

No. 719,422.

PATENTED FEB. 3, 1903.

G. A. BATES.
LINOTYPE MACHINE.

APPLICATION FILED FEB. 11, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

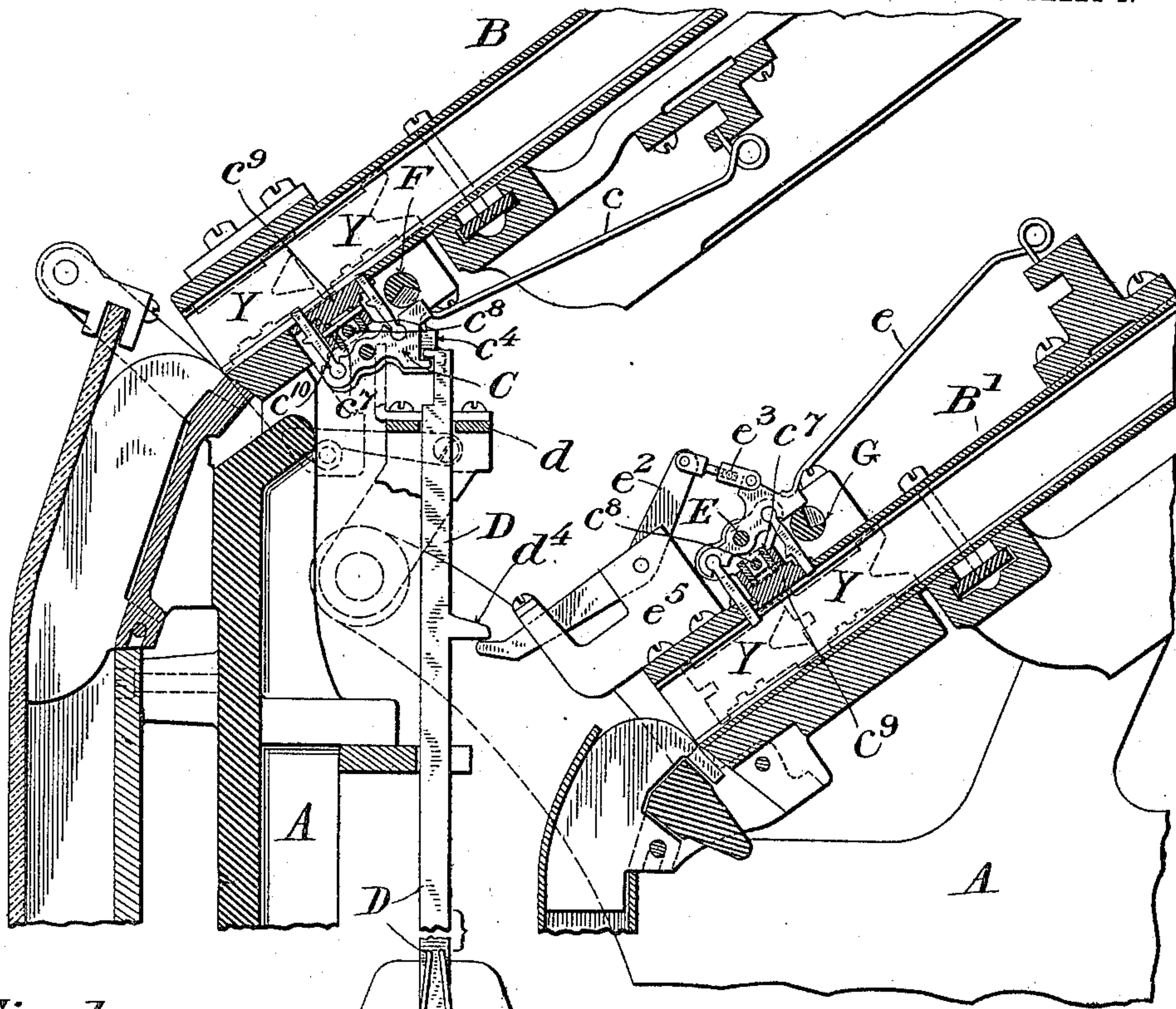
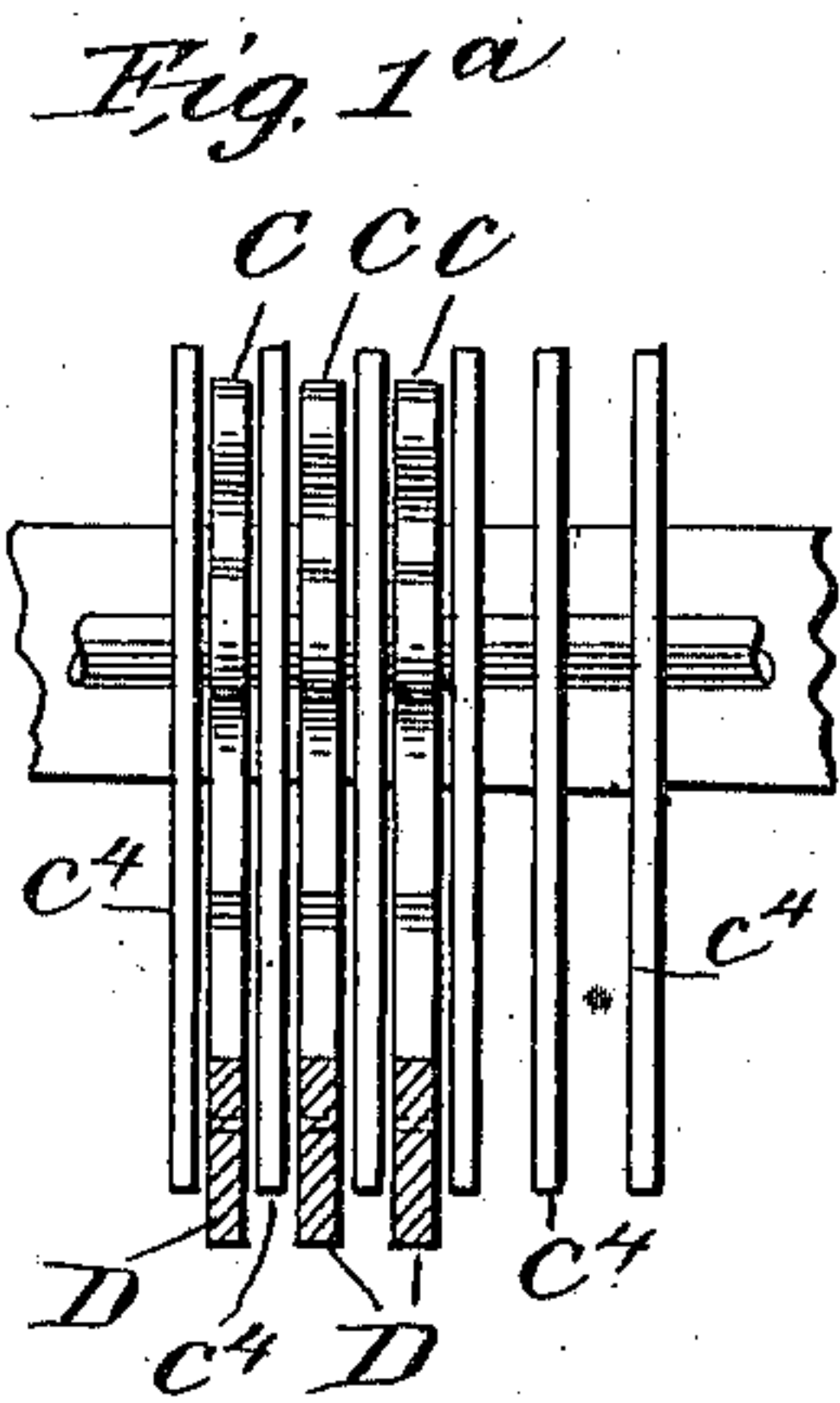
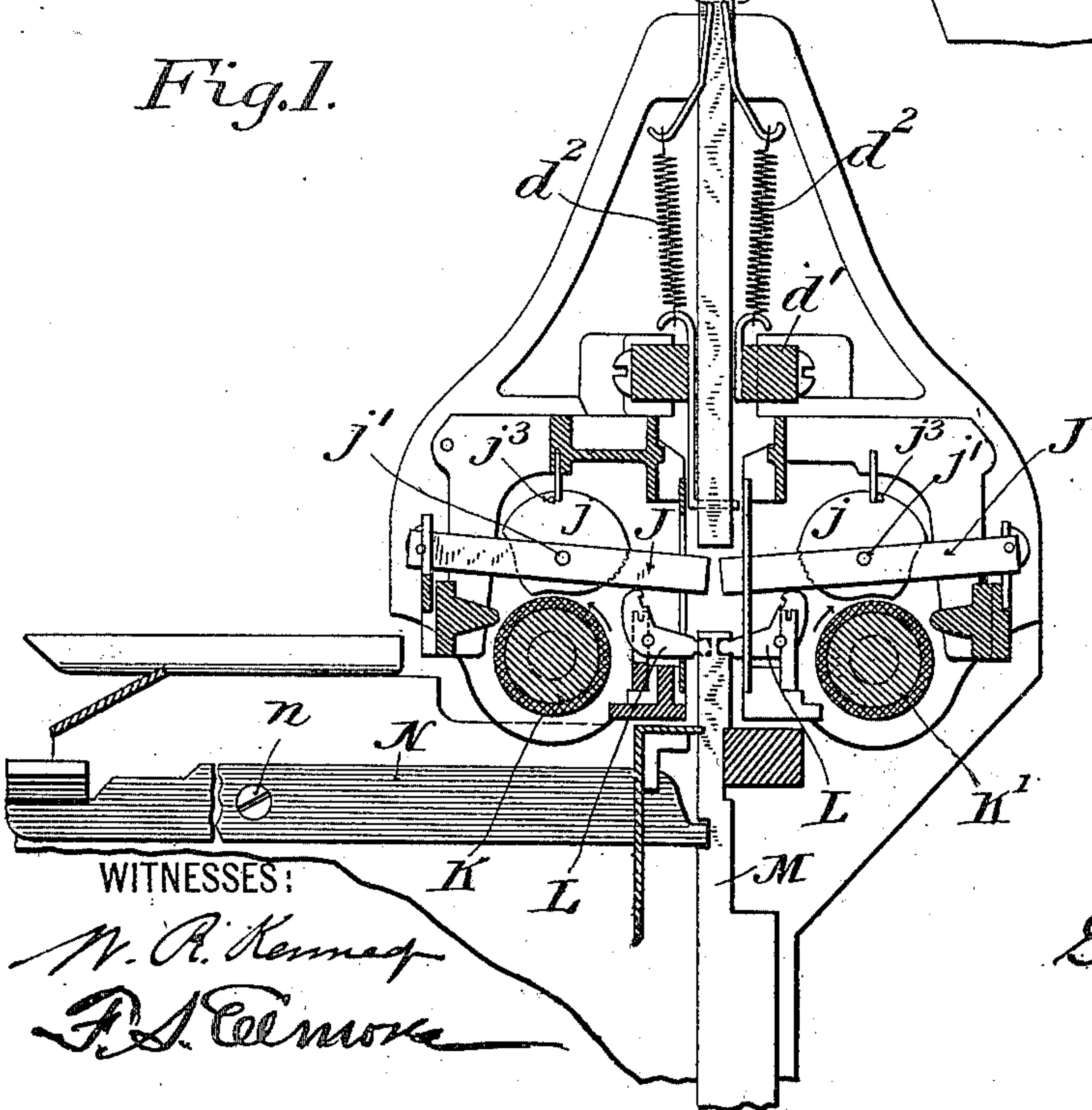


Fig. 1.



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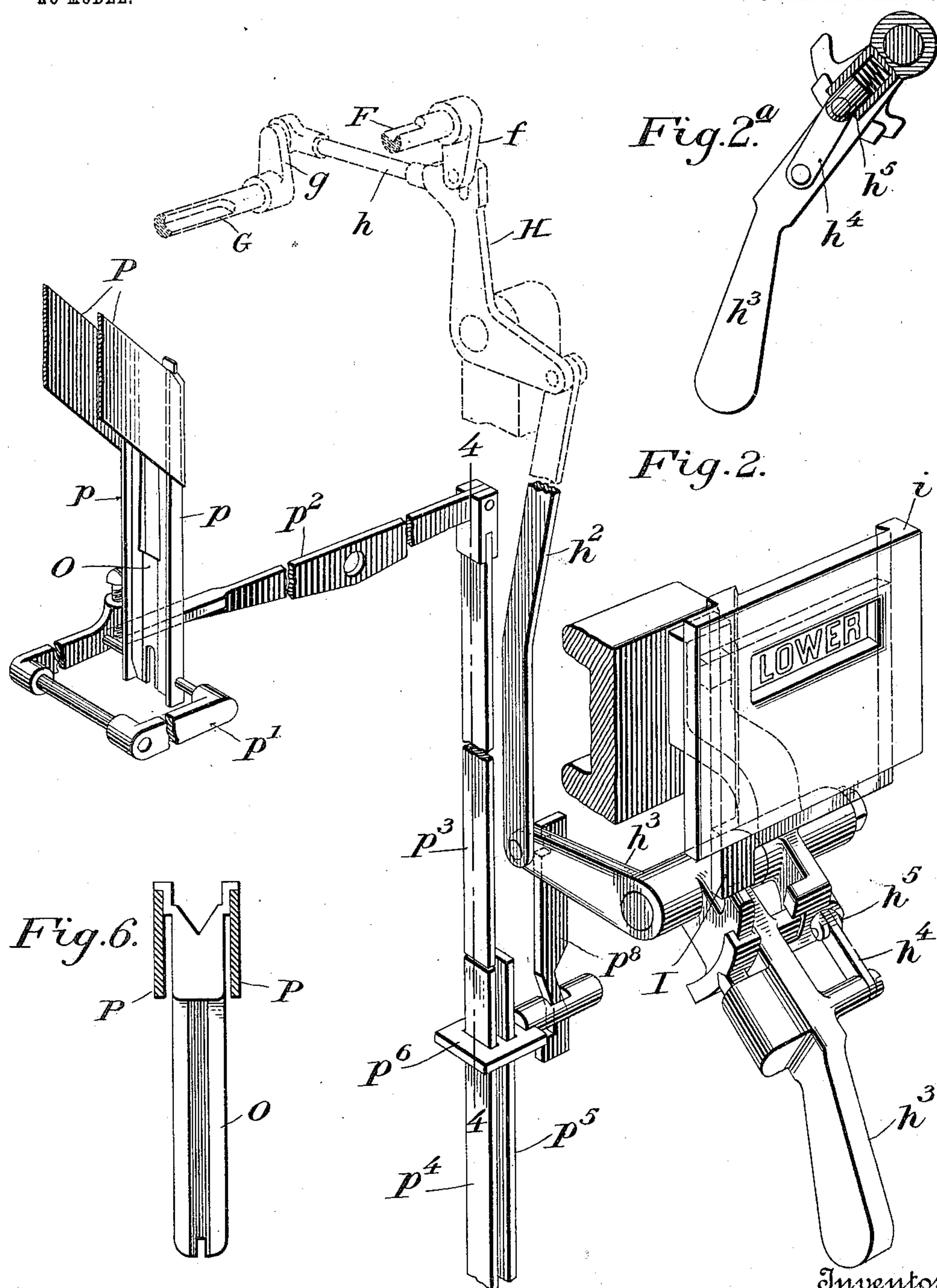
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3 SHEETS—SHEET 2.



Witnesses
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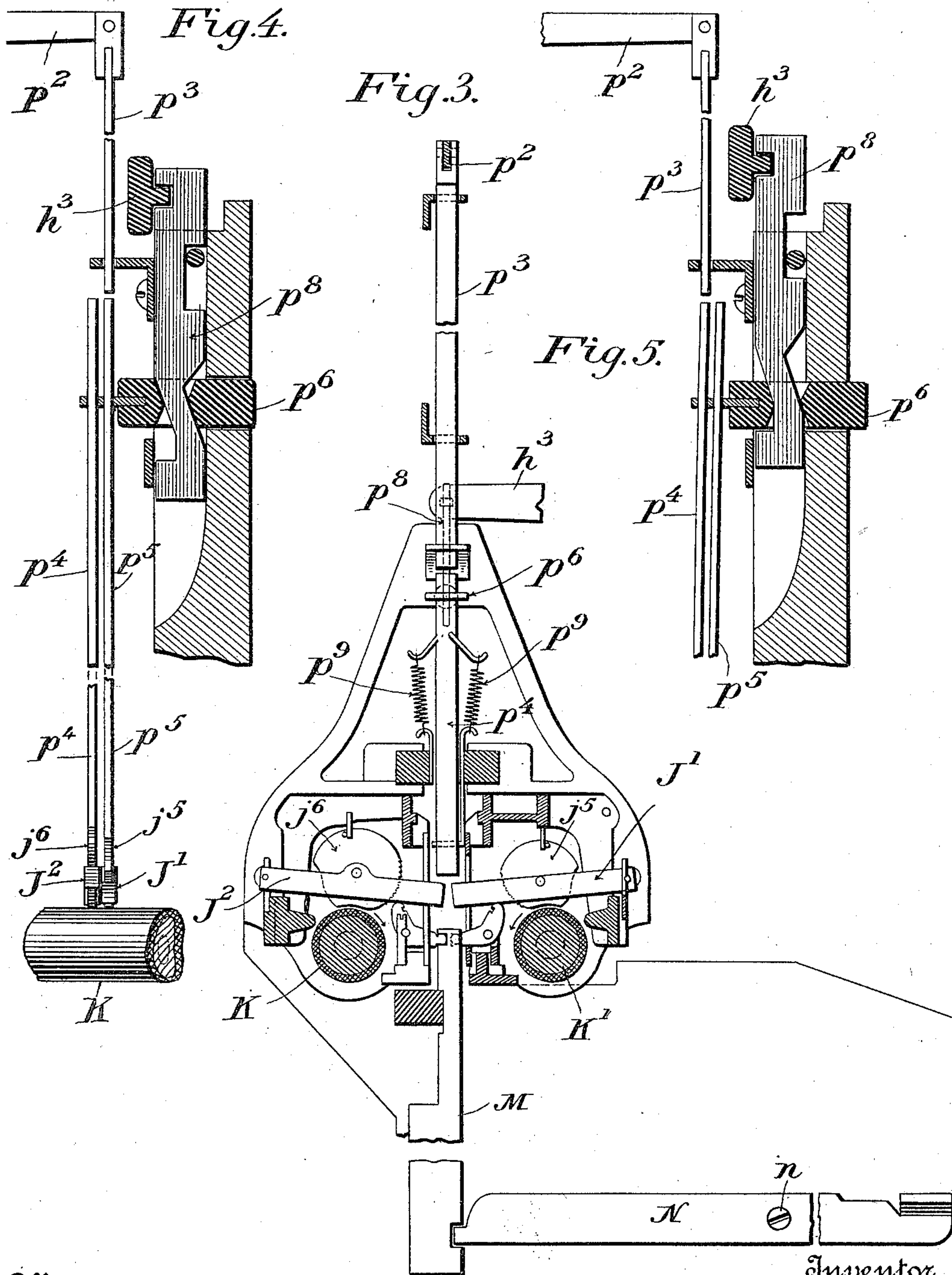
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3 SHEETS—SHEET 3.



Witnesses
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UNITED STATES PATENT OFFICE.

GEORGE A. BATES, OF BROOKLYN, NEW YORK, ASSIGNOR TO MERGENTHALER LINOTYPE COMPANY, A CORPORATION OF NEW YORK.

LINOTYPE-MACHINE.

SPECIFICATION forming part of Letters Patent No. 719,422, dated February 3, 1903.

Application filed February 11, 1902. Serial No. 93,497. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. BATES, of Brooklyn, county of Kings; and State of New York, have invented a new and useful Improvement in Linotype-Machines, of which the following is a specification.

My invention has reference to improvements in linotype-machines of the character represented in Letters Patent of the United States No. 640,033, in which individual matrices are stored in two magazines, one overlying the other and having their escapement devices actuated by shifting connections from a single keyboard, so that the matrices from either or both magazines may be delivered with the usual spacers from their magazine to one assembler for transference to the casting mechanism in which the linotype is produced, the matrix-line being thereafter lifted as a unit to the top of the machine and the matrices separated and delivered individually to the distributor of the upper or the lower magazine, as required.

It consists in mechanism for delivering the wedge spacers or justifiers to the line in course of composition in a longer or shorter interval after the operation of the space-key, according as the matrices are being delivered at the instant from the upper or the lower magazine, this to compensate for the slight difference in time required for the passage of matrices from the respective magazines to the line, to the end that transposition in the line may be prevented.

It further consists in coupling together the keyboard connections and the space-delivery devices above referred to, so that the change in the delivery of matrices from one magazine or the other will automatically effect the change in the speed of delivery of spacers.

In the accompanying drawings I have limited the illustrations to such parts of the linotype-machine as are necessary to an understanding of my invention.

The general organization of the machine with two magazines and shifting connections to a single keyboard is essentially the same as that in the United States Patent No. 640,033 to J. R. Rogers, dated December 26, 1899, while the keyboard and its immediate connections are essentially the same as those in

United States Patent No. 530,931 to P. T. Dodge, dated December 18, 1894, except as to the particular matters hereinafter pointed out.

Referring to the drawings, Figure 1 is a vertical section from front to rear through the lower ends of the two magazines, the keyboard proper, and the intermediate connections. Fig. 1^a is a bottom plan view showing escapements of the upper magazine with the separating-plates and actuating-bars. Fig. 2 is a perspective view illustrating the connections for locking out of action the escapements of either magazine when matrices are to be delivered from the other and also the associated devices for hastening or retarding the delivery of the spacers to the line. Fig. 2^a is a sectional elevation of a detail. Fig. 3 is a vertical section through the keyboard and attendant parts for actuating the space-delivery devices with variable speed. Figs. 4 and 5 are vertical transverse sections through the devices for determining the action of the space-delivering mechanism on the line 4 4 of Fig. 2. Fig. 6 is a cross-section through the space-bar magazine, showing one of the space-bars suspended therein.

Referring to Fig. 1, A represents the rigid main frame of the machine, and B B' the two stationary magazines, arranged in inclined positions, so that the matrices Y, delivered into their upper ends by the distributing mechanism, will descend through them by gravity and escape one at a time at the lower ends as they are released by the escapement devices. The two magazines deliver the matrices through intermediate guiding or conducting devices to a common assembler, in which they are assembled or composed in line. The construction and arrangement of the foregoing parts are essentially the same as the correspondingly-lettered parts in Patent No. 640,033, above referred to. The magazines are grooved or channeled longitudinally, as usual, to receive and guide the matrices in rows one endwise behind another. Each of the magazines is provided, as usual, with an escapement device for each row of matrices, and the corresponding escapements of the two magazines are actuated alternately by one set of connections from the

keyboard. The connections shown operate on the same general plan as those represented in the earlier patent and in themselves are not claimed as of my invention.

5 *Escapements of the upper magazine.*—C represents one escapement of the upper magazine, located on the under side and consisting, as usual, of a centrally-pivoted lever carrying at opposite ends two pawls, which
10 are projected upward alternately through the bottom of the magazine by the rocking of the lever. A spring c , secured to the magazine-frame, bears at one end upward under the rear end of the escapement-lever and tends
15 to depress the lower pawl in order to permit the escape of the matrix detained in the mouth of the magazine. This action is prevented, however, when the parts are at rest and the lower pawl held in its elevated position by
20 the downward pull of the vertical sliding key bar or reed D, which is mounted in guides d and d' in the main frame and urged constantly downward by a spring d^2 of such strength as to overcome the spring c and hold the escape-
25 ment normally in the position shown in Fig. 1. The escapement-levers, arranged in a row across the magazine, are separated from each other by fixed plates c^4 , which are extended rearward beyond the escapement-levers in
30 order to overlap and guide the upper ends of the bars or reeds D, which are thus prevented from moving laterally out of engagement with the levers. When the key bar or reed D is raised by the keyboard connections, hereinafter described, so that the escapement is re-
35 lieved from the downward pull, the spring c reverses the position of the escapement, retracting the lower pawl and permitting the escape of the under matrix, to be succeeded
40 in its position by the next matrix in the row.

The above action of the escapement is the same as in the commercial linotype-machine of the present day.

45 *Escapements of the lower magazine.*—Passing now to the escapements of the lower magazine, which are mounted on its upper side, as shown at E, they are of essentially the same construction as those of the upper magazine, but in a reversed or inverted position, the
50 centrally-pivoted lever having the pawls or dogs at its opposite ends projected downward through the top plate of the magazine and actuated by a spring e , fixed to the magazine-frame and bearing on the upper or rear
55 end of the escapement-lever with a tendency to retract the lower pawl of the escapement to effect the release of the end matrix. This releasing action of the escapement under the influence of the spring e is, however, pre-
60 vented, as in the case of the upper escapement, by the downward pull of the key-bar D, which communicates with the escapement E through an intermediate lever e^2 , mounted centrally on a fixed pivot and having its rear
65 end connected by a link e^3 with the rear end of the escapement, while its forward end lies beneath a shoulder d^4 on the key-bar D. The

downward pull of the key-bar D under the influence of its spring d^2 holds the escapement E normally in its elevated position; but when
70 the key-bar is raised by the keyboard connections it permits the escapement to reverse its position and discharge the matrix.

From the foregoing it will be understood that the one key-bar D controls the action of
75 two escapements, one for each magazine, the escapement of the upper being controlled directly and that of the lower magazine through the lever e^2 .

80 *Locking the escapements.*—As the one key-bar controls the escapement of both magazines and as a matrix is to be delivered from only one magazine at a time, it follows that provision must be made for preventing the
85 operation of one escapement or the other, according as a matrix is required from the upper or the lower magazine. For this purpose I mount in the frame of each magazine outside of the magazine proper a device for locking
90 all the escapements of the magazine out of action at will. This locking device consists in the case of the upper magazine of a longitudinally-grooved rock-shaft F, mounted directly over the rear ends of the escapement-
95 levers. When turned to the position shown in Fig. 1, this shaft presents its cut-away side opposite the escapement-levers, which are left free to operate and deliver the matrices in the usual manner. When, however,
100 the shaft is given a partial rotation, the effect is to bring its solid or uncut surface downward directly over the upper ends of the escapement-levers, which are thus locked against action. The upper end of the key-
105 bar D, which engages the escapement, is cut away, as shown, to admit of the key-bar D rising freely independently of the locked escapement. It will be seen that the locking of the upper escapements does not prevent
110 the key-bar from rising and actuating the escapements of the lower magazine.

The locking device for the escapements of the lower magazine is a rock-shaft G, mounted in the frame of the lower magazine under the upper ends of the escapements E, its form,
115 arrangement, and mode of action being the same as that of the corresponding device in the upper magazine, so that when turned to one position it will lock all the escapements of the lower magazine and prevent the de-
120 livery of matrices therefrom, while in its other position it will leave them all free to operate.

It will be observed that the locking devices F and G engage directly with the escape-
125 ment-levers and lock them positively against movement, so that it is impossible for any escapement in the series to be moved accidentally either while the magazine is on the machine or when it is removed therefrom to
130 be replaced by another.

Changing style of matrix-delivery.—The respective magazines will ordinarily be provided with matrices carrying type-faces of

different fonts. The change of font in the print is effected by delivering matrices from one magazine or the other. This necessitates the locking of the escapements of the two magazines by the devices above described alternately. In order to promote the instantaneous change of font and to prevent the possibility of delivering matrices from both magazines or both fonts at one time, I couple the locking-shaft F of the upper magazine and the locking-shaft G of the lower magazine, as shown in Fig. 2. The two shafts are provided, respectively, with crank-arms f and g , the former connecting directly with the upper end of an elbow-lever H, while the latter is connected with the lever by a rod or link h . When, therefore, the lever H, mounted on a fixed pivot, is operated, it has the effect of turning the two locking-shafts and locking the escapements of one magazine out of action, while releasing those of the other magazine. The lever H is connected by rod h^2 with a rocking arm or lever h^3 , mounted on a horizontal pivot immediately over the keyboard of the machine or in other convenient position in front of the operator, who is thus enabled by simply moving the forward end of the lever upward or downward to instantly adjust the parts for the delivery of matrices from one magazine or the other as required. He is enabled by this arrangement without appreciable loss of time to cause not only the delivery of a complete line of matrices from either magazine, but in one line of composition part of the matrices from one magazine and part from the other.

Indicator.—To the end that the operator may know at all times from which magazine or font the matrices are being delivered and that errors in composition may be prevented I propose to combine with the controlling devices an indicator of suitable form. In the preferred form this indicator consists of a plate I, provided on its face with the words "Upper" and "Lower" or like words to indicate the respective magazines. This plate is mounted to slide in guides on the back of a fixed plate or screen i , having in its face a slot or opening through which one or the other of the words will be exposed, according to the height of the plate, which rests at its lower edge upon the reversing-lever h^3 , so that the movement of the lever to lock and unlock the respective series of escapements has at the same time the effect of properly adjusting the indicator.

Any suitable contrivance may be used for locking the reversing-lever h^3 ; but I prefer, as shown in the drawings, a link h^4 , pivoted at one end thereto and at the opposite end to a sliding plunger h^5 , seated in a hole in the frame and urged outward by a spring, as illustrated in Fig. 2^a. The movement of the lever will throw this link over the center, so that it will tend to hold the lever in either of the two positions in which it may be placed.

While I prefer to employ the connections

above described extending from the escapement-locking devices downward within reach of the operator at the keyboard, it will of course be understood that they may be varied in form and arrangement within the limits of mechanical skill without departing from the essence of my invention.

Keyboard connections to escapements.—For the purpose of lifting the key bars or rods D to actuate the escapements I may employ finger-keys or their equivalents operating directly or through any suitable intermediate devices on the bars, these features forming no part of the present invention. I prefer, however, to employ the ordinary keyboard of the commercial linotype-machine illustrated in Fig. 1 of the drawings and set out in detail in the United States Patent to P. T. Dodge, No. 530,931.

As shown in the drawings, each of the bars D stands at its lower end directly over but out of contact with a lifting bar or yoke J, pivoted at its outer end and carrying in an interior slot a vertical cam j , mounted on a pivot j' . The yokes for lifting the successive bars are extended laterally to the front and rear, this arrangement being adopted in order to secure increased space. The bars of the front and rear yokes respectively overlie two horizontal constantly-rotating rolls K and K', covered with rubber or like material. The free ends of the yokes are held normally in an elevated position by pivoted dogs L to keep the cams out of contact with the rolls, and each cam is provided with a shoulder or stud j^3 , which rests normally against a stop-shoulder on the overlying frame. When the parts are at rest, the cams are all held out of contact with the rolls, and these parts are for the time inert. Each dog L is connected to a vertical guide-bar M, which is in turn engaged by the rear end of a finger-key lever N, mounted on a fixed pivot n . Whenever a finger-key is actuated, it lifts the corresponding bar M, which disengages the dog L from the overlying yoke J, which falling lowers its cam j out of engagement with the stop-shoulder above and at the same time permits it to engage with the roller below. The frictional engagement with the roll causes the cam to rotate, and by reason of its irregular or eccentric contour it raises its yoke, causing the latter to lift the rod D and permit the movement of the escapement in one magazine or the other. The yoke on falling to its original position is again arrested and sustained by the dog L, and the cam is arrested in its rotation by contact with the stop-shoulder. Thus it will be seen that the operation of the one finger-key effects the delivery of a matrix from the upper or the lower magazine, according to the position of the respective locking-shafts F and G and their controlling-lever h^3 .

It is to be noted that the action of the keyboard mechanism and of the key-bar D on the escapement of the upper magazine are

the same as in the commercial linotype of the present day and that the invention lies in the arrangement of parts for communicating motion from the rod D to the escapements of the lower magazine and for locking the escapements of one magazine or the other out of action for the time being, so that the series which is unlocked may be operated by the bars D.

10 *Delivery of spacers.*—The spacing or justifying devices O (see Fig. 2) employed in the present machine are the same as those used in the commercial Mergenthaler machine of the present day and covered by the patent of 15 Mergenthaler, No. 345,525, and the patent of Schuckers, No. 474,306, consisting each of a short wedge provided with suspending ears and of a long and inversely-tapered wedge connected with the short wedge by a sliding 20 joint, so that the spacer may be handled as a unit and so that after being introduced into the line of matrices it may be expanded or widened at the operative point by thrusting the long wedge upward through the line in a 25 manner well known to those familiar with the art. In the present machine it is found that the time required for the delivery of matrices from the lower magazine to the matrix-line being composed is slightly longer 30 than the time required for delivery from the upper magazine, and in order to prevent the transposition of the matrices and space-bands passing to the line I provide means for delivering the space-bands more quickly when the 35 matrices are passing from the upper magazine than when they are passing from the lower magazine. This mechanism in its preferred form is plainly shown in Figs. 2, 3, 4, 40 and 5, in which O represents a space-band suspended, as usual, by its ears on the inclined side rails P of the space-band magazine and detained by shoulders at the lower ends of these rails. The delivery is effected by vertically-reciprocating lifters p , 45 each acting under the ears of the foremost band to lift them clear of the shoulders on the rails, so that they may pass thereover and permit the band to fall into the line below in the usual manner. The lifters p are operated by connected cranks p' , actuated in 50 turn by lever p^2 , connected to vertical key-rod p^3 . Heretofore this rod has been continued downward to a position to be operated by one of the cam-yokes J in the keyboard, the parts being controlled by a finger-key and arranged to operate in the same manner as the matrix-delivery cams. In my improved construction I terminate the rod p^3 at some distance above the keyboard and directly above two key-bars p^4 and p^5 , which 60 are mounted in a horizontally-movable guide p^6 , by which they may be shifted laterally, so that either p^4 or p^5 may be brought under the bar p^3 in position to operate the same. The bars p^4 and p^5 are urged downward, as shown in Fig. 3, by springs p^9 and are each arranged over one of the keyboard cam-yokes J'. One

of these yokes carries a cam j^5 , having a form and action with the key-bar p^5 and the underlying roll K similar to that of the cams for 70 delivering the matrices already described. The other yoke J², which guides the bar p^4 , carries a cam j^6 of substantially the same form as the other, but of greater diameter, by reason of which it is caused to receive a slower 75 rotation from the underlying roll K. It follows, therefore, that when the cam j^5 and rod p^5 are in action they will impart through the bar p^3 a relatively quick motion to the space-delivering device, or, in other words, effect 80 the delivery of the space in a short time after the operation of the finger-key, and that, on the other hand, the cam j^6 and bar p^4 when in action will effect the delivery of the space 85 a relatively long time after the action of the finger-key. In practice the parts operate very rapidly, and the difference in time of delivery above referred to is, in fact, very slight, but sufficient for the end in view.

In order to save time and insure the change 90 in the delivery of spacers whenever a change in the delivery of matrices from one magazine or the other occurs, I connect the mechanism which controls the matrix-delivery 95 with the devices controlling the delivery of spacers, as shown in Figs. 2, 4, and 5. The slide p^6 , which controls the operation of key-bars p^4 and p^5 , is mounted in a suitable guide in the frame and moved horizontally by 100 wedge-shaped or inclined surfaces on the lower end of a vertical slide p^8 , suitably guided in the main frame and connected at its upper end to the crank-arm h^3 , through which the escapements of the respective 105 magazines are locked and unlocked, as heretofore explained. Whenever the lever or handle h^3 is depressed, as shown in Figs. 2 and 5, to cause the delivery of matrices from the lower magazine, it brings into action the key-bar p^4 to cause the slow delivery of 110 spacers. When, on the contrary, the arm h^3 is lifted to cause the delivery of matrices from the upper magazine, the key-bar p^5 will be brought into action and speedy delivery of the spacers will result. 115

Details of escapement-bars.—All of the plates in the series have their ears extended up through slots in the under side of a channeled or U-shaped supporting-bar c^7 and secured by a long wire or pin c^8 , extended 120 through the entire series. This pin holds the guide-plates firmly to their places in the slots, which latter in turn keep them parallel and prevent them from being turned or twisted out of position. This construction is exceedingly cheap, strong, and reliable and renders 125 unnecessary a great amount of hand-work heretofore required in soldering the division-plates to the supporting-bar.

It will be observed that the rear ends of the 130 plates c^4 are lengthened and widened vertically, so that they project beyond the escapement-lever C and past the sides of the key-bars D and springs c , which are thus guided

and prevented from moving laterally out of engagement with the lever.

The channeled bar, in which the partitions are mounted as above described, is in turn seated, as shown in Fig. 1, in the underside of a horizontally-grooved bar or plate c^9 , forming a part of the under side of the magazine. The bar c^7 is secured in the fixed bar by transverse pins c^{10} , passed through holes, as shown in Fig. 1.

The escapements of the lower magazine are supported by and between partition-plates constructed and arranged like those of the upper magazine, except that they are in an inverted position, as shown in Fig. 1.

It will be observed that each of the escapement-levers C is grooved longitudinally in the rear end and the connecting-spring c bent at the end into rounded form to fit within the groove, in which it works with slight friction and without danger of escaping sideways or coming into frictional contact with the guide-plates at the sides.

Referring again to the links e^3 which connect the lower escapement-levers with the actuating-levers e^2 , it is to be noted that these links are formed in two parts screwed together, so that they may be varied in length. This is of importance in assembling the machine and also as a means for compensating for wear, since it permits the escapement and the forward end of the lever which engages the actuating-bar D to be properly adjusted throughout the series. It will be observed in this connection that the levers e^2 are supported in and guided for the greater portion of their length by the bar e^5 , secured upon and forming part of the lower magazine and provided with transverse slots, in which the levers are seated.

The devices herein shown for imparting motion to the escapements of two magazines, consisting of the bars D , levers e^2 , and links e^3 , are not of my invention and are not claimed herein.

Having described my invention, what I claim is—

1. In a linotype-machine, a magazine, a vibrating escapement mounted therein, a spring tending to move the escapement in one direction, and an adjustable locking device, mounted in and forming part of the magazine and adapted to directly engage and lock the escapement, whereby movement of the escapement is positively prevented.

2. In a linotype-machine, a magazine, a vibrating escapement mounted therein, and a rock-shaft adapted to engage and hold the escapement.

3. In a linotype-machine, the magazines, each provided with escapements, rotary locking devices mounted in the respective magazines and directly engaging the escapements, and means connecting the two locking devices and acting to throw each out of action as the other is brought into action.

4. In a linotype-machine, two magazines, each provided with pivoted vibrating escapements, substantially as described, in combination with a locking device permanently mounted in each magazine and adapted to directly engage its escapement, and means connecting said locking devices to throw them alternately into action.

5. In a linotype or analogous machine, a magazine provided with a series of escapement devices, in combination with an adjustable locking device permanently mounted in the magazine and adapted to directly engage and lock the series of escapements.

6. In a linotype-machine, in combination with the two magazines, locking devices F , G , for the escapements of the respective magazines, a bar h^2 connecting the said locking devices and extending downward, and a manual device, as h^3 , at the lower end of bar h^2 , for actuating the same.

7. In a linotype-machine, two magazines, mechanism for controlling the delivery of matrices from the two magazines alternately, and an indicator connected therewith to show which magazine is in service.

8. In a linotype-machine and in combination with mechanism for controlling the escapements of two magazines, an indicator comprising a support with suitable indications thereon and a shield, movable one in relation to the other, whereby one indication or the other will be automatically exposed as one magazine or the other is brought into action.

9. In a linotype-machine, in combination with escapement-controlling devices, their actuating lever or handle h^3 , and the spring-actuated link h^4 to hold the same in its two positions.

10. In a linotype-machine having two magazines, space-delivering devices and means whereby the speed of said devices may be increased or diminished at will in relation to the speed of the other parts.

11. In a linotype-machine, the combination of a space-delivering mechanism, two actuating-cams which are relatively fast and slow, and means whereby either cam may be brought into action at will, whereby the delivery of a space may be effected at a longer or shorter interval.

12. In a linotype-machine having two magazines and escapements for delivering matrices therefrom, means for bringing the escapements of one magazine or the other into action at will, space-delivering devices, fast and slow actuating mechanism therefor, and connections between the last-named mechanism and the escapement-controlling mechanism, whereby the bringing of one magazine or the other into use is caused to effect a change in the speed of delivery of the spacers.

13. In a linotype-machine, the two escapement-controlling devices, F , G , and an actuating device h^3 connected therewith, in com-

62
 bination with space-delivering devices, their
 two actuating-bars p^4 and p^5 , means for mov-
 ing these bars at different speeds, and means
 connected with the actuating device h^3 for
 5 throwing p^4 and p^5 into action alternately.

14. In combination with a lever or handle
 h^3 , controlling the escapement-locking de-
 vices, the slide p^8 with inclined surfaces, the
 guide p^6 actuated thereby, the fast and slow
 10 moving bars p^4 and p^5 , a bar p^3 arranged to
 actuate the space-delivering mechanism and
 to be actuated by p^4 and p^5 alternately.

15. In a linotype-machine, the combination
 of a space-delivering mechanism, two vari-
 15 ant cams j^5 and j^6 , means for rotating said
 cams and means for communicating motion

from the cams alternately to the space-deliv-
 ering mechanism.

16. In a linotype-magazine and in combi-
 nation with a series of escapement-levers C, 20
 a series of fixed intermediate plates c^4 pro-
 jecting beyond the ends of the levers as de-
 scribed, whereby they are adapted to guide
 the parts coöperating with the levers.

In testimony whereof I hereunto set my 25
 hand, this 31st day of January, 1902, in the
 presence of two attesting witnesses.

GEORGE A. BATES.

Witnesses:

C. E. GRANT,
 FRANCIS E. WHARTON.