

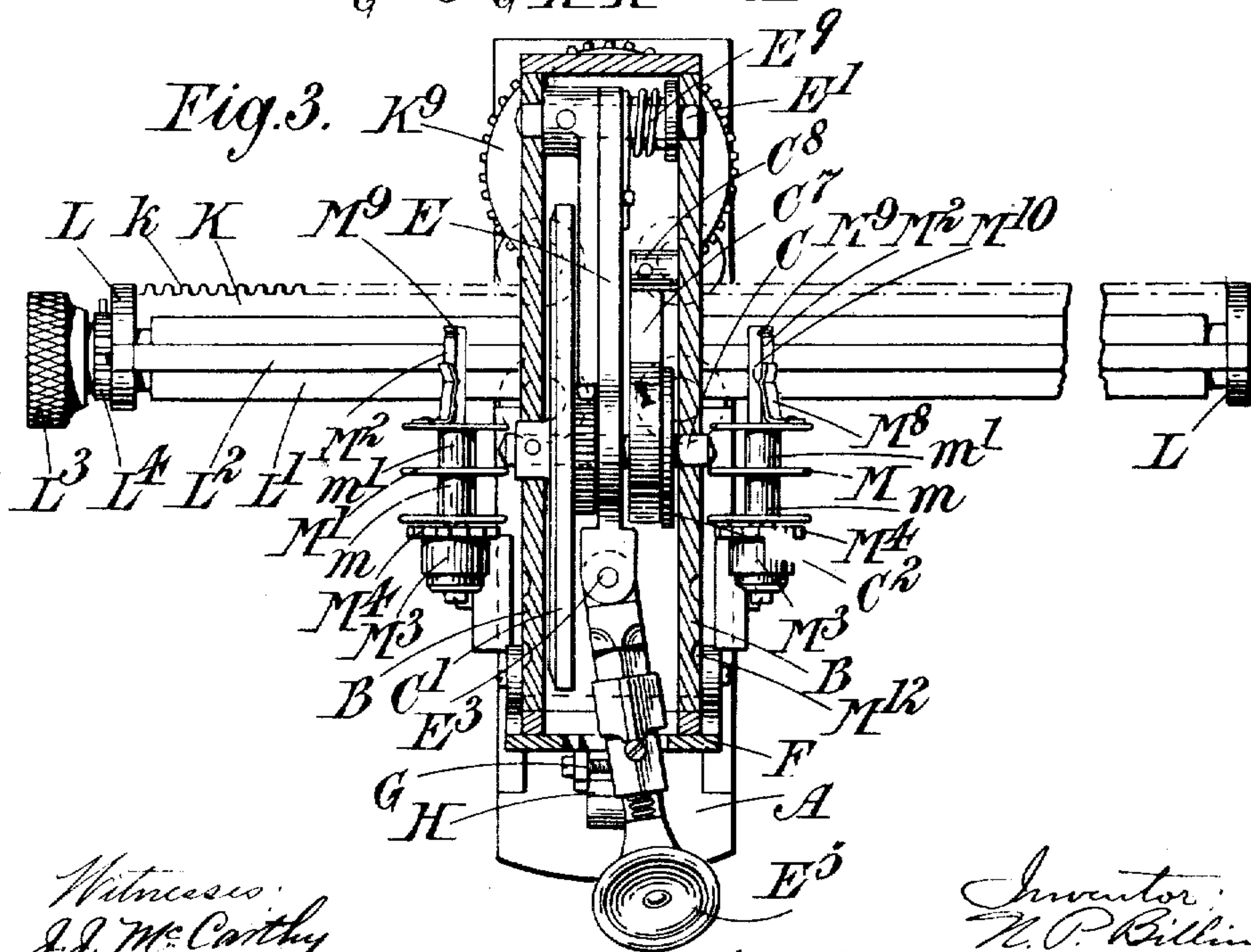
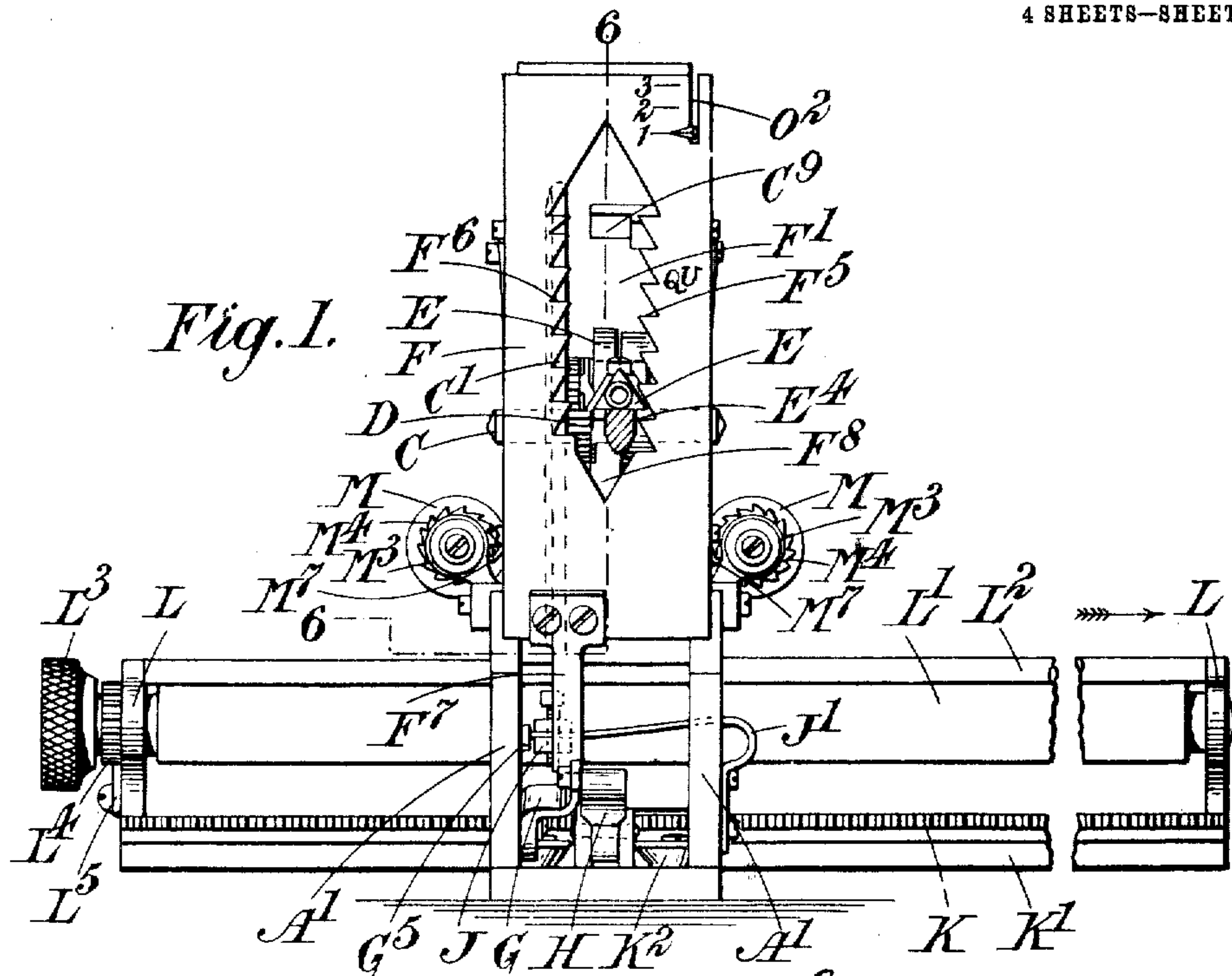
N. P. BILLING.
TYPE WRITER.

APPLICATION FILED MAR. 3, 1908.

911,805

Patented Feb. 9, 1909.

4 SHEETS—SHEET 1.

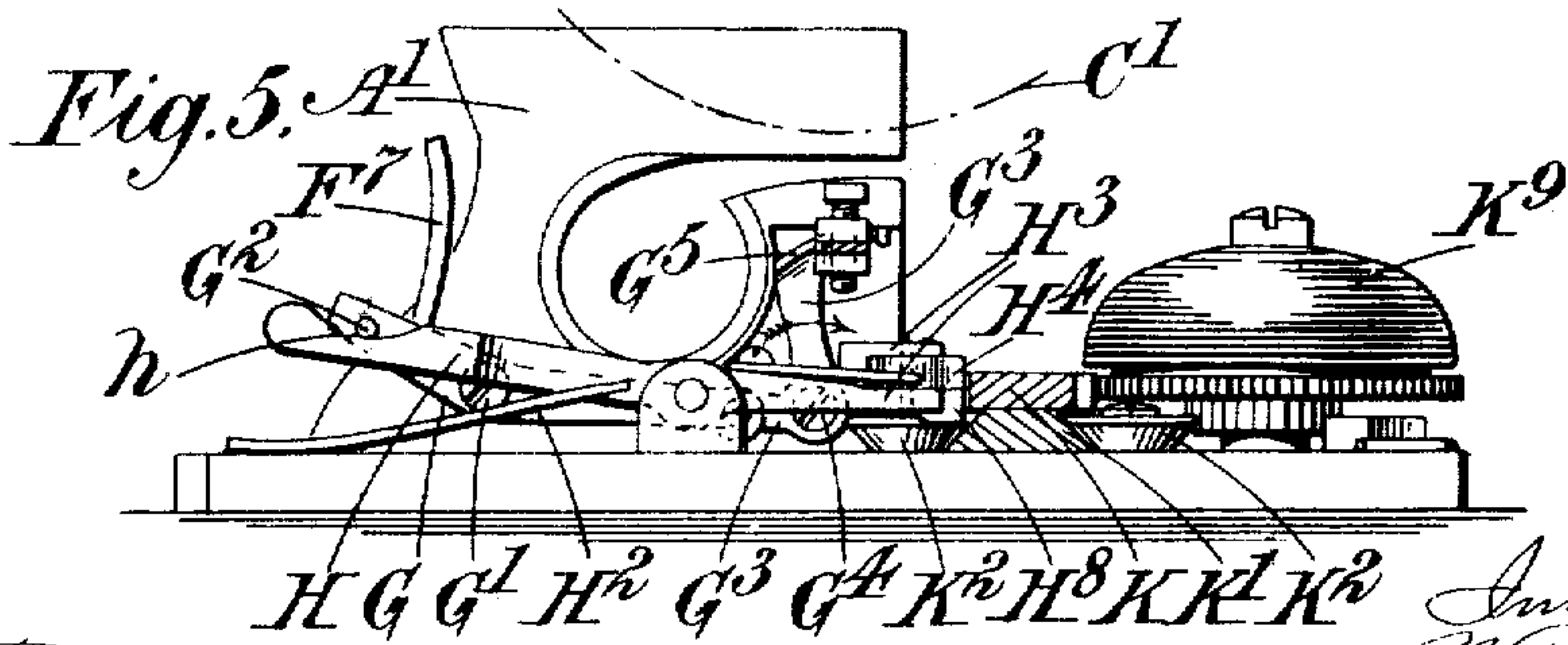
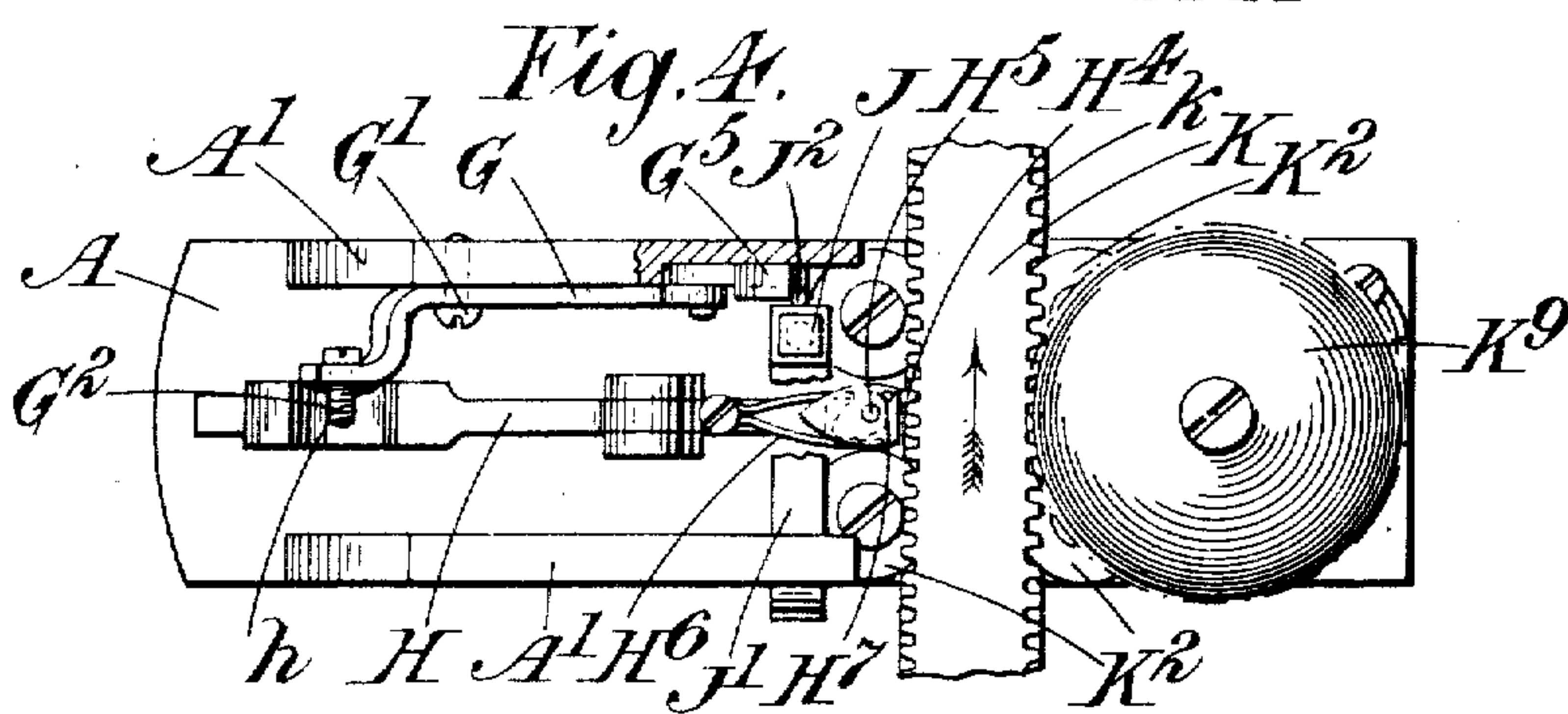
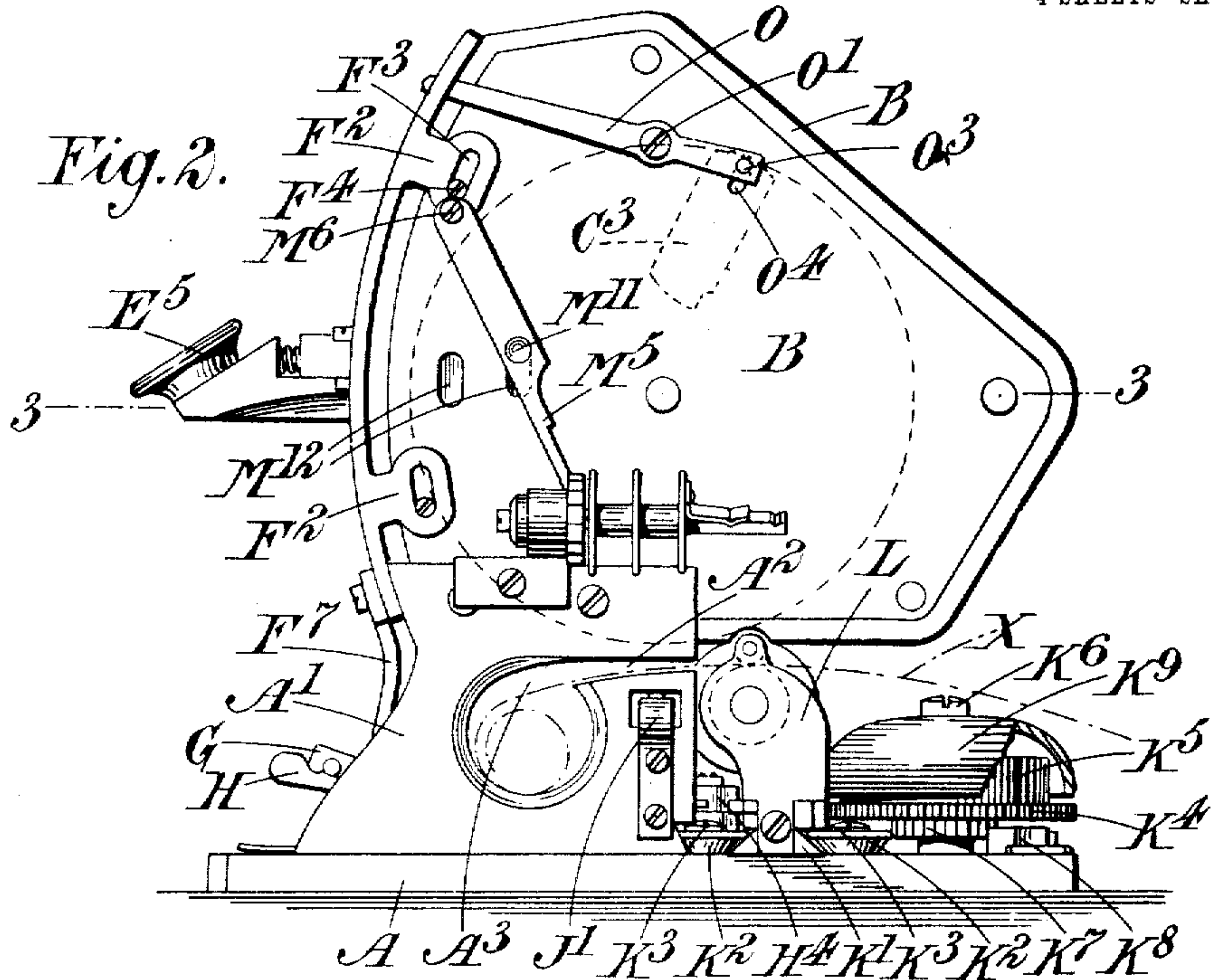


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4 SHEETS—SHEET 2.



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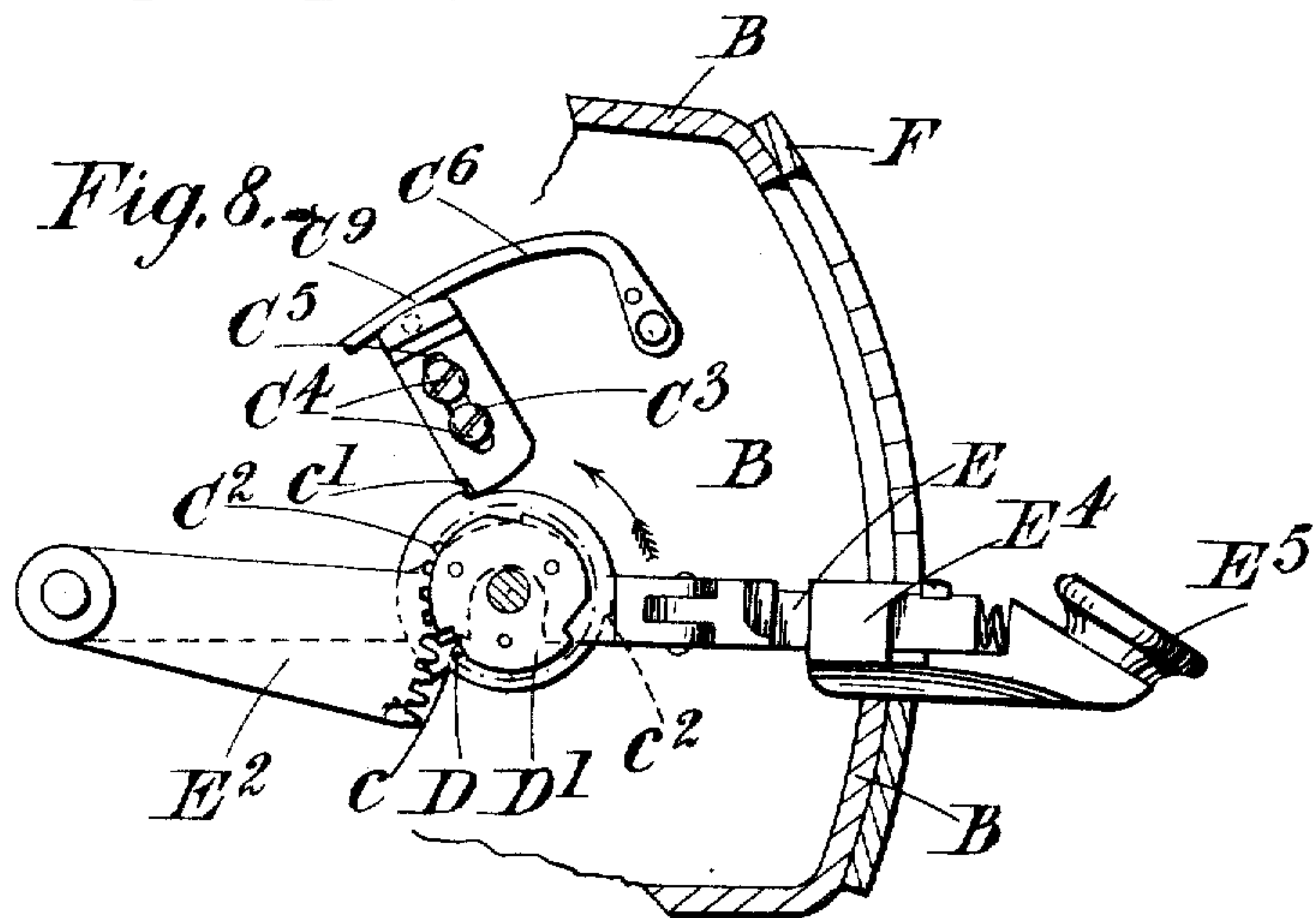
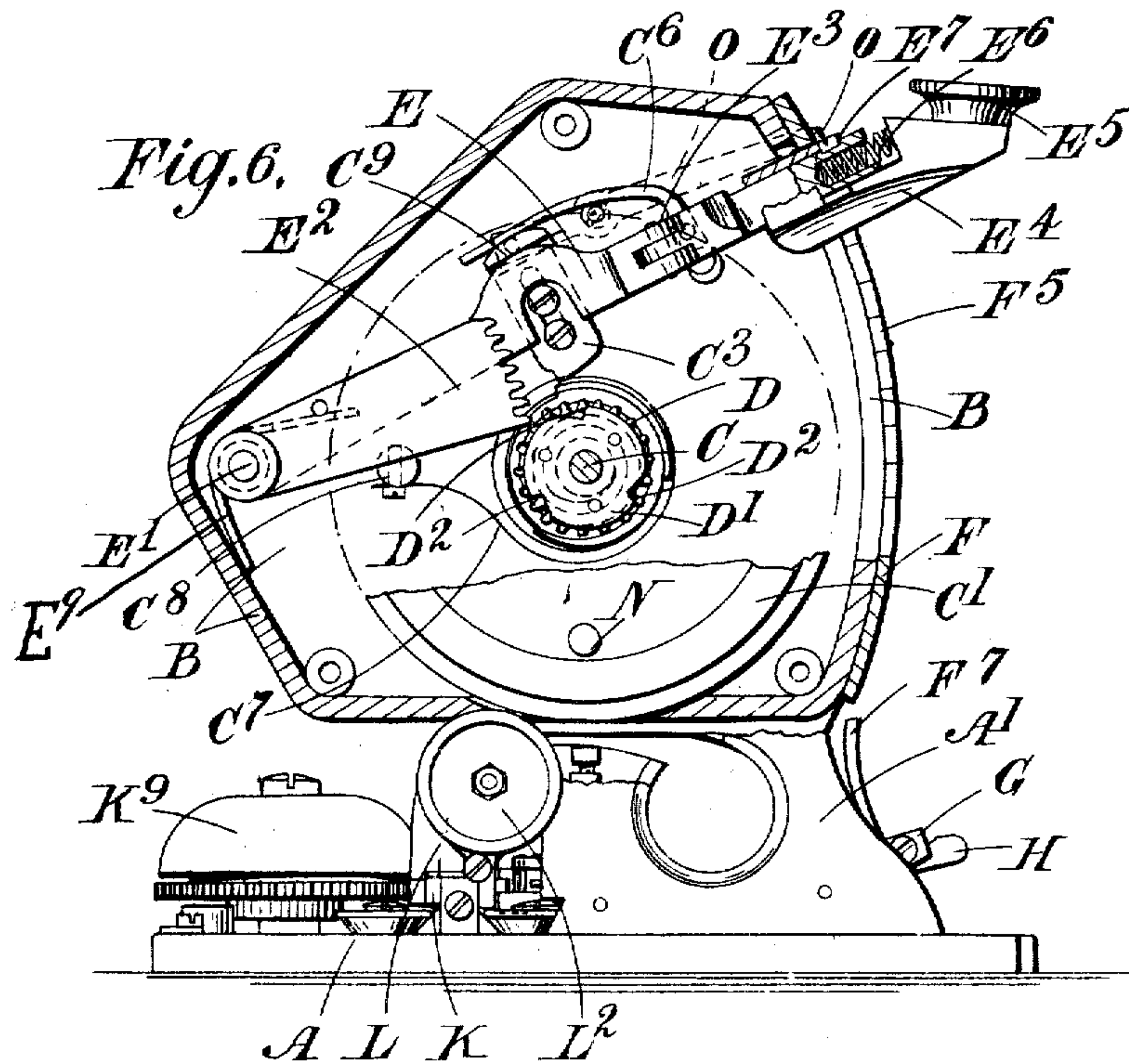
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4 SHEETS—SHEET 3.



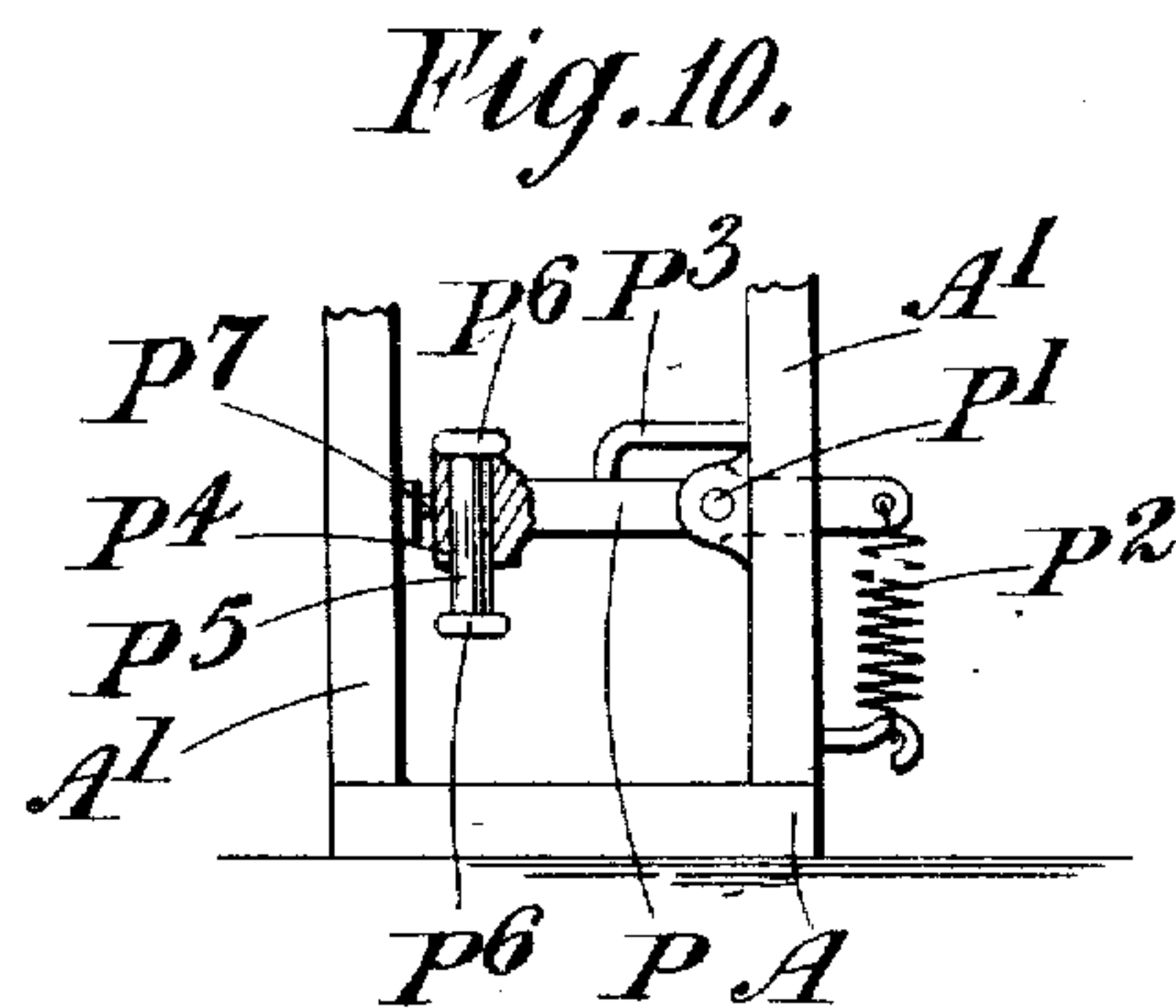
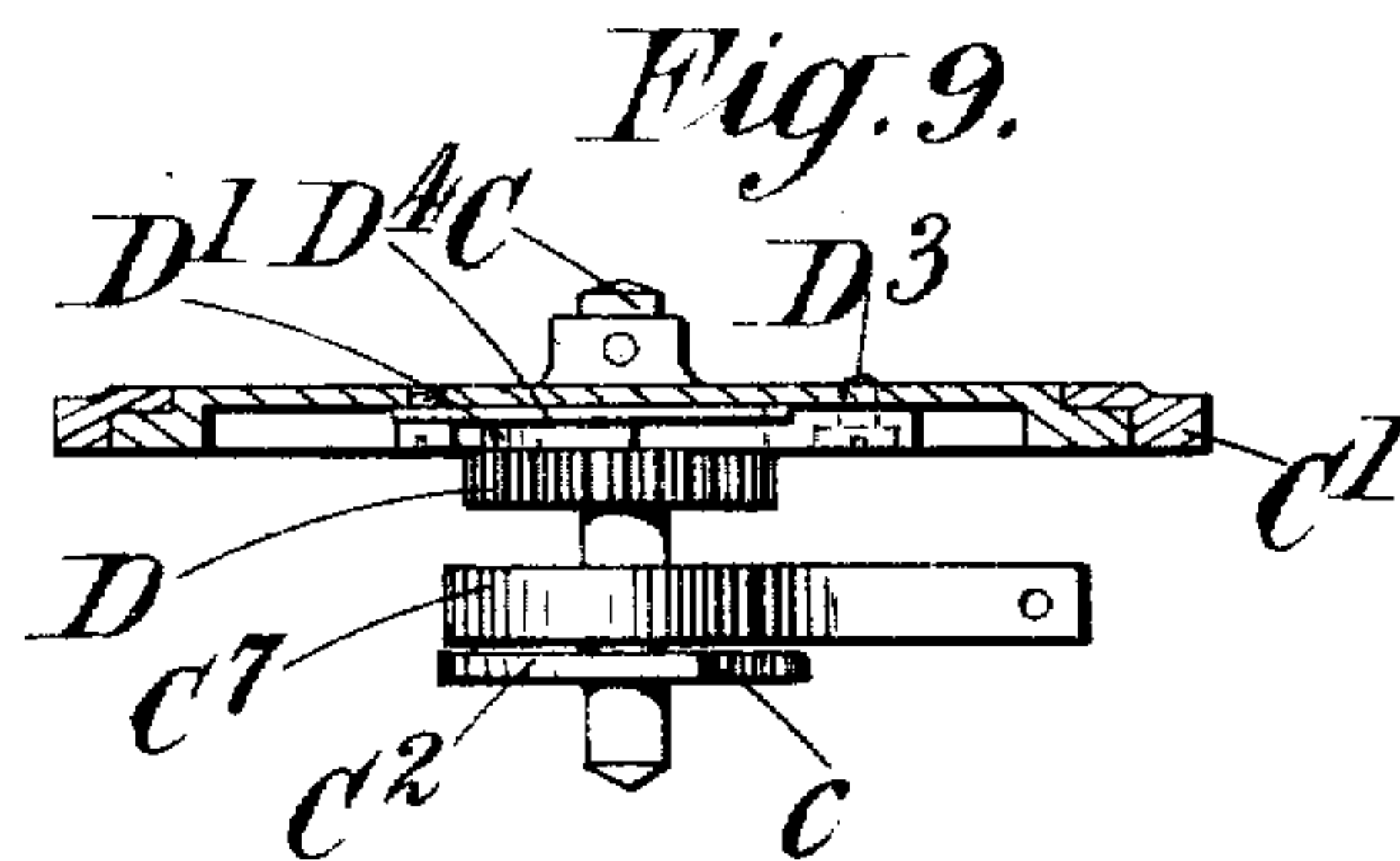
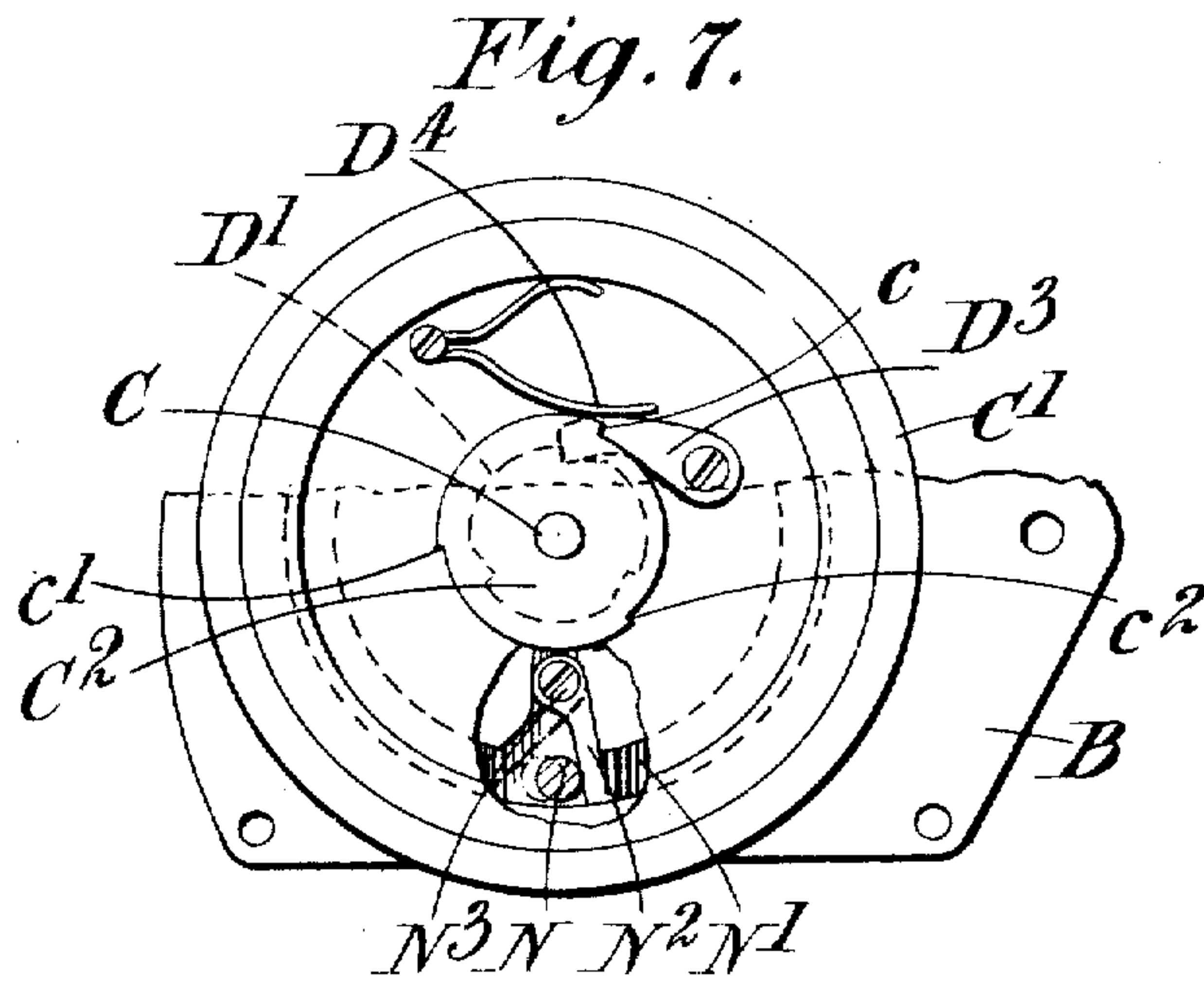
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TYPE WRITER.
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4 SHEETS—SHEET 4.



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UNITED STATES PATENT OFFICE.

NOEL PEMBERTON BILLING, OF LONDON, ENGLAND.

TYPE-WRITER.

No. 911,805.

Specification of Letters Patent.

Patented Feb. 9, 1909.

Application filed March 3, 1908. Serial No. 418,990.

To all whom it may concern:

Be it known that I, NOEL PEMBERTON BILLING, a subject of the King of England, residing at London, England, have invented certain new and useful Improvements in Type-Writers, of which the following is a specification.

This invention is for improvements in or relating to typewriters, and has for its object to provide a compact and simple form of instrument having, if desired, the full range of the more complicated machines at present on the market.

A typewriter constructed according to this invention is provided with a single key whereby mechanism for selecting the character to be printed and printing such character is operated. The same key may also have operative connection with the spacing mechanism, though this latter may be so constructed as to enable it to be operated by means other than the said key if desired.

This invention further consists in the employment with a type disk, that is a disk carrying upon its periphery a series of type characters, of a device whereby the angular position of the disk relatively to its driving member can be changed. Thus the disk may be provided with several groups of characters on its periphery, and by changing the angular position of the disk relatively to its driving member, each of these groups of characters may be brought into printing position as required.

One method of changing the angular position of the disk relatively to its driving member consists in connecting the disk to the operating key referred to by means of a rack and pinion, the rack being carried by the key and the pinion engaged with the disk by some convenient form of one-way-clutch. The disk is spring-controlled and has rigidly secured to it, or to a part connected with it, a stepped cam that coöperates with a spring-controlled detent. That portion of the cam which lies between any two steps is made to correspond to one of the groups of characters on the disk and the detent is arranged to come into operation at given angular positions of the disk, that is to prevent backward movement of the cam beyond that step which it has last passed. It follows therefore that when the key is depressed, the disk will be rotated and, so long as it is not turned through such an angle that one of the steps on the cam is

brought past the detent, it can return under the action of its spring so that any character lying within the angle of movement thus allowed can be brought opposite the printing point. When, however, the disk has been turned through such an angle that one of the steps on the cam is brought past the detent, the detent will prevent return of the disk beyond this step so that the key when released rises without rotating the disk and now any further operation will be carried on with the group of characters lying within that portion of the disk that corresponds to that section of the cam plate that extends from the step to which the disk has been advanced and the next step on the cam.

To determine the degree of displacement of the operating key, and consequently the angular movement of the disk for the purpose of bringing any one character opposite the printing point, a stepped plate is employed, so that by entering the key in any one step, the positioning relatively to the printing point of the particular character allotted to that step is insured. This stepped plate may be mounted movably upon its support and connected with a striker whereby the printing may be effected; also the striker mechanism may coöperate with a spacing device so that the same movement of the plate which effects the printing may effect the spacing.

In addition to the devices described above, this invention includes features described hereinafter in detail with reference to the drawings.

In the accompanying drawings, which illustrate one method of carrying out the invention:—Figure 1 is a front elevation of the typewriter; Fig. 2 is a side elevation of the same; Fig. 3 is a plan in section on the line 3—3 of Fig. 2; Fig. 4 is a plan of the base-plate and the parts mounted thereon, but with the body of the machine removed; Fig. 5 is a side elevation of Fig. 4; Fig. 6 is a section on the line 6—6 of Fig. 1; Fig. 7 is a side elevation of a type-disk and certain parts coöperating therewith, viewed from the right of Fig. 3; Fig. 8 is a side elevation of the operating key and parts immediately connected therewith shown in a different position from that occupied by them in Fig. 6; Fig. 9 is a plan of the type-disk and certain parts connected therewith, and Fig. 10 is a side elevation of a modified construction of striker.

Like letters indicate like parts throughout the drawings.

Carried on uprights A¹ on a base-plate A is a casing B. Pivoted in the side walls 5 of the casing is a spindle C and secured fast on this spindle is a type-disk C¹. The spindle also has fast upon it a stepped cam or disk C². This disk has three steps *c*, *c*¹ and *c*² respectively wherewith a detent C³ 10 is arranged to cooperate. This detent is carried on the inner face of one of the side walls of the casing by screws C⁴ and is slotted at C⁵ to permit endwise movement; a spring C⁶ always maintains the detent in 15 contact with the edge of the disk C².

Free on the spindle C is a pinion D and rigidly secured to the pinion is a ratchet wheel D¹ having three teeth only, indicated at D². The ratchet wheel D¹ lies close to the 20 type-disk C¹ and the latter has pivoted to it a pawl D³ which by means of a spring D⁴ is maintained in engagement with the ratchet.

Pivoted in the side walls of the casing 25 B at E¹ is a lever E and secured thereto or on the spindle carrying the lever is a rack or toothed arm E² adapted to engage the teeth of the pinion D. The lever E is controlled by a spring E³ that normally main- 30 tains the lever in the raised position so that the rack E² lies clear of the pinion D. If, however, the lever E is depressed, the rack engages the teeth of the pinion and rotates it in the direction of the arrow, Fig. 8. As 35 hereinafter described, this movement of the pinion carries with it the type-disk C¹ which latter is controlled by a spring C⁷. One end of the spring is secured to the spindle C carrying the type-disk and the other end is 40 fastened to a stud C⁸ on the inner face of one of the side walls of the casing B. The detent C³ already referred to has on it a lug C⁹ that lies in the path of the lever E and when the lever is forcibly moved to the 45 limit of its upward travel (for the purpose hereinafter described) then the detent is moved back against the action of its spring C⁶ and permits the largest portion of the stepped cam C² to pass it.

50 The forward end of the lever E extends through a slot F¹ in a plate F. This plate is provided with side arms or lugs F² each of which is slotted at F³ to receive a screw F⁴ secured to the casing B. The plate has 55 two of these arms on each side so that between them they embrace the casing and prevent lateral displacement of the plate, while endwise movement of the same relatively to the supporting casing is permitted by the 60 slots F³. The plate F is provided with a series of steps or recesses F⁵ on one side of the central slot F¹ and on the other side it has a corresponding series of steps F⁶ which however are staggered relatively to the steps 65 F⁵. The free end of the lever E is hinged

to the main portion of the lever at E² so that it can move in a direction at right angles to the general movement of the lever about the pivot E¹. It will thus be seen that as the lever traverses the slot F¹ it may be 70 moved to the right or left to enter any one of the recesses F⁵ or F⁶.

On the hinged portion of the lever E an extension E⁴ is carried. This extension is free to slide endwise on the lever and has on 75 it a key E⁵ whereby the lever may be depressed. A spring E⁶ mounted within the end of the lever bears against an opposed projection on the sliding piece E⁴ and thus normally maintains it against a stop E⁷ 80 whereby the movement of this portion in an outward direction away from the casing B is restricted. The sliding piece E⁴ extends over that portion of the lever E which is adapted to come into engagement with the 85 steps F⁵ F⁶ and thus acts as a stop whereby the lever is prevented from coming directly into contact with the step, but when this sliding piece is pushed back against its spring E⁶, it exposes the lever E so that this 90 now comes into direct contact with the step.

The lower end of the plate F carries a downwardly extending arm F⁷ whose end bears upon a lever G pivoted at G¹ to one end of the uprights A¹ on the base A of the 95 machine.

One end of the lever G carries a stud G² that projects over the forward end of a spacing lever H. This lever is pivoted to the base A of the machine at H¹ and is 100 controlled by a spring H² whereby the forward end of the lever is normally maintained in the raised position. The rear end of the lever G is pivoted to a bell-crank lever G³. This lever is pivoted at G⁴ to one 105 of the uprights A¹ and that arm not connected to the lever G carries a cam-piece G⁵.

Situated transversely to the levers G and H is a striker J. This consists of a block 110 carried by a bent spring J¹ and situated directly beneath the type-disk C¹. On one face of the striker J is a projection J² which lies in the path of the cam-piece G⁵.

When the lever G is operated as herein- 115 after described, the bell-crank lever G³ is rocked in the direction of the arrow, Fig. 5, and the forward end of the cam-piece G⁵ is so disposed that when thus advanced it will engage the upper face of the pin J². 120

The rear end of the lever H is made in the form of a jaw H² and pivoted between the limbs of the jaw is a dog H⁴. The dog is pivoted at H⁵ and is controlled by a spring H⁶ which tends to turn the dog clockwise. 125 The dog however, engages the teeth of a spring-controlled rack K whereby it is normally maintained at the limit of its movement in a counter-clockwise direction so that it bears against a stop H⁷. The lower 130

member of the jaw H^3 is also made to take the form of a dog H^8 , which lies vertically below the dog H^4 when the latter is in the position shown in Fig. 4 and also below the rack K.

The rack K constitutes part of the paper-carriage and is free to slide backwards and forwards in an endwise direction upon the base-plate A.

The under side of the rack is shaped to provide a guide K^1 whose edges are beveled to engage correspondingly shaped rollers K^2 . These rollers are situated on opposite sides of the rack and are free to rotate about pins K^3 whereby they are secured to the base-plate A. In addition to the teeth which co-operate with the dogs H^4 H^8 the rack has a second series of teeth k . These teeth engage a wheel K^4 which forms part of a barrel K^5 wherein a spring such as is usually employed for driving the platen-carriage of a typewriter is mounted. One end of the spring is made fast to the barrel K^5 and the other end is made fast to a pin or arbor K^6 . This arbor has fast upon it a ratchet wheel K^7 wherewith a spring-controlled pawl K^8 , pivoted to the base-plate A, co-operates. A bell K^9 is fastened to the arbor K^6 and it will be seen that, by rotating the bell, the arbor and consequently the ratchet K^7 can be rotated, for the purpose of putting any desired amount of tension upon the spring within the barrel K^5 .

On each end of the rack K is an upright L and in the uprights is rotatably mounted a paper feed roller L^1 . The roller is preferably covered with rubber or some yielding material and bears against a rod L^2 . This rod is also carried on the brackets L and may be rotatable, if desired, or it may carry upon it a rotatable sleeve. At one end of the roller L^1 is a milled head L^3 to afford a grip for the purpose of rotating the roller by hand. The roller also carries a toothed wheel L^4 which co-operates with a spring-controlled detent L^5 so that the operator can feel when he has turned the roller through an angle corresponding to one tooth on the wheel L^4 , as will be readily understood.

The paper upon which typing is to be effected is fed in between the roller L^1 and the rod L^2 and passes through a horizontal slot A^2 in the uprights A^1 . This slot communicates with an orifice A^3 wherein the paper fed through the slot can collect.

In Fig. 2 the chain line X indicates the paper and shows the position it takes. It will be seen that the paper passes between the striker J and the lower side of the type-disk C^1 and in order that the character on the type-disk may be printed upon the paper, it is necessary that a ribbon shall pass between the paper and the disk. The ribbon for this purpose is carried upon double spools M M^1 mounted on opposite sides of

the machine and the ribbon passes from one spool through the slots A^2 in the uprights and above the paper and is wound upon the spool on the opposite side of the machine. Each spool is carried on a squared spindle M^2 rotatably mounted in a bracket M^3 secured to the uprights A^1 . The spindle M^2 has fast upon it a ratchet wheel M^4 which co-operates with a resilient pawl member M^5 . The member M^5 is pivoted at M^6 to one of the arms F^2 on the plate F and its lower end is made to take the form of a claw M^7 , Fig. 1, which lies in the path of the teeth of the ratchet wheel M^4 . The pawl M^5 can be swung about its pivot M^6 so that its claw-shaped end is brought out of alinement with the ratchet wheel M^4 .

As already stated, each spool M is double so that it may carry two ribbons, one being wound upon the part m and the other upon the part m' . Each spool carries a spring detent M^8 that engages notches M^9 M^{10} in the squared spindle M^2 . With the spools in the position shown in Fig. 3, the ribbon on the part m' is in the operative position, but if the spools are moved along their spindles so that the spring detents M^8 engage the end notches M^9 , the ribbon on the parts m will be brought into operative position.

The operation of this machine is as follows:—The foot of the paper X is first fed in between the roller L^1 and the rod L^2 on the paper-carriage and then the sheet is fed through to the orifices A^3 in the uprights A by rotating the roller L^1 . The sheet passing through the orifices rolls up upon itself, as indicated in Fig. 2, and when sufficient of the sheet has been passed through so that the point at which writing is to commence lies over the striker J, the paper is in position for writing. The paper-carriage is then advanced to the limit of its movement in the direction of the arrow, Fig. 1. The spring in the barrel K^5 has already been set up to the required degree of tension by rotating the bell K^9 and the movement of the paper-carriage to the right rotates the wheel K^4 in such direction that further tension is put upon the spring. The lever E having been released, is in the position shown in Fig. 6 and to print any desired character on the paper it must be depressed and entered in one of the recesses or steps F^5 or F^6 of the plate F.

In Fig. 1 one of the steps F^5 is marked Q U and each step similarly has two characters allotted to it. Supposing now, the lever is depressed to the step marked Q, the rack E^2 , which moves with the lever, will engage the teeth of the pinion D and rotate the pinion in the direction of the arrow, Fig. 8. The pinion however carries with it the ratchet-wheel D^1 wherewith the pawl D^3 on the type disk C^1 is in engagement. The teeth on the ratchet-wheel and the pawl D^3

are so set that when the wheel is rotated in the counter-clockwise direction, the type-disk is carried round with it. The characters on the type-disk are so disposed that that character corresponding to the particular step in the plate F with which the lever is brought into engagement will lie approximately opposite the striker J when the disk C¹ has been rotated through an angle corresponding to the amount of displacement of the lever for the purpose of engaging it with that particular step. Thus if the lever is depressed to the level of the step Q, the character Q on the disk will lie approximately opposite the striker. The forward end of the lever is now swung about its hinges E² so that it enters the recess or step, whereupon further depression will carry with it the plate F and complete the positioning of the character Q. This plate F is maintained in the raised position by the spring H² operating upon the spacing lever H. This lever in turn maintains the forward end of the lever G raised by means of its engagement with the stud G² thereon and as the depending arm F¹ on the plate F is in contact with the forward end of the lever G the plate F is also maintained in the raised position. It follows, therefore, that as the plate F is depressed, the lever G is rocked so that the bell-crank lever G² is rocked in the direction of the arrow, Fig. 5, this causes the cam-piece G³ to pass over the pin J² on the striker J and in so doing it depresses the striker against the action of its spring J¹. The cam-piece G³ however passes beyond the pin J² so that the striker is released from the lower end of the cam-piece and thus suddenly rises under the action of its spring J¹. The sudden release of the striker causes it to fly beyond its normal position with the result that it strikes the under side of the paper and forces this towards the type-disk C¹. The ribbon as already described lies between the paper and the type-disk, so that that character which lies opposite the striker at the moment of its release is printed by means of the ribbon upon the paper.

It will be understood that any suitable guide may be provided for the ribbon so that it does not come into contact with the paper except at the moment of printing and then only at that point opposite the character to be printed.

As stated, each step corresponds to two characters and if it is required to print say U instead of Q the operator when bringing the lever into the step F² corresponding to Q and U, also imparts endwise pressure to the key E² so that the part E⁴ which slides on the lever is moved endwise towards the casing B against the action of the spring E³. This carries the underside of the sliding step E⁴ clear of the step and permits the lever E itself to directly engage the step. The

displacement of the step thus allows the lever to descend lower, although engaging the same step, and this difference of movement is sufficient to bring the next character on the type-disk into operative position. As the key E² is released the spring E³ returns the lever E to its normal position and the rack E² returns the pinion D while the spring C² which controls the type-disk C¹ causes the latter to follow the movement of the pinion and maintains the pawl D² in engagement with the ratchet wheel D¹.

The disengagement of the lever E from the step in the plate F frees the plate and permits the levers H and G to be returned under the action of the spring H². As the lever G returns to its normal position it returns the bell-crank lever G² but in the return movement the lower end of the cam-piece G³ is advanced against the pin J² of the striker J and engages the under side of the same so that the striker is only slightly displaced in an upward direction and does not rise sufficiently to effect any printing.

In addition to the depression of the key E² bringing the character to be printed into printing position and effecting such printing, it also automatically releases the paper-carriage one tooth for the purpose of spacing.

The spacing is effected as follows: As the plate F descends and its depending arm F¹ depresses the forward end of the lever G, the stud G² on the lever carries down with it the forward end of the spacing lever H. This lifts the rear end of the lever so that the spring-controlled dog H⁴ is raised clear of the rack K while the fixed dog H³ engages the tooth from which the spring controlled dog has just been withdrawn. Immediately the dog H⁴ is free of the rack, its spring H² swings it about its pivot H⁵ in a clockwise direction so that it now lies opposite the next tooth on the rack K.

After the printing has been effected and the lever E is released, the spring H² returns the lever H and the parts connected therewith to their normal positions as already stated and the dog H³ is thus again carried down below the rack K while the spring-controlled dog H⁴ is brought into engagement with the tooth next to that with which it formerly engaged. As however the rack K is constantly urged forward in the direction of the arrow, Fig. 4, by the spring in the barrel K², it immediately advances one step carrying with it the dog H⁴ until this is again brought against its stop H⁷. The movement thus permitted to the paper-carriage is sufficient to carry the printed character a distance to the left of the printing point sufficient to allow the next character to be printed beside it in the well-known manner.

If it is desired to advance the paper-car-

riage one or more spaces, as at the end of a word or sentence, this may be effected by bringing the lever into any one recess F^5 F^6 and only partially depressing the plate F , so that no printing takes place, but the lever H is rocked sufficiently to first disengage and then reengage the spring-controlled pawl H^1 . In order that this may be more readily effected, a notch h is provided in the face of the lever H so that the operator can feel when the stud G^2 of the lever G enters the same. This notch is placed in such position that when the stud enters it the lever has been depressed sufficiently to effect the spacing but has not been carried down so far as to effect printing.

As has already been indicated, the type-disk C^1 carries on its periphery three distinct sets of characters, such as capitals, lower case type and figures and each of these sets of characters occupies one third of the circumference of the disk and corresponds to the three portions into which the stepped cam C^2 is divided by the steps c^1 and c^2 . The whole movement of the lever E however, only rotates the type-disk sufficiently to bring any one character of one of the groups of characters into operation, unless the lever is carried down below the last step into the notch F^8 at the bottom of the slot F^1 . Thus, starting with the parts in the position shown in Fig. 6, any character in the first group, say capitals, may be printed by bringing the lever into one or other of the notches F^5 F^6 and while so operating the lever disk C^1 is free to revolve backwards and forwards and the detent C^3 in the meantime slides upon the largest portion of the stepped cam C^2 . If, however, the lever is carried down into the notch F^8 , the disk C^1 is carried so far round that the stepped cam C^2 , which moves with it, is brought round to such a position that the step c^1 passes the detent C^3 , as shown in Fig. 8. The release of the lever E now returns the pinion D as before, but the type-disk is prevented from returning by the detent C^3 so that the teeth on the ratchet wheel D^1 slide under the pawl D^3 instead of the latter following the same round as before. It will thus be seen that when the lever has arrived at the raised position, the angular position of the type-disk has been changed relatively to the driving member, that is the pinion D , and the pawl D^3 now engages the tooth on the ratchet wheel next to that which it formerly engaged. If now the lever E is depressed, it operates the type-disk as before but a different group of characters, for example the lower case type, is carried backwards and forwards over the printing point while the detent C^3 slides over that portion of the stepped cam which lies between the steps c^1 and c^2 .

A second depression of the lever E down

to the bottom notch F^8 in the plate, will carry the type-disk round to its third position so that the step c^2 passes the detent and figures can be written, while the detent slides on that part of the stepped member which lies between the parts c and c^2 .

To return the type-disk to its first position it is only necessary to press the lever E upwards so that the detent C^3 is moved against the action of its spring C^6 and lifted clear of the stepped cam C^2 when the spring C^7 will immediately rotate the disk back to its normal position. If the lever is not lifted to the full limit of its upward movement, the detent C^3 may be displaced a sufficient distance only to allow the return of the disk until the step c^1 engages the detent so that lower case type are again in operation, instead of returning to capitals, should this be desired.

The degree of lift is determined by the sliding stop E^4 whose upper face normally engages the upper end of the slot F^1 in the plate F when the lever E is lifted. In such case the lever E can only be lifted a sufficient distance to return the type-disk to the middle position by lifting the detent C^3 over the step c^2 but if it is desired to return to the first position the key E^5 is pushed towards the casing B whereby the upper face of the stop E^4 is carried clear of the plate F and thus the additional degree of lift required to carry the detent C^3 over the step c^1 is permitted.

To limit the return movement of the disk C^1 , a pin N is mounted on the disk and the inner face of one wall of the casing B is recessed at N^1 (Fig. 7) to admit this pin without interfering with the free movement of the disk. Sunk in a recess in the same wall of the casing is a movable stop N^2 pivoted at N^3 and the recess wherein this stop is received is of such width as to allow the stop to move from one side to the other a sufficient distance to permit a complete rotation of the disk C^1 .

It will thus be seen that when the type disk is allowed to return to its first position the pin N is brought against one side of the stop N^2 and carries the same over to the limit of its movement in one direction whereas when typing is being effected with the type-disk in the third position, the disk can be rotated until the pin N has been brought against the other side of the stop N^2 and has moved the latter over to the left, as indicated in chain line in Fig. 7.

In order that the operator may always know which group of characters is in the operative position, a pointer O is pivoted at O^1 to the casing and extends through a slot O^2 in the plate F . The plate is marked as at 1, 2 and 3, and the end of the pointer is brought opposite one or other of these indications according to the group of characters

in operation. The movement of the pointer is effected by the detent C^3 which carries a pin O^3 . This pin projects through a slot O^4 in the wall of the casing and is engaged with the free end of the pointer O . It thus follows that as the detent drops over one or other of the steps on the stepped cam C^2 , the pointer will be correspondingly moved.

Although, as has been stated, spacing as well as printing may be effected by the key E^3 , spacing may be separately effected, if desired, by the operator placing his finger direct upon the forward end of the lever H instead of depressing this through the medium of the key E^3 and the plate F ; moreover the lever may be depressed by this means a sufficient distance to lift the fixed dog H^3 above the rack E so that the paper-carriage can be withdrawn from the machine.

Any convenient form of stops may be employed with the paper-carriage for the purpose of controlling the marginal position, etc., and any suitable device for ringing the bell K^3 may also be connected with the same but as these details constitute no part of the present invention, it is unnecessary to describe them in this specification.

The operation of the ribbon mechanism is as follows: One of the arms M^2 is placed in position to align with its ratchet M^1 but the other arm is swung on its pivot so that it does not align with the same. As the plate F descends, the arms descend with it, and the free end of that arm which aligns with its ratchet will slide over one tooth of the ratchet so that the claw M^1 will lie below the tooth next to that which it formerly engaged. It follows therefore that as the plate F is released and again rises the claw M^1 on the arm M^2 will rotate the ratchet through the angle corresponding to that occupied by one tooth. The other ratchet and bobbin is free so that the ribbon is wound upon the bobbin which is operated and drawn from the free bobbin. When all the ribbon has been wound off the free bobbin the arm M^2 on that side is put into operation and the first arm M^1 is withdrawn from its engagement with the ratchet. The bobbins are shown double for the purpose of carrying two ribbons as described but obviously single bobbins may be employed if desired.

An embossed stud M^{11} is provided on each arm M^2 and recesses M^{12} are provided in the face of the casing B to receive the stud when the arm is in its operative and inoperative positions. The stud thus serves to retain the arm in whichever position it is placed.

In Fig. 10 a modified form of striker is shown. This comprises a lever P pivoted at P^1 to any suitable support and controlled by a spring P^2 . The spring maintains the lever against a fixed stop P^3 . At the free end of the lever a socket P^4 is provided and free to

slide therein is a member P^5 retained in place by any convenient means, as for instance by enlarging the ends P^6 . The socket carries a pin P^7 which corresponds to the pin J^2 on the striker J and is intended to engage the cam-piece G^2 . With this form of striker the cam-piece as it is advanced will engage the pin P^7 and depress the lever P against the action of the spring P^2 . As soon as the cam-piece has passed over the pin, the lever will be suddenly released and its spring P^2 will bring it forcibly against the stop P^3 . This stop is so arranged that when the parts are at rest the striker lies clear of the paper, but when the lever is brought forcibly against it the movable member P^5 in the socket P^4 flies upward and strikes the under side of the paper so that printing is effected. After printing, the member P^5 drops back by gravity to its normal position clear of the paper as will be easily understood.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a typewriter the combination of, a rotatable type-disk, an impression device co-operating with the disk, driving mechanism that is operative in one direction to rotate the disk through an angle of less than 360° but is free to move in the other direction independently of the disk, a control device that always tends to return the disk, a stop that is inoperative while the disk is reciprocated within given limits but is opposed to a part movable with the disk, means for automatically advancing the stop when the disk is advanced by the driving mechanism beyond this limit to hold the disk against return while the driving mechanism is returned to its position of rest to establish new limits of reciprocation for the disk, means for releasing this stop, means for arresting the disk at any point of its travel, and means for releasing the driving mechanism from the disk when the stop is released, for the purpose set forth.

2. In a typewriter the combination of, a rotatable type-disk, an impression device co-operating with the disk, driving mechanism that is operative in one direction to rotate the disk through an angle of less than 360° but is free to move in the other direction independently of the type disk, a control device that always tends to turn the disk in the reverse sense to that of the operative movement of the driving mechanism, a stepped member movable with the disk, a yieldingly controlled stop co-operating with this member and permitting movement in the direction for advancing the disk but engaging the step that last passed it when the member moves in the reverse direction the distance between the steps corresponding to the angular displacement of the disk by the driving mechanism, means for releasing this stop, means for arresting the disk at any

point of its travel, and means for releasing the driving mechanism from the disk while the stop is inoperative, for the purpose set forth.

5 3. In a typewriter the combination of, a rotatable type-disk, an impression device co-operating with the disk, driving mechanism that is operative in one direction to rotate the disk through an angle of less than 360°
10 but is free to move in the other direction independently of the type-disk, a control device that always tends to turn the disk in the reverse sense to that of the operative movement of the driving mechanism, a
15 stepped member movable with the disk the distance between the steps corresponding to the angular displacement of the disk by its driving mechanism, a yieldingly controlled stop that bears against and advances behind
20 each step as these pass it the steps being guided in such order that as each passes the stop in advancing still covers the return path of those that previously passed it, means for moving the stop away from the
25 stepped member, means for controlling the degree of this movement in order that any one step may be engaged by it as the member returns, means for arresting the disk at any point of its travel, and means for releasing
30 the driving mechanism from the disk while the stop is inoperative, for the purpose set forth.

4. In a typewriter the combination of, a rotatable type-disk whose working face is
35 divided into groups of characters, an impression device co-operating with the disk, driving mechanism that is operative in one direction to rotate the disk through an angle of less than 360° but is free to move in the
40 other direction independently of the type-disk, a control device that always tends to turn the disk in the reverse sense to that of the operative movement of the driving mechanism, a second disk mounted concentrically
45 with the type-disk and having its periphery divided into stepped sections that occupy angular positions corresponding to the groups of characters on the type-disk one step being allotted to each group, the steps
50 being moreover graded so that each successive step is nearer to the center than that which preceded it, a yieldingly controlled stop that bears against the periphery of this member, means for releasing this stop,
55 means for arresting the type-disk at any point of its travel, and means for releasing the driving mechanism from the disk while the stop is inoperative, for the purpose set forth.

60 5. In a typewriter the combination of, a rotatable type-disk whose working face is divided into groups of characters, an impression device co-operating with the type-disk, a pinion that is operative in one direction to rotate the disk but moves freely in

the other direction, a lever, a rack operatively connected with the lever and in engagement with the pinion, a control device that always tends to return the disk, means for arresting the type-disk at any point of its travel, a
70 stepped member movable with the disk the distance between the steps corresponding to the groups of characters, a yieldingly controlled stop that bears against and advances behind each step as these pass it and that
75 has a part that is engaged to release it, by some part movable with the rack, when the rack is moved so far as to carry its teeth out from engagement with the pinion, and means for limiting the return movement of the
80 type-disk thus released from its driving mechanism, substantially as set forth.

6. In a typewriter the combination of, a rotatable type-disk whose working face is
85 divided into groups of characters, an impression device co-operating with the type-disk, driving mechanism that is operative in one direction to rotate the disk but moves freely in the other direction, a control device that always tends to return the disk, means
90 for arresting the type-disk at any point of its travel, a stepped member movable with the disk the distance between the steps corresponding to that occupied by the respective groups of characters on the disk, a
95 yieldingly controlled stop that bears against and advances behind each step as these pass it the steps being graded so that as each passes, the stop, in advancing, still covers the return path of those that previously
100 passed it, a lever for operating the driving mechanism, the yieldingly controlled stop having a part that is engaged to release it, by some part movable with the lever, when the lever is moved beyond a given limit, a
105 check opposed to the lever to limit its movement one of these members having steps thereon, a movable portion on the lever to render one or other of the stepped portions operative according to selection the steps al-
110 lowing such difference in the limiting movement of the lever as will displace the stop a distance sufficient to permit the return of the stepped member that moves with the type-disk one or more steps according to selection,
115 and means for releasing the driving mechanism from the disk while the stop is thus displaced, for the purpose set forth.

7. In a typewriter the combination of, a rotatable type-disk whose working face is
120 divided into groups of characters, an impression device co-operating with the type-disk, driving mechanism that is operative in one direction to rotate the disk but moves freely in the other direction, a control device
125 that always tends to return the disk, means for arresting the type-disk at any point of its travel, a stepped member movable with the disk the distance between the steps corresponding to that occupied by the respective
130

groups of characters on the disk, a yieldingly controlled stop that bears against and advances behind each step as these pass it, the steps being graded that as each passes the stop in advancing still covers the return path of those that previously passed it, a lever for operating the driving mechanism, the yieldingly controlled stop having a part that is engaged to release it, by some part movable with the lever, when the lever is moved beyond a given limit, a check opposed to the lever to limit its movement in this direction one of these members having steps thereon, a movable portion on the lever to render one or other of the stepped portions operative according to selection the steps allowing such difference in the limiting movement of the lever as will displace the stop a distance sufficient to permit the return of the stepped member that moves with the type-disk one or more steps according to selection, means for releasing the driving mechanism from the disk while the stop is thus displaced, a casing inclosing the type-disk with its stepped member and the yieldingly controlled stop, and an indicator operatively connected with the stop and extending through the casing, substantially as set forth.

30 8. In a typewriter the combination of, a rotatable type-disk whose working face is divided into groups of characters, an impression device cooperating with the disk, driving mechanism for imparting such angular movement to the disks as will permit any part of a selected group of characters to be brought to the impression producing position, means for changing the angular position of the disk relatively to its driving mechanism whereby one or other of the groups can be brought into the operative position, a lever for operating the driving mechanism, a member carrying a series of stops disposed in a line parallel to the path of the lever the member being movable by pressure applied to the stops in the direction of movement of the lever, an extension on the lever movable in a lateral direction relatively to the path of movement of the lever and adapted to engage the stops, a spring controlled impression device opposed to the type-disk and held normally free of the same but having a part yieldingly controlled that may advance beyond

the normal position and strike the type-disk, a pivoted member having operative connection with the stop-carrying member and having a cam for engaging the spring-controlled impression device whereby the said device is drawn back against its spring as the stop-carrying member is displaced the cam however being of such length that it passes beyond the impression device and releases the same before the stop-carrying member arrives at the limit of its movement, for the purpose set forth.

9. In a typewriter the combination of, a rotatable type-disk whose working face is divided into groups of characters, an impression device cooperating with the disk, driving mechanism for imparting such angular movement to the disk as will permit any part of a selected group of characters to be brought to the impression producing position, a device for changing the angular position of the disk relatively to its driving mechanism whereby one or other of the groups can be brought into the operative position, a lever for operating the driving mechanism, a member carrying a series of stops disposed in a line parallel to the path of the lever the member being movable relatively to the type-disk by pressure applied to the stops in the direction of movement of the lever for selecting the character, an extension on the lever movable in a lateral direction relatively to the path of movement of the lever and adapted to engage the stops, operative connection between the stop-carrying member and the impression device whereby the latter is advanced towards the type-disk, a paper carriage movable endwise and controlled by yielding means to move in one direction, a longitudinally disposed toothed rack thereon, a rocking member carrying releasing dogs that cooperate with the rack to release this step by step, and means operatively connecting the movable stop-carrying member with this rocking member, substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NOEL PEMBERTON BILLING.

Witnesses:

HARRY B. BRIDGE,
G. G. TALMONDTT.