

(No Model.)

3 Sheets—Sheet 1.

G. C. BLICKENSDERFER.
TYPE WRITING MACHINE.

No. 457,298.

Patented Aug. 4, 1891.

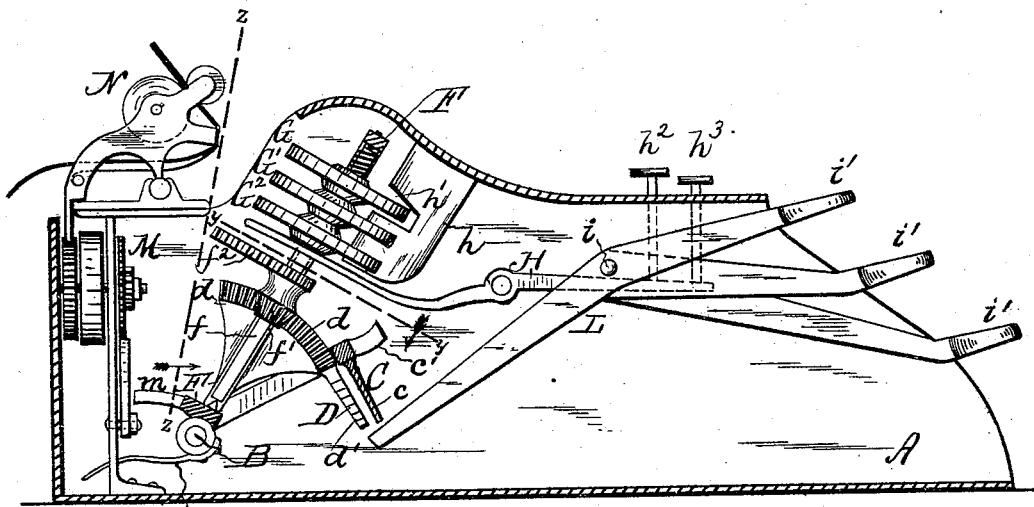


Fig. 1

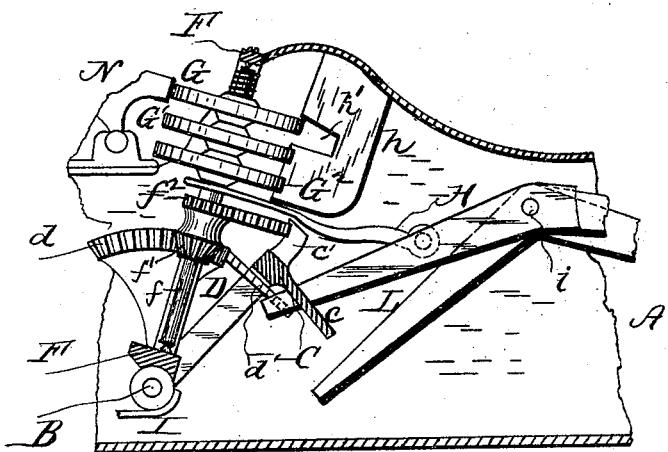


Fig. 2

WITNESSES

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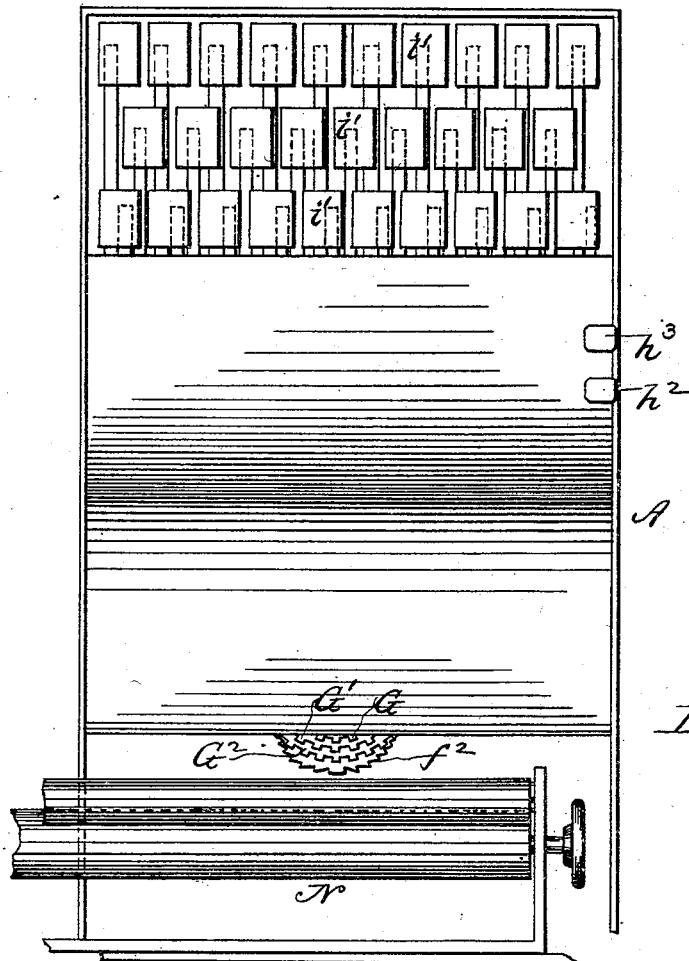


Fig. 3

WITNESSES

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G. C. BLICKENSDERFER.
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Fig. 5

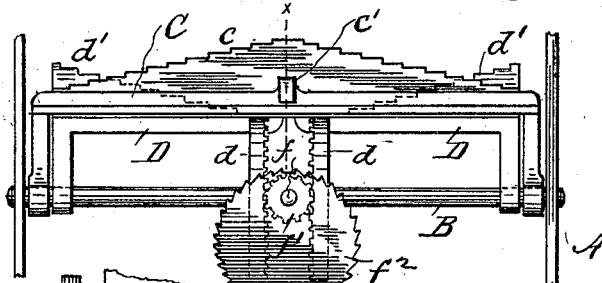


Fig. 6

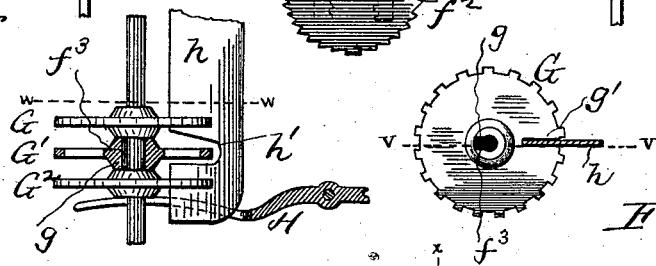


Fig. 8

x

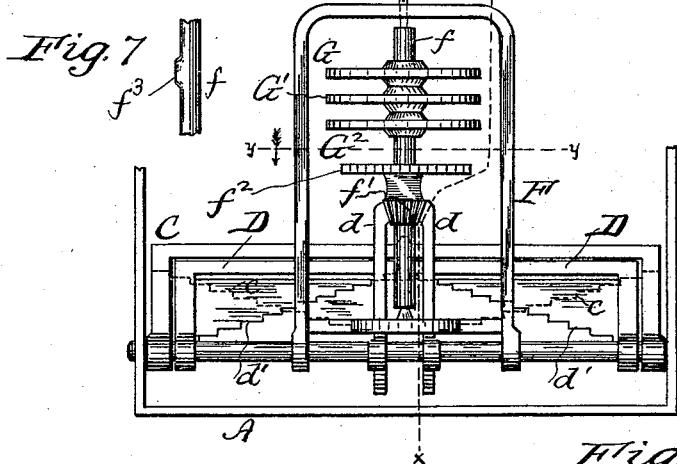


Fig. 4

WITNESSES

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UNITED STATES PATENT OFFICE.

GEORGE C. BLICKENSDERFER, OF STAMFORD, CONNECTICUT, ASSIGNOR TO
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TYPE-WRITING MACHINE.

SPECIFICATION forming part of Letters Patent No. 457,298, dated August 4, 1891.

Original application filed May 23, 1888, Serial No. 274,862. Divided and this application filed July 5, 1889. Serial No. 316,588.
(No model.)

To all whom it may concern:

Be it known that I, GEORGE C. BLICKENSDERFER, a citizen of the United States, residing at Stamford, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Type-Writing Machines, of which the following is a specification.

My invention relates to type-writing machines; and it consists in certain improvements in the construction and operation of the same, as will be hereinafter fully set forth, and pointed out in the claims, reference being had to the accompanying drawings, which represent one form of construction which embodies my invention and which sufficiently illustrates my invention as to enable those skilled in the art to which it relates, when taken in connection with the following description, to understand my improvements and apply the same to various constructions of type-writing machines.

The leading features of my construction, which are not dependent upon the particular form of the parts or the form or relation of the surrounding or contributory parts, are as follows: An axially-movable type-wheel, a ratchet which serves to arrest the movement of said type-wheel to position any of its type and moves axially coincidentally with said type-wheel, which has the distinguishing feature of having its teeth or steps moving in different paths, and a pawl to engage said ratchet by contacting with any of its teeth, according to the degree of axial movement at which the type-wheel is to be arrested. These leading features may be applied in various forms and with various accompaniments, and singly or in duplicate. For example, there may be one or more type-wheels, as shown there are three, but only one is at any time in operative action. The type-wheel may be shiftable, as shown, or not. The type-wheel may be movable axially in either direction from an initial point. The shaft which carries the type-wheel may be laterally vibrated to effect an impression of a position-type. The ratchet will have two oppositely-toothed faces, as shown, when the type-wheel is moved axially in opposite directions. The

operating mechanism which imparts the necessary movements to the type-wheel, the ratchet, and the engaging pawl will be adapted to turn the type-wheel either to the right or left and to vibrate it laterally and to move the pawl varying distances inversely proportional to the distance the type-wheel is moved when the operation is as shown; but if the operation of the machine should not require all these movements of the type-wheel, the operating mechanism could be modified as required or desired without departing from the essential features of my invention.

The construction, as at present illustrated in the accompanying drawings, is as follows:

Figure 1 represents a longitudinal section on line xx in Figs. 4 and 5; Fig. 2, a like view, partly broken away, showing the changed position of parts which occurs when an impression is made; Fig. 3, a plan of the top of the machine; Fig. 4, an elevation of the same, looking from the line zz in Fig. 1, as indicated by the arrow thereon. Fig. 5 is an elevation from line yy in Fig. 1, in the direction of the arrow thereon, the observer standing at the left of the line zz ; Fig. 6, an elevation, partly in section, showing the wheel-shaft spline for peripheral engagement with said wheels, and shifter for said wheels detached from the machine; Fig. 7, an elevation of part of the type-wheel shaft with feather or spline thereon; and Fig. 8 a section on line WW of Fig. 6.

A represents a frame of any desired construction; B, a cross-shaft connected with the sides of the frame A; C, a pawl-frame the journal of which is upon said shaft; D and D' , two separate aligned frames also hung loosely upon said shaft, and F a single frame overlapping the adjacent or inner ends of the frames D D' . This frame is loose on shaft B if the latter is rigidly held, and fixed to said shaft if the latter is journaled in the frame. A shaft f is mounted in said frame and carries a type-wheel f' and ratchet f'' . This ratchet may be of any desired shape, and moves coincidentally with said shaft. It has steps or teeth extending in one or more directions from an initial or neutral point, prefer-

ably upon opposite sides of a body eccentrically secured to said shaft, so that when the shaft and ratchet are axially moved the teeth will travel in different paths concentric with said shaft.

5 Above the ratchet f^2 on shaft f are arranged type-fields, which in the present instance are represented as wheels marked G , G' , and G'' , of which any suitable number may be used. 10 These wheels are loose on said shaft, so as to slide longitudinally thereon, and every wheel has a groove or recess in its hub bore for engagement with a short spline or feather f^3 on shaft f , so as to be rotated by the shaft when 15 the remaining type-wheels are out of action.

In the periphery of every type-wheel, opposite to or in line with its hub-bore recess g , is an elongated groove or slot g' , which engages with a wide fixed spline h , secured to 20 any suitable part of the machine. Said spline h prevents the type-wheels, when not in use, from moving with the shaft f .

In spline h , opposite to or in line with the feather f^3 in shaft f , is a notch or recess h' , into which the type-wheels enter to release 25 themselves from said spline and revolve therethrough when moved into engagement with the shaft-feather f^3 . The elongated groove or slot g' in the type-wheel and the wide 30 spline h are used in order to maintain such locking or clutch engagement for the type-wheels not in use when the type-wheel in use 35 is acting as a hammer to make the impression, as hereinafter described. Normally the type-wheels are so arranged that the upper wheel is the one most in use and is normally in engagement with the shaft-feather f^3 and free from the spline h , as most plainly indicated in Fig. 1, while the lower type-wheels 40 are in engagement with spline h . Said type-wheels are supported upon the forked or other configured end of a pivoted lever H , which operates to move or shift the type-wheel on shaft f to bring any one of them into engagement 45 with the shaft-feather f^3 and free the same from the spline h . The lever H is actuated by two or more keys h^2 h^3 , located at different distances from the fulcrum of said lever in order to vary the extent of its oscillation for correspondingly moving or sliding 50 the type-wheel upon the shaft f to bring any of the wheels into engagement with the shaft-feather f^3 and free it from spline h . When the lever H is in its normal position, as shown 55 in Fig. 1, it holds the upper wheel free from spline h and in engagement with the shaft-feather f^3 and the two lower wheels in engagement with said spline h . A movement of either key h^2 h^3 actuates lever H to move 60 either one or the other of the lower type-wheels into engagement with the shaft-feather f^3 and free from spline h , while the remaining type-wheels are in engagement with spline h and are held in place when shaft f is moved 65 axially.

Axial movement to shaft f may be imparted in a variety of ways. In the machine illus-

trated the axial movement is imparted by means of segmental racks d d' , projecting from adjacent ends of bails or frames D D' 70 and meshing with the gear-wheel f' on the latter, so that a movement of either frame will impart axial motion to said shaft, the type-wheels, and the ratchet f^2 . By placing the racks d d' upon opposite sides of the shaft 75 axial motion in reverse direction can be given to said shaft as one or the other of the racks is moved.

As arranged in the present device each rack gives a half-revolution to the shaft, the movement being accomplished by operating mechanism acting upon the flanges d d' . These flanges diminish in width from their outer to their inner ends, or in reverse directions, to make inclined faces with the inclines converging 85 toward each other from the outer to the inner ends of said flanges or frames D D' . Each of these flanges is of sufficient length to permit all the key-levers L on one side of the machine to be in contact therewith, and as there is a flange for each side of the machine it follows that all the key-levers L are 90 in contact with the flanges, the divisional point being the median longitudinal line of the machine. These flanges are preferably 95 provided with steps or graduations, each incline having the same number of steps or graduations as there are characters or letters upon each half of the type-wheel on either side of the initial point from which it is axially moved, and for every such letter and step or graduation a key-lever L is provided, thus forming two series of key-levers, one 100 for the right and the other for the left hand side of the machine. The right-hand set of 105 key-levers, acting upon the inclined flange on the right-hand side of the machine, causes the rack d , attached to its frame, to move forward to axially move the type-wheel shaft in one direction, while the other set of key-levers acts in the same manner upon its inclined flange and rack to axially move said shaft in the opposite direction and give a 110 corresponding movement to the type-wheel and ratchet, so that said shaft, wheel, and 115 ratchet will have an axial movement in either direction from an initial or neutral point.

The key-levers L may be of any desired form and are hung upon the cross-bar i and arranged to form two or more rows or banks 120 of keys i' , as preferred, and to move the same distance when pressed down. The inner ends of the key-lever contacting with the inclined flanges d' of frames D and D' all lie or rest in a common horizontal and vertical plane 125 for convenience in actuating the frames D and D' . The pawl-frame C has on one of its long edges or sides a flange c , adjacent to the inclined flanges on frames D and D' . This flange is widest at its transverse center and 130 diminishes in width from its center to its ends in reverse direction, so as to be inclined from its transverse center in opposite directions, and each such inclination is in the re-

verse direction of the inclination of the flange d' adjacent thereto, as plainly shown in Fig. 5. The inclines of flange c are preferably stepped or graduated in the same manner as the flange d' . At the transverse center of the pawl-frame C and in line with the central or zero point of the type-wheel is an extension forming a pawl c' , which engages with the teeth on the ratchet f^2 , when the pawl-frame 5 is moved forward by one of the key-levers and locks the type-wheel in position, to which it has been axially moved by said key-lever, and holds the wheel relative to the shaft in the said position until the character has been 10 impressed or the pressure upon the key-lever has been removed. This result is accomplished every time a key-lever L is properly depressed, as the inclined flange c of pawl-frame C extends across both flanges d' of frames D and D', and all of said levers come 15 in contact with the inclined edge of said pawl. The ratchet f^2 (shown in the drawings) has the teeth arranged in two rows extending from an initial or neutral point and pointing in 20 opposite directions. There are as many teeth in each row of said ratchet as there are letters or characters on each half of a type-wheel if a single field or row of letters or characters be used, and if more than one field be 25 used the same teeth may be used for every field, as is the case in the device shown in the drawings. This result is accomplished without destroying the coincidence between the neutral point of the type-wheel and the ratchet 30 and the coincidence of movement of the type-wheel ratchet and their shaft.

As the type-wheels only make half of a revolution in either direction from a central or zero point, it follows that a smaller movement or traverse of the type-wheel is required 40 to position a letter adjacent to the center or zero point than that required for one that is farther away from said point, and that such traverse or movement increases from the central or zero point to the opposite end of each half of the type-wheels, and vice versa, and that to effect such variation of movement of the type-wheel the flanges d and d' of the frames D and D' are inclined in different directions, the key-levers engaging with the least widths of said flanges to produce a limited movement or oscillation of said frames to effect a small traverse of the type-wheel shaft for positioning the letters nearest to the 45 central or zero line, and the key-levers engaging with the larger widths of said flanges produce a greater movement of said frames and a corresponding traverse of the type-wheel shaft for positioning the letters farther 50 away from said central point, and as the representative teeth on the ratchet f^2 are correspondingly located and have corresponding movements it follows that the smaller the traverse of the type-wheel the smaller the movement of the ratchet, and reversely. Accordingly as the variation of traverse of the eccentric ratchet is effected the movement of

the pawl-frame C also varies, but in reverse ratio, in order that the pawl c' may engage with the proper teeth of the ratchet at the proper time under all variations of movement thereof to lock the type-wheel and shaft to position the desired letter or character to be struck or impressed—that is to say, when the type-wheel, its shaft, and ratchet have the greater traverse, the pawl-frame C has its smaller movement, and reversely, and it is for this reason that the inclines or steps on the flange of pawl-frame C are oppositely directed to the respective inclines on the flanges of frames D and D'. 70

The operation is obvious. If a key-lever is depressed which represents a letter that is so located on any of the type-wheels, that the shaft f must move its full traverse in order 85 to position the type of the letter for the impression. The lever of such key is so located that its inner end will impinge upon one of the flanges d' of the frames D or D' at its greatest width and upon the flange d' of the 90 pawl-frame C at its least width. The result will be that the initial movement of said lever will first move or tilt either frame D or D' nearly its full movement or traverse before said lever comes into contact with the flange 95 c of pawl-frame C. This movement of either frame D or D' will have revolved shaft f almost a half-turn before the key-lever begins to actuate the pawl-frame C to move it forward to bring its pawl c' into engagement 100 with the last tooth of either half of the ratchet f^2 , or that tooth farthest away from its central or zero point, and as the type-wheel and the ratchet will have then been revolved almost far enough the further slight movement of the pawl-frame C and frame D or D' together brings the type-wheel and ratchet to the full limit of their traverse at a time when the pawl c' of pawl-frame C is ready to engage with the representative teeth on said 105 ratchet. As soon as the pawl-frame C engages with the ratchet f^2 the shaft and type-wheel are locked against further rotation, and either of the frames D or D' and pawl-frame C are in such position that a continuation of 110 their forward movement by a further depression of said key-lever also effects a forward movement of the type-wheel-carrying-shaft frame F to advance or throw the type-wheel against the paper or impression-pad, as seen 115 in Fig. 2. If in place of the above-named key-lever being depressed it should be a key which represents a letter on any of the type-wheels near to its central or zero point, so that only a slight movement of the type-wheel 120 and shaft is required to position such letter, then in such case the key-lever depressed will be located to first strike the larger width of the flange c on pawl-frame C, and it will be moved until its pawl c' is nearly in engagement with the ratchet f , at which time 125 said lever will contact with the narrower width of the flange d' of either of the frames D D' to move one of said frames the slight 130

distance required to effect a corresponding axial movement of shaft *f* to position the letter on the type-wheel and its representative tooth on the ratchet; but the pawl-frame *C* having previously been brought up close to the ratchet, its pawl is in position to engage with said ratchet as soon as such slight axial movement of the shaft and wheel is effected, and said parts are locked against further axial movement, whereupon a continuation of the depression of the key-lever causes the pawl-frame *C* to act as a propelling-pawl for moving the type-wheel to the pad or paper to make the impression. It will be noted that every tooth of the ratchet moves in a separate path, and the farther from the center of the shaft the teeth are the longer the path they have to travel before reaching the radial plane in which the point *c'* of pawl-frame *C* moves, and as the traverse of said pawl is in the inverse ratio of that of the representative teeth on the eccentric ratchet the point of the pawl is always in position to lock the ratchet and in turn the type-wheel against further axial movement after the same is moved to position a letter. Furthermore, as the ratchet and pawl move with the type-wheel or its supporting-frame said locking engagement is maintained during the time the type-wheel is laterally vibrated or advanced to or withdrawn from the impression-pad. Each representative ratchet-tooth has an independent path or length of movement which is of the same extent or traverse as that of the represented type. The various degrees of movement or traverse of the type-wheel and representative ratchet-teeth are simultaneously made or controlled by a representative step in a graduated flange *d* of a right and left hand frame *D* or *D'*, actuated by the depression of correspondingly-located representative key-levers. The pawl *C* with its point *c'* has graduated movements representative of, but inversely in extent of, the unison movements of the type and ratchet teeth, which pawl movements are controlled by said representative key-levers, so that a depression of any key-lever first actuates the pawl *C* and frames *D* or *D'* to either first axially move the shaft *f* with its type and ratchet-wheel and move point *c'* to position a letter or type and lock said shaft against further axial movement, or to first move pawl *C* and then rotate the shaft with its type and ratchet for like purposes, and, second, to throw or carry the type-wheel to the impression-pad. After each impression the pressure on the key-levers is released and the parts are returned by a spring properly applied—such, for example, as the spring *I*.

On the tilting frame *F* there is an arm *m*, which operates a ratchet-feeding device *M*, which properly moves the paper-carriage *N*, the construction of which, the means for moving it, and the means for inking the type form no part of this invention, and will not be described.

From the foregoing it will be noted that any one of the different type-wheels is shifted into engagement with the type-wheel shaft to be axially moved therewith when in use, the remaining wheels not in use being held in position against rotation with said shaft; that the parallel segments on each side of the type-wheel shaft axially move it in different directions; that a pawl having a graduated movement engages with the proper tooth of the ratchet-wheel at the proper time to lock the type-wheel shaft against further axial movement when moved to position a letter, and that said pawl vibrates laterally the type-wheel as a hammer. By such construction the number of operative parts required for the machine is very materially diminished and consequently effects an economy in the cost of the machine and enhances its durability and efficiency, besides which perfect vertical and horizontal alignment of the impressions is secured.

It is obvious that the construction of the ratchet may be varied to make it applicable for a type-wheel having a motion in one direction only, that various constructions of mechanism for rotating said ratchet-wheel and for throwing it and the type-wheel toward the pad or paper may be substituted for that shown and described, and that the ratchet may be used in conjunction with a single type-wheel having different rows of type thereon, in which case the spline *h* and the slot or recess *g* in the type-wheel are dispensed with, the shifting mechanism *H* for said type-wheel being the same as shown or described, or said shifting device may be modified as desired.

When the type-wheel is not used as a hammer and a separate hammer is employed, the pawl *C* will lock the type-wheel shaft, as above described, and its further movement may be utilized to actuate the hammer in any well-known or other desired way for this type of machines.

I do not herein claim the combination of two or more type-wheels shiftable on a driving-shaft, a shifter for shifting said wheels, a spline or clutch for engaging one of said wheels at a time with the shaft at a given point or place, and a second spline or clutch for holding the other wheels or wheel from turning with said shaft, as the same forms the subject-matter of another pending application filed by me the 23d day of May, 1888, Serial No. 274,862, of which this present application is a division.

What I claim is—

1. In a type-writing machine, the combination, with a type-wheel, of a ratchet which moves axially coincidently with said type-wheel and has its adjacent teeth moving in different paths, and a pawl for engaging said ratchet, substantially as set forth.
2. In a type-writing machine, a type-wheel, combined with a ratchet the teeth of which move in different concentric paths coinci-

dently with the type-wheel, and a movable frame for engaging said ratchet-teeth, substantially as set forth.

3. In a type-writing machine, the combination, with a type-wheel, of an eccentric ratchet which moves axially coincidently with said type-wheel, and a pawl for engaging said ratchet, substantially as set forth.

4. In a type-writing machine, the combination of a type-wheel mounted on a shaft, a ratchet mounted on said shaft and moving coincidently therewith and having its adjacent teeth moving in different paths, and a pawl for engaging said ratchet, substantially as set forth.

5. In a type-writing machine, the combination, with a rotating shaft, of a type-wheel which is rotated concentrically with said shaft, a ratchet mounted on said shaft and having its contiguous teeth moving in different paths which are concentric with said shaft, and a pawl for engaging said ratchet-teeth, substantially as set forth.

6. In a type-writing machine, the combination, with a rotating shaft, of a type-wheel which is rotated concentrically with said shaft and is longitudinally shiftable on said shaft, a ratchet mounted on said shaft and moving coincidently therewith and having its contiguous teeth moving in different paths, which are concentric with said shaft, and a pawl for engaging said ratchet-teeth, substantially as set forth.

7. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which is rotated coincidently and concentrically with said shaft, a ratchet mounted on said shaft and having its contiguous teeth moving in different paths concentric with said shaft, and a pawl which is in engagement with said ratchet while the said shaft is moved laterally.

8. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which is rotated coincidently and concentrically with said shaft and is longitudinally shiftable on said shaft, a ratchet on said shaft and having its contiguous teeth moving in different paths, which are concentric with said shaft, and a pawl which is in engagement with said ratchet while the said shaft is moved laterally.

9. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel which is rotated concentrically with said shaft, is vibrated laterally with said shaft, and is movable in the direction of said shaft, a ratchet which is moved coincidently with and is in operative connection with said type-wheel to control its axial movement, and a laterally-vibrating pawl which engages with said ratchet and thereby limits the axial movement of said type-wheel, substantially as set forth.

10. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel which is rotated concentrically with said shaft, is vibrated laterally with said shaft, and is movable in the direction of said shaft, a ratchet rotated coincidently with said type-wheel and having its contiguous teeth moving in different paths, which are all concentric with said shaft and which is in operative connection with said wheel to control its axial movement, and a pawl which engages said ratchet and thereby limits the axial movement of said type-wheel, substantially as set forth.

11. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which is rotated with said shaft, is vibrated laterally with said shaft, and is movable in the direction of said shaft, a ratchet moving coincidently with said type-wheel and having its contiguous teeth traveling in different paths and which is in operative connection with said shaft to control its axial movement, and a pawl which engages said ratchet and thereby limits the axial movement of said shaft, substantially as set forth.

12. In a type-writing machine, the combination of a type-wheel having its letters or characters arranged on its periphery on each side of a neutral or zero point, an eccentric ratchet having its teeth pointing in opposite directions on each side of a neutral or zero point and moving coincidently with the type-wheel, and a pawl for engaging said ratchet, substantially as set forth.

13. In a type-writing machine, the combination of a type-wheel having its letters or characters arranged on its periphery on each side of a divisional or zero point, a ratchet having its teeth pointing in opposite directions on each side of a divisional or zero point and said teeth moving in different paths coincidently with the type-wheel, and a single pawl for engaging said ratchet-wheel, substantially as set forth.

14. In a type-writing machine, the combination, with a type-wheel which has its characters arranged serially on opposite sides of a neutral point, of a double eccentric ratchet which moves axially coincidently with said type-wheel, and a pawl for engaging said ratchet-wheel, substantially as set forth.

15. In a type-writing machine, the combination of a type-wheel mounted on a shaft and rotating concentrically therewith in opposite directions from an initial point and having its characters arranged on opposite sides of a neutral or zero point, a double eccentric ratchet which moves coincidently with said type-wheel, and a pawl for engaging the teeth of both parts of said ratchet.

16. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel which has its characters arranged in opposite directions from a zero or divisional point, is rotated concentrically with said shaft in opposite directions from an initial point, is vibrated laterally with said shaft, and is movable in the direction of said shaft, a

double oppositely-toothed ratchet which is moved coincidently with said type-wheel and is in operative connection therewith to control its axial movement, and a pawl which 5 engages with said ratchet and thereby limits the axial movement of said type-wheel.

17. In a type-writing machine, the combination, with a type-wheel, of a ratchet which moves axially coincidently with said type-wheel and has its adjacent teeth moving in different paths of varying length, and a pawl having graduated movements inversely proportional to the movements of the ratchet for engaging said ratchet, substantially as set 15 forth.

18. In a type-writing machine, the combination, with a type-wheel, of a double eccentric ratchet which moves axially coincidently with said type-wheel, and a pawl having a graduated movement inversely proportional to the movement of the ratchet for engaging said ratchet, substantially as set forth.

19. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel which moves axially concentrically with 25 said shaft and is vibrated with said shaft, a double eccentric ratchet which moves axially with said type-wheel, and a pawl for engaging said ratchet which has a graduated movement 30 inversely proportional to the movement of said ratchet, substantially as set forth.

20. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which is moved with 35 the said shaft, a double eccentric ratchet which moves coincidently with said shaft, and a pawl for engaging said ratchet which has a graduated movement which is inversely proportional to the movement of said ratchet, 40 substantially as set forth.

21. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel which has an axial movement concentric with said shaft in opposite directions from an initial point and has its letters or characters arranged in opposite directions from a divisional or zero point which coincides with the point of rest of said wheel, a double eccentric ratchet which moves axially coincidently 45 with said wheel and has its teeth pointing in opposite directions from a divisional line which coincides with the divisional line of the type-wheel and the point of rest of said wheel, and a pawl for engaging said ratchet which has a graduated movement proportional to the 50 movement of said ratchet, substantially as set forth.

22. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a 60 type-wheel which is shiftable longitudinally in the direction of said shaft, has an axial movement concentric with said shaft in opposite directions from an initial point, and has its letters or characters arranged in opposite directions from a divisional or zero point which coincides with the point of rest 65

of said wheel, a double eccentric ratchet which moves axially coincidently with said wheel and has its teeth pointing in opposite directions from a divisional line which coincides with a divisional line of the type-wheel and the point of rest of said wheel, and a pawl for engaging said ratchet which has a graduated movement proportional to the movement of said ratchet, substantially as set 70 forth.

23. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which has an axial movement concentric with said shaft in opposite directions from an initial point and has its letters or characters arranged in opposite directions from a divisional or zero point which coincides with the point of rest of said wheel, a double eccentric ratchet which moves axially coincidently with said wheel and has its teeth pointing in opposite directions from a divisional line which coincides with the divisional line of the type-wheel and the point of rest of said wheel, and a pawl for engaging said ratchet which has a graduated movement proportional to the movement of said ratchet, substantially as set 80 forth.

24. In a type-writing machine, the combination, with a rotating and laterally-vibrating shaft, of a type-wheel which is shiftable longitudinally in the direction of said shaft, has an axial movement concentric with said shaft in opposite directions from an initial point, and has its letters or characters arranged in opposite directions from a divisional or zero point which coincides with the point of rest of said wheel, a double eccentric ratchet which moves axially coincidently with said wheel and has its teeth pointing in opposite directions from a divisional line which coincides with the divisional line of the type-wheel and the point of rest of said wheel, and a pawl for engaging said ratchet which has a graduated movement proportional to the movement of said ratchet, substantially as set 90 forth.

25. In a type-writing machine, the combination, with a laterally-vibrating shaft, of an axially-moving type-wheel carried by said shaft, a ratchet to arrest the axial movement of said type-wheel, a laterally-vibrating pawl for engaging said ratchet, operating mechanism for imparting axial movement to said type-wheel and vibratory action to said shaft and pawl, and a system of key-levers for actuating said operating mechanism.

26. In a type-writing machine, the combination, with a laterally-vibrating shaft, of an axially-moving type-wheel carried by said shaft, a ratchet to arrest the axial movement of said type-wheel which has a coincident axial movement with said type-wheel, a laterally-vibrating pawl for engaging said ratchet, operating mechanism which imparts axial movement to said type-wheel and vi- 125 130

bratory movement to said shaft and pawl, and a system of key-levers for actuating said operating mechanism.

27. In a type-writing machine, the combination, with a laterally-vibrating shaft, of an axially-moving type-wheel which is carried by said shaft, a ratchet to arrest the axial movement of said type-wheel which has a coincident axial movement with said wheel and has its teeth moving in different paths, a pawl for engaging said ratchet, operating mechanism which imparts said axial movement to said type-wheel and vibratory action to said shaft and pawl, and a system of key-levers for actuating said operating mechanism.

28. In a type-writing machine, the combination, with a laterally-vibrating shaft, of an axially-moving type-wheel carried by said shaft, an eccentric ratchet to arrest the axial movement of said type-wheel which has a coincident axial movement therewith, a pawl for engaging said ratchet, operating mechanism for actuating said type-wheel, shaft, and pawl, and a system of key-levers for actuating said operating mechanism.

29. In a type-writing machine, the combination, with a laterally-vibrating shaft, of an axially-moving type-wheel carried by and shiftable on said shaft, an eccentric ratchet to arrest the axial movement of said type-wheel which has a coincident axial movement therewith, a pawl for engaging said ratchet, operating mechanism for actuating

said type-wheel, shaft, and pawl, and a system of key-levers for actuating said operating mechanism.

30. In a type-writing machine, the combination, with a laterally-vibrating shaft, of a type-wheel carried by said shaft which has axial movement concentric therewith in opposite directions from an initial point, a double ratchet to arrest the axial movement of said wheel which has an axial movement coincident therewith and has the teeth of each part thereof moving in different paths, a pawl for engaging said ratchet, operating mechanism for operating said type-wheel, shaft, and pawl, and a system of key-levers for actuating said operating mechanism.

31. In a type-writing machine, the combination of a laterally-vibrating shaft, a type-wheel which is shiftable on said shaft and has an axial movement concentrically with said shaft, a ratchet for arresting the axial movement of said wheel, a laterally-vibrating pawl for engaging said ratchet, key-actuating mechanism for shifting said type-wheel, and a system of key-levers and connecting mechanism for imparting axial movement to said type-wheel and vibrating action to said shaft and pawl, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE C. BLICKENSDERFER.

Witnesses:

S. J. VAN STAVOREN,
CHAS. F. VAN HORN.