the hinge connection of the two links or arms 21 22 is carried rearwardly, permitting the descent of the type-bar segment until the hinged ends of the link 21 22 abut against the adjustable screw bolt or stop 30, carrying in its end a plug of felt or leather or other suitable material, which, while affording an accurate stop, takes up the shock and jar and diminishes noise. When the shift-key is released, the rod 25 moves toward the front of the machine, partly under stress of the spring 29 and also under that of a spring 32, applied to the link 21, until the link abuts against the adjustable front stop 33, which maintains the links 21 22 in their normal vertical position. The movable type-bar guide 34, disposed below and adjacent to the printing-point on the platen, is pivotally supported by two pairs of parallel links 35 36, pivotally attached to its sides and arranged normally horizontally. The rear ends of the upper links 35 are piv-

oted on a rod 37, extending between posts 38, (shown as mounted on the top plate of the machine,) while the rear ends of the lower links 36 are fast upon a rock-shaft 39, having bearings in the posts 38 and at the opposite sides of the frame. At the left-hand side of the machine a radial arm 40 (shown in dotted lines in Fig. 5) projects horizontally from this rock-shaft and has hinged to it a pend-ent link 41, slotted longitudinally in its lower portion. A pin in the end of an arm 42, pivoted at 42', runs in this slot. Integral with the arm 42 is a downwardly-extending arm 43, the lower end of which is hinged in the end of the shift-rod 25. Normally, as shown by full lines in Fig. 5, the parts 41, 42, and 43 and rock-shaft 39 support the guide, the pin being against the upper wall of the slot in link 41, and the parallel arms 35 and 36, carrying the type-bar guide, are therefore held normally horizontally to support the type-guide in a proper position to guide the type-bars when the segment 1 is in its normal position. When the shift-key is depressed, the endwise-movable rod 25 moves the arm 43 to the rear, allowing the type-bar guide, by reason of the pin-and-slot connection between 41 and 42, to drop until it is arrested by a stop 44, Fig. 2. Following this dropping movement of the type-bar guide the end wall of the slot 24 in the rod 25 comes against the pin in the radial arm 23, and the hinge connection of links 21 22 is thrown to the rear, as already described, permitting the segment to descend correspondingly, the segment and the type-bar guide being then in their second or shifted position, when impressions may be taken from the other characters on the type-bar. On the release of the shift-key it is thrown upwardly by the reaction of the spring 29 and the spring 32, and all the parts are again restored to normal position. So far as we are aware, the plan of dropping the type-bar segment and guide when the shift occurs is novel and possesses the following advantage: The lower-case type are nearer the pivots of their type-bars and the guide, and for that reason there is less strain, jar, or vibration of parts when printing from them, and as they are used far more frequently than the other type near the ends of the bars wear and tear in this regard is reduced to a minimum. The pivotal mounting of the type-bar guide makes its movement easy and certain, and the general arrangement described by which the work of moving the type-bar guide and segment is apportioned to different stages of the depressions of the shift has advantages which will be readily understood. This latter feature, however, is shown and claimed in the application of Hess hereinbefore mentioned.

The universal bar is shown in the form of a vertically-disposed frame 44', composed of a segmental bottom portion 44², whose ends are connected by a transverse part 44³, placed in rear of the segment 1 and supported by

two, three, or more links 45, pivotally connected at their upper ends to the bottom side of the universal bar and at their lower ends to the base of the machine. At the rear the universal bar has a yoke 46, connected by a spring 46' with an adjusting screw-bolt 47, disposed in the longitudinal center of the machine. From the heel or projection 3 of each type-bar a link 48 extends rearwardly, being guided in a vertically-disposed segmental or comb plate 49 and shaped at its rear end to hook over or otherwise engage the segmental bottom portion of the universal bar. As shown at Z in Fig. 4, the link 48 is bent into hooked form, and the opening of the hook is bridged by a spring to retain the links in position on the universal bar. The hook or bent end 50 of each such link normally extends beyond and out of contact with the universal bar and only engages it to draw it forward after the type-bar has made a part of its excursion toward the printing-point, and this for reasons well understood. As shown in Fig. 2, 51 is the carriage-rack, 52 a pinion engaging it, 53 an escapement-wheel on the shaft of the wheel 52, 54 an escapement latch or pawl, and 55 its spring. The pawl is pivoted at 56, and hinged to it is a rearwardly-extending rod 58, guided in a slot or aperture in plate 59 and adapted to be struck by the upper part of the universal bar when it is drawn forward on the depression of a finger-piece. The links 48 may be said to be connected with the type-bar or with the rear end of the flexing connection. Either way of stating it is mechanically correct. There are therefore connections extending from the fixed points Y to the universal bar, and the endwise movement of the rear parts of the flexing connections toward the fixed points actuate both the type-bars and the universal bar. The device that actuates a type-bar transmits by means of a suitable connection a strain in the same direction to actuate the universal bar, and consequently the reaction of the spring applied to the universal bar may serve effectively to return the type-bar to its initial position by a pull. There may therefore be but one spring that determines the behavior of the universal bar, the touch of the finger-pieces, and the uniform speed of retreat of the type-bars from the platen, and that spring may be readily adjusted. This feature of the invention may be embodied in other constructions of machines than that shown and is not dependent upon the use of a flexing type-bar connection or other details of construction illustrated. In the construction shown the light springs 12 are applied to the links 5 primarily to sustain the flexing connections and prevent chattering of the type-bars on their back-stop, the universal-bar spring performing, primarily, the function of accelerating the retreat of the type-bar from the platen.

In a type-actuating mechanism comprising a part moving about an axis the employment

of a link, such as 6, not only permits the finger-piece or part operated by it to move in a vertical line, but also applies the power in a most efficient and desirable manner.

5 Thus in the style of type-bar-actuating mechanism shown the link attached to the fixed point is the member moving about a fixed axis.

We claim as our invention—

1. In a writing-machine, the combination
10 of a part to be actuated, a flexing actuating connection, comprising links hinged together at their adjacent ends extending between said part and a fixed point and adapted when flexed to actuate said part with a pull, a finger-piece, and a flexible connection between
15 the finger-piece and said actuating connection.

2. In a writing-machine, the combination of a pivoted type-bar, a flexing connection
20 acting substantially as described, extending between said part and a fixed point and adapted when flexed to throw the type-bar to the printing-point by a pull, a finger-piece and a flexible connection between the finger-piece
25 and said actuating connection.

3. In a writing-machine, the combination of a type-bar segment, type-bars pivoted therein and normally lying toward the front of the machine, flexing actuating connections,
30 acting substantially as described, extending from and under the type-bars to fixed points at the front part of the machine, finger-pieces arranged above such connections, and flexible connections between the finger-pieces and
35 such actuating connections.

4. In a writing-machine, the combination of a type-bar segment, means for shifting the segment, type-bars pivoted therein and normally lying toward the front of the machine,
40 flexing actuating connections, acting substantially as described, extending from and under the type-bars to fixed points at the front part of the machine, finger-pieces arranged above such connections, and flexible
45 connections between the finger-pieces and such actuating connections.

5. In a writing-machine, the combination of a type-bar segment, means for shifting the segment downwardly from its normal position, type-bars pivoted therein and normally
50 lying toward the front of the machine, flexing actuating connections, acting substantially as described, extending from and under the type-bars to fixed points at the front part of the machine, finger-pieces arranged
55 above such connections, and flexible connections between the finger-pieces and such actuating connections.

6. In a writing-machine, the combination
60 of a flexing connection extending from a movable part to be actuated to a fixed point, a link having its lower end connected to said flexing connection intermediate its ends, and an actuating device to which the upper end
65 of the link is connected, the operation being substantially as described.

7. In a writing-machine, the combination

of a flexing connection extending from a movable part to be actuated to a fixed point and comprising links united at their adjacent ends
70 by a hinge-joint, a third link whose lower end is hinged to the flexing connection intermediate its ends and an actuating device to which the upper end of the link is connected, the operation being substantially as described. 75

8. In a writing-machine, the combination of a flexing connection extending from a movable part to be actuated to a fixed point and comprising two links united at their adjacent ends by a hinge-joint, a third link hinged to
80 the connection at said joint, and an actuating device by which the other end of the link is depressed, the operation of the flexing connection being substantially as described.

9. In a writing-machine, the combination
85 of a pivoted type-bar, a flexing connection operatively connected at one end to the type-bar and at the other end to a fixed point, a finger-piece a part actuated thereby, a link having its ends respectively flexibly connect-
90 ed to said part and to the flexing connection intermediate its ends, said part and link extending in substantially a direct upright line between the finger-piece and flexing connection. 95

10. In a writing-machine, the combination of a pivoted type-bar, a flexing connection operatively connected at one end to the type-bar and at the other end to a fixed point and comprising links united at their adjacent
100 ends by a hinge-joint, a finger-piece, a part actuated thereby, a third link having one end flexibly connected to the flexing connection intermediate its ends and the other end flex-
105 ibly connected to said part, said part and third link extending in substantially a direct upright line between the finger-piece and flexing connection.

11. In a writing-machine, the combination of a pivoted type-bar, a flexing connection
110 operatively connected at one end to the type-bar and at the other end to a fixed point and comprising two links united at their adjacent ends by a hinge-joint, a third link hinged to the connection at said joint, and an actuating
115 device by which the other end of the link is depressed, the operation of the flexing connection being substantially as described.

12. In a writing-machine, the combination of a platen, a type-bar segment, means for
120 moving the segment relatively to the platen, type-bars pivoted in the segment, and normally lying away from the platen toward the front of the machine, flexing connections, operating substantially as described, oper-
125 atively connected at their rear ends to the type-bars and at their front ends to fixed points, links hinged to such connections intermediate their ends and arranged transversely to the general line or direction of
130 such connections, and actuating devices to which the other ends of the links are connected.

13. In a writing-machine the combination

of a platen, a type-bar segment, means for moving the segment relatively to the platen, type-bars pivoted in the segment and normally lying away from the platen toward the front of the machine, flexing connections, operating substantially as described, operatively connected at their rear ends to the type-bars and at their front ends to fixed points, and consisting of two links united at their adjacent ends by a hinge-joint, a third set of links hinged to such connections at said hinge-joints, and actuating devices to which the other ends of the last-named links are connected.

14. In a writing-machine, the combination of a pivoted type-bar, a flexing connection, acting substantially as described, operatively connected at one end to the type-bar and at the other end to a fixed point, a link hinged thereto intermediate its ends and arranged transversely to the general line or direction of such connection, a vertically-movable finger-piece, and its stem to which the link is also hinged.

15. In a writing-machine, the combination of a pivoted type-bar, a flexing connection acting substantially as described, operatively connected at its rear end to the type-bar and at its front end to a fixed point and consisting of links united at their adjacent ends by a hinge-joint, and the link hinged to such connection at such hinge-joint, a vertically-movable finger-piece, and its stem to which said last-named link is also hinged.

16. In a writing-machine, the combination of pivoted type-bars, horizontally-disposed anchor-pieces mounted in the front plate of the frame, flexing connections operatively connected at their rear ends to the type-bars and at their front ends to said anchor-pieces, finger-pieces and the connections between the finger-pieces and flexing connections applied to the latter intermediate their ends.

17. In a writing-machine, the combination of pivoted type-bars, horizontally-disposed endwise-adjustable anchor-pieces mounted in apertures in the front plate of the frame so as to be inserted and removed, flexing connections operatively connected at their rear ends to the type-bars and at their front ends to said anchor-pieces, finger-pieces and the connections between the finger-pieces and flexing connections applied to the latter intermediate their ends.

18. In a writing-machine, the combination of pivoted type-bars, horizontally-disposed anchor-pieces mounted in the front plate of the frame, flexing connections operatively connected at their rear ends with the type-bars and at their front ends to said anchor-pieces, finger-pieces, connections applied to the latter intermediate their ends between the finger-pieces and flexing connections, and springs mounted on said anchor-pieces acting upon the flexing connection.

19. In a writing-machine, the combination of a type-bar segment, a curved slot therein, a series of type-bars, a wire seated in said slot upon which the type-bars are pivoted, and means acting upon the wire obliquely intermediate its extreme ends to thrust it against its seat in the slot.

20. In a writing-machine, the combination of a type-bar segment, a curved slot therein, a series of type-bars, a wire seated in said slot upon which the type-bars are pivoted, and means located at both ends of the series of type-bars acting obliquely upon the wire to force it against the bottom of the curved slot.

21. In a writing-machine, the combination of a type-bar segment, a curved slot therein, a series of type-bars, a wire seated in said slot upon which the type-bars are pivoted, and screws mounted in the segment at both ends of the series and impinging obliquely upon the side of the wire to exert an endwise thrust toward the central part thereof to force the wire against its seat in the slot.

22. In a writing-machine, the combination of a type-bar segment, type-bars pivoted therein, a universal bar movable to and fro in rear of the segment, means for operating the type-bars and connections between the type-bars and universal bar by which the latter is actuated by a pull.

23. In a writing-machine, the combination of pivoted type-bars, a universal bar, a series of fixed pieces, two links for each type-bar hinged together at their adjacent ends and connected respectively to a fixed piece and type-bar, a third link loosely connected with the universal bar and connected with the link connected with the type-bar, and means for flexing the hinge-joint of the first-named links to actuate the type-bar.

24. In a writing-machine, the combination of pivoted type-bars normally lying toward the front of the machine, a universal bar arranged in rear of the type-bar pivots, links connecting the universal bar with the type-bars, connections for actuating the type-bars extending under them toward the front of the machine, finger-pieces and means for operating such connections on the depression of corresponding finger-pieces, whereby the type-bars and universal bar are actuated.

25. In a writing-machine, the combination of a type-bar segment, type-bars pivoted therein, finger-pieces arranged on one side of the segment, a universal bar on the other side, flexing type-bar-actuating connections means applied intermediate their ends for at will flexing them, and connections between the respective type-bars and the universal bar which actuate the universal bar by a pull when the type-bars are thrown to the printing-point.

26. In a writing-machine, the combination of a type-bar segment, type-bars pivoted there-

in, and normally lying toward the front of the machine, means for actuating the type-bars, a universal bar in rear of the segment, and loose link connections between the type-bars and universal bar.

27. In a writing-machine, the combination of a type-bar segment, type-bars pivoted therein, a universal bar, connections extending from fixed points on the frame to the type-bars and thence to the universal bar, and means for flexing said connections intermediate the type-bars and fixed points.

28. The combination of a platen, a vertically-movable segmental type-bar support mounted below the platen, means for operating the type-bars, a vertically-movable type-bar guide adjacent to the platen and mounted independently of the type-bar support, a shift-key, operative connections between the shift-key and the type-bar guide, whereby during the initial depression of the shift-key the type-bar guide is lowered, and operative connections between the vertically-movable type-bar support and the shift-key whereby said support is lowered during the later stage of movement of depression of the shift-key.

29. The combination of a platen, a vertically-movable type-bar support, type-bars pivotally mounted therein, means for actuating the type-bars, a vertically-movable type-bar guide located adjacent to the platen, a shift-key and operative connections between the shift-key and the type-bar guide, and operative connections between the shift-key and the type-bar support, whereby the type-bar guide is lowered before the depression of the shift-key is completed and the type-bar support is lowered on the completion of the movement of the shift-key.

30. The combination of a platen, a vertically-movable type-bar support, type-bars pivotally mounted therein, means for operating the type-bars, a vertically-movable type-bar guide adjacent to the platen, the shift-key, and means interposed between the type-bar support and guide whereby on the depression of the shift-key one of said parts is lowered during the earlier stage of depression of the shift-key and the other said part is lowered during the later stage of depression of said key.

31. The combination of a platen, a vertically-movable type-bar support, a vertically-movable type-bar guide, a shift-key, and means actuated by the shift-key to move one of said vertically-movable parts to its lower position during part of the depression of the shift-key, and the other said part to its lower position during the remainder of the depression of the shift-key.

32. The combination of a movable type-bar support, type-bars mounted therein and means for actuating them, a movable pivoted type-bar guide, a shift-key and devices operated by the shift-key to move the guide

during one part of the excursion of the key and the support during the other part of the excursion of the key.

33. The combination of a movable type-bar support, a pivoted type-bar guide adapted to occupy two positions, a single shift-key and means actuated by said key for first moving one of said parts and then the other, type-bars mounted in said support and means for actuating them.

34. The combination of a movable type-bar support, type-bars mounted therein and means for actuating them, a movable type-bar guide, pivoted in parallel link-supports, a shift-key and devices operated by the shift-key to move the guide during one part of the excursion of the key and the support during the other part of the excursion of the key.

35. The combination of a movable type-bar support, a type-bar guide, pivoted in parallel link-supports adapted to occupy two positions, a single shift-key and means actuated by said key for first moving one of said parts and then the other, type-bars mounted in said support and means for actuating them.

36. In a writing-machine, the combination of a platen, a pivoted type-bar, a universal bar, its spring, and means for actuating the type-bar and universal bar by a direct strain in the same line, whereby the reaction of the universal-bar spring is directly applied to the type-bar to accelerate its retreat from the printing-point.

37. In a front-stroke machine, the combination of a platen, a series of pivoted type-bars, a series of horizontally-disposed endwise-movable links or members connected to and actuating the type-bars, a universal bar, its spring, and a series of links or members connecting the type-bars and universal bar.

38. In a writing-machine, the combination with a platen, a series of pivoted type-bars and means for actuating them, of a universal bar, its spring, and connections between the universal bar and type-bars whereby when a type-bar is thrown to the printing-point the universal bar is actuated against the tension of its spring and the reaction of said spring is applied primarily to accelerate the retreat of the type-bar from the platen.

39. In a writing-machine, the combination with a platen, a series of pivoted type-bars and means for actuating them, of a universal bar, its spring, and link connections between the universal bar and type-bars whereby when a type-bar is thrown to the printing-point the universal bar is actuated against the tension of its spring and the reaction of said spring is applied primarily to accelerate the retreat of the type-bar from the platen.

40. In a writing-machine, the combination of a pivoted type-bar, its actuating mechanism that throws the type-bar to the printing-point by a pull, comprising a member moving about a fixed axis, a finger-piece movable

in a true vertical line and located above said member, a part movable up and down with the finger-piece, and a link having its ends respectively flexibly connected with said part
5 and member.

41. In a writing-machine, the combination of a pivoted type-bar, a flexing connection attached at its rear end to the type-bar and at its front end to a fixed point, an actuating-
10 link flexibly applied to such connection intermediate its ends and arranged transversely to the front part thereof, and means for moving the link endwise to flex said connection

while maintaining, substantially, its angular relation to the front part thereof.

In testimony whereof we have hereunto
15 subscribed our names.

EDWARD B. HESS.

JOSEPH M. STOUGHTON.

Witnesses to signature of Edward B. Hess:

R. L. HAWES,

V. L. NELSON.

Witnesses to signature of Joseph M. Stoughton:
ton:

EDWARD C. DAVIDSON,

KATHARINE MACMAHON.