

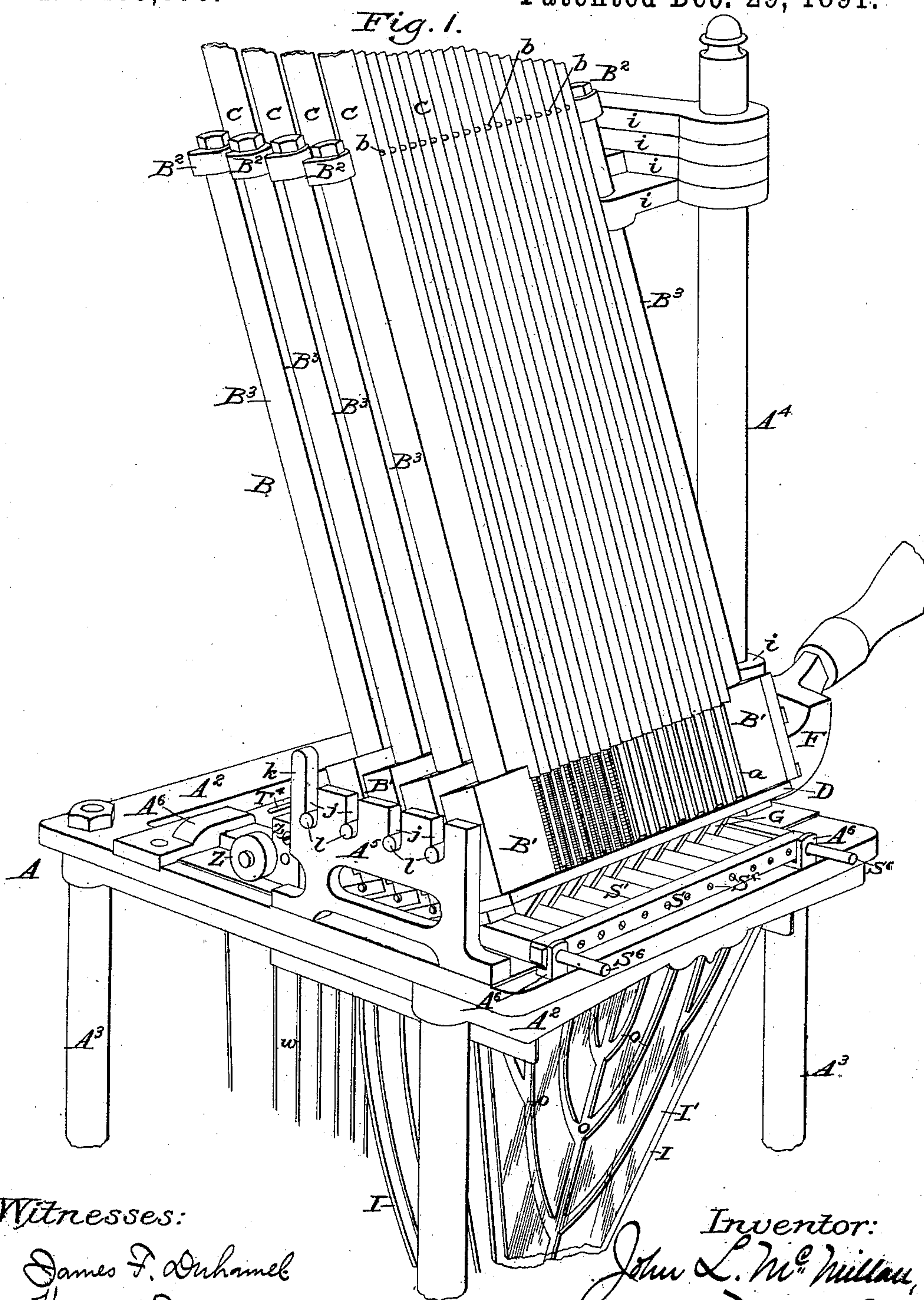
(No Model.)

8 Sheets—Sheet 1.

J. L. McMILLAN.
TYPE SETTING MACHINE.

No. 465,876.

Patented Dec. 29, 1891.



Witnesses:

James F. Duhamel
Horace H. Dodge

Inventor:

John L. McMillan,
by Dodger & Sons,
his Attys.

(No Model.)

8 Sheets—Sheet 2.

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Fig. 2.

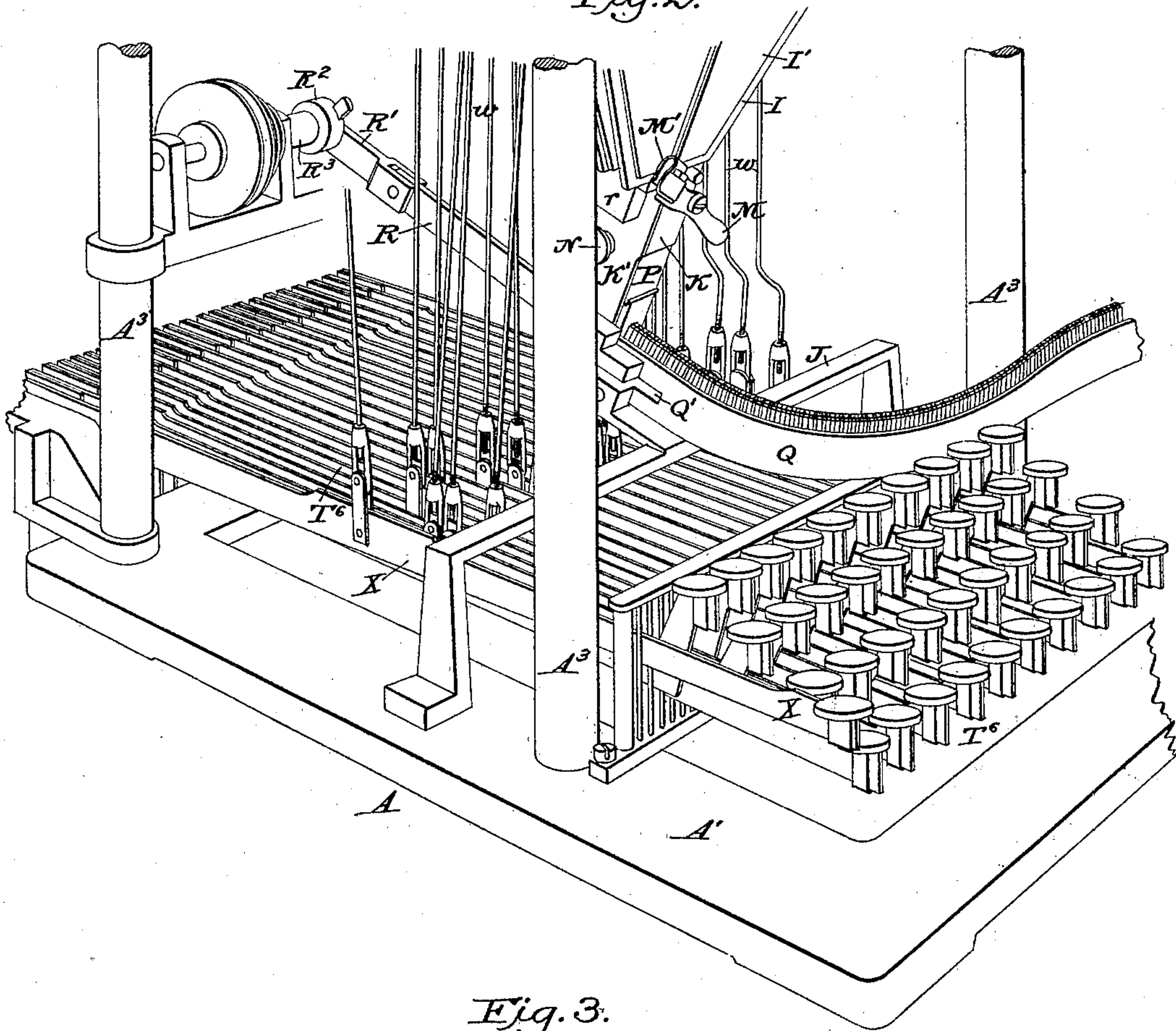
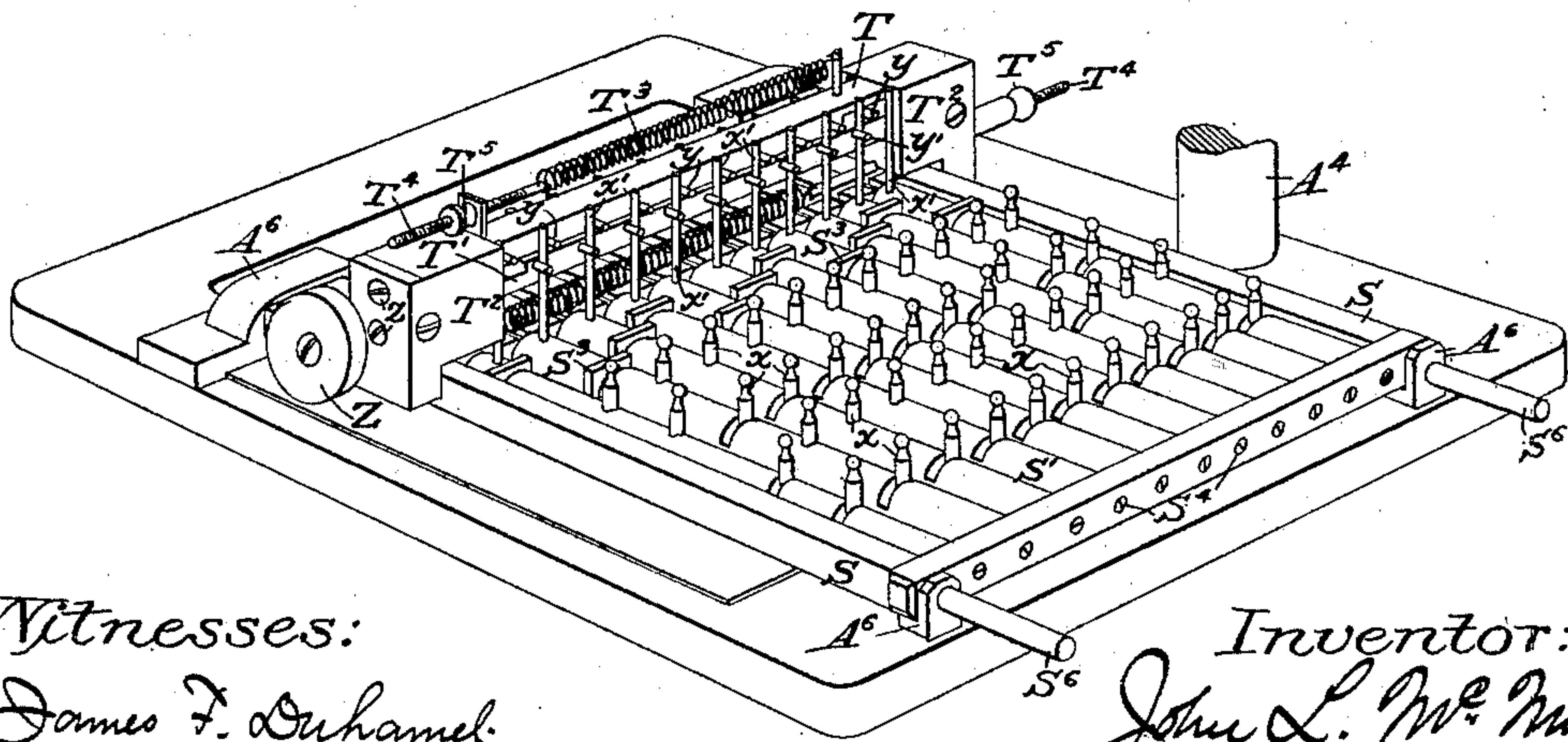


Fig. 3.



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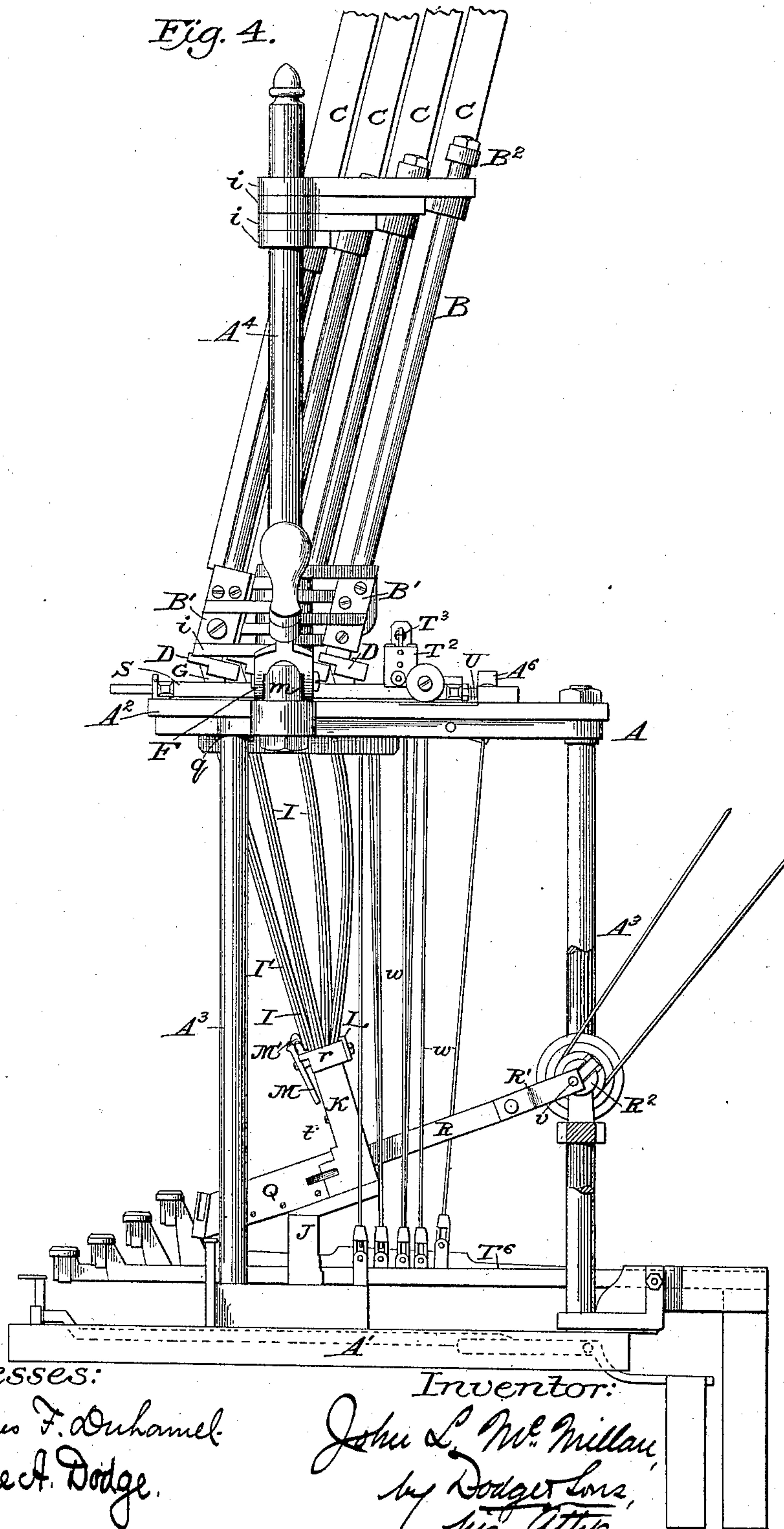
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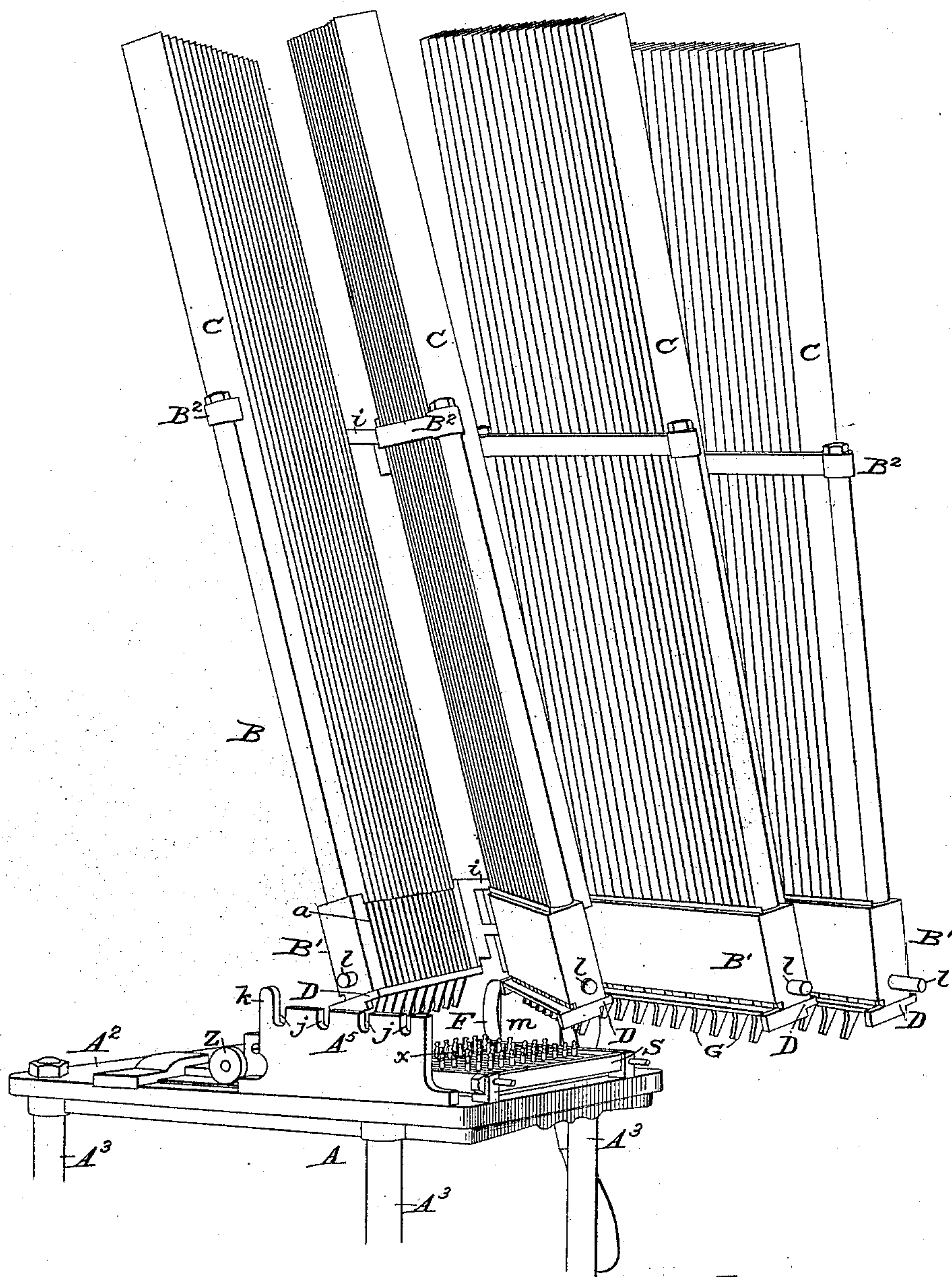
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Fig. 5.



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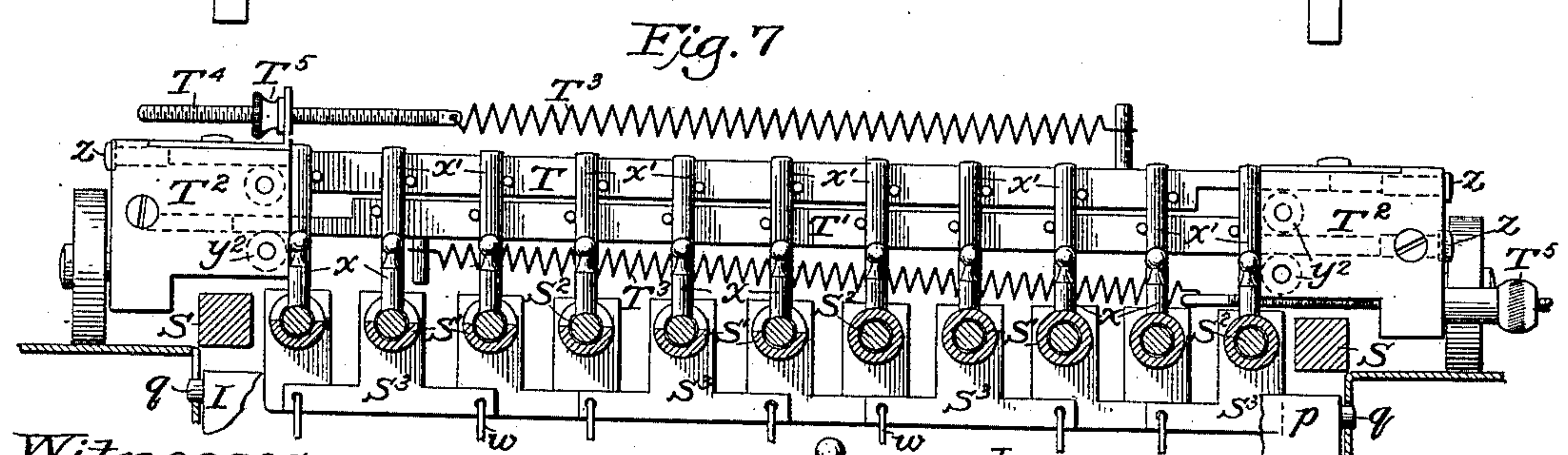
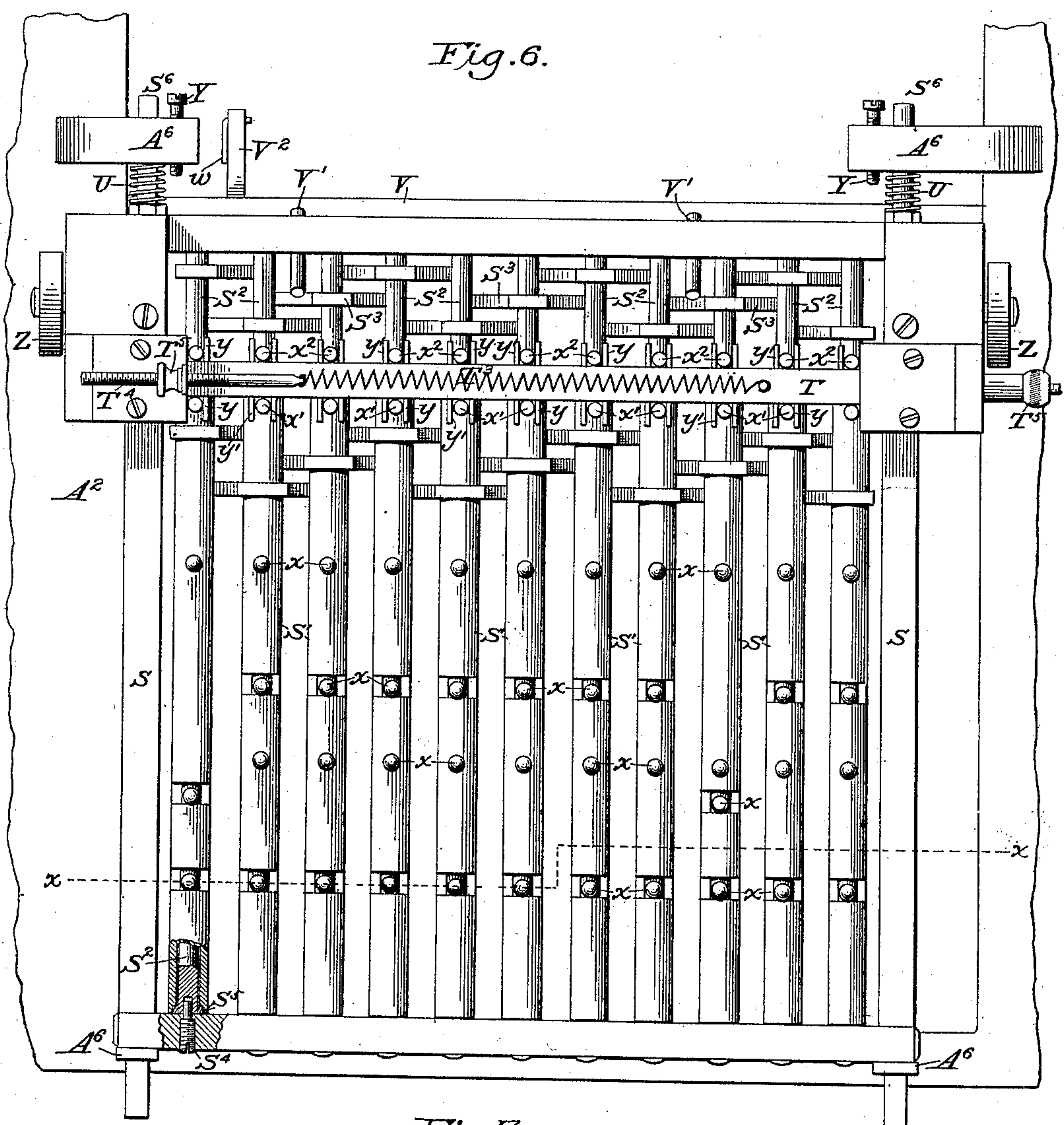
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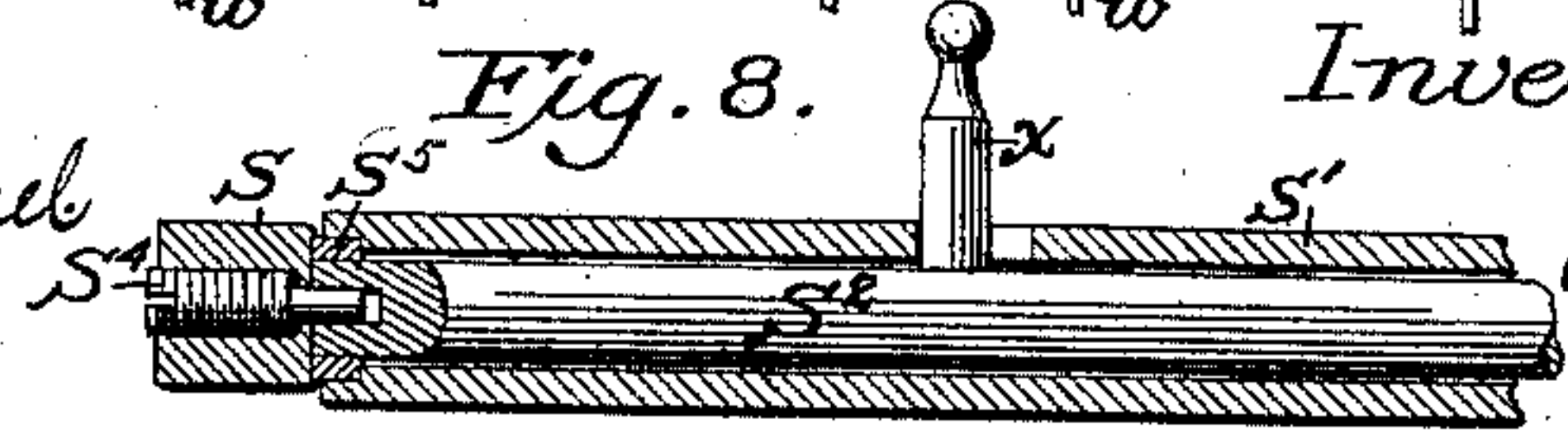
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Fig. 9.

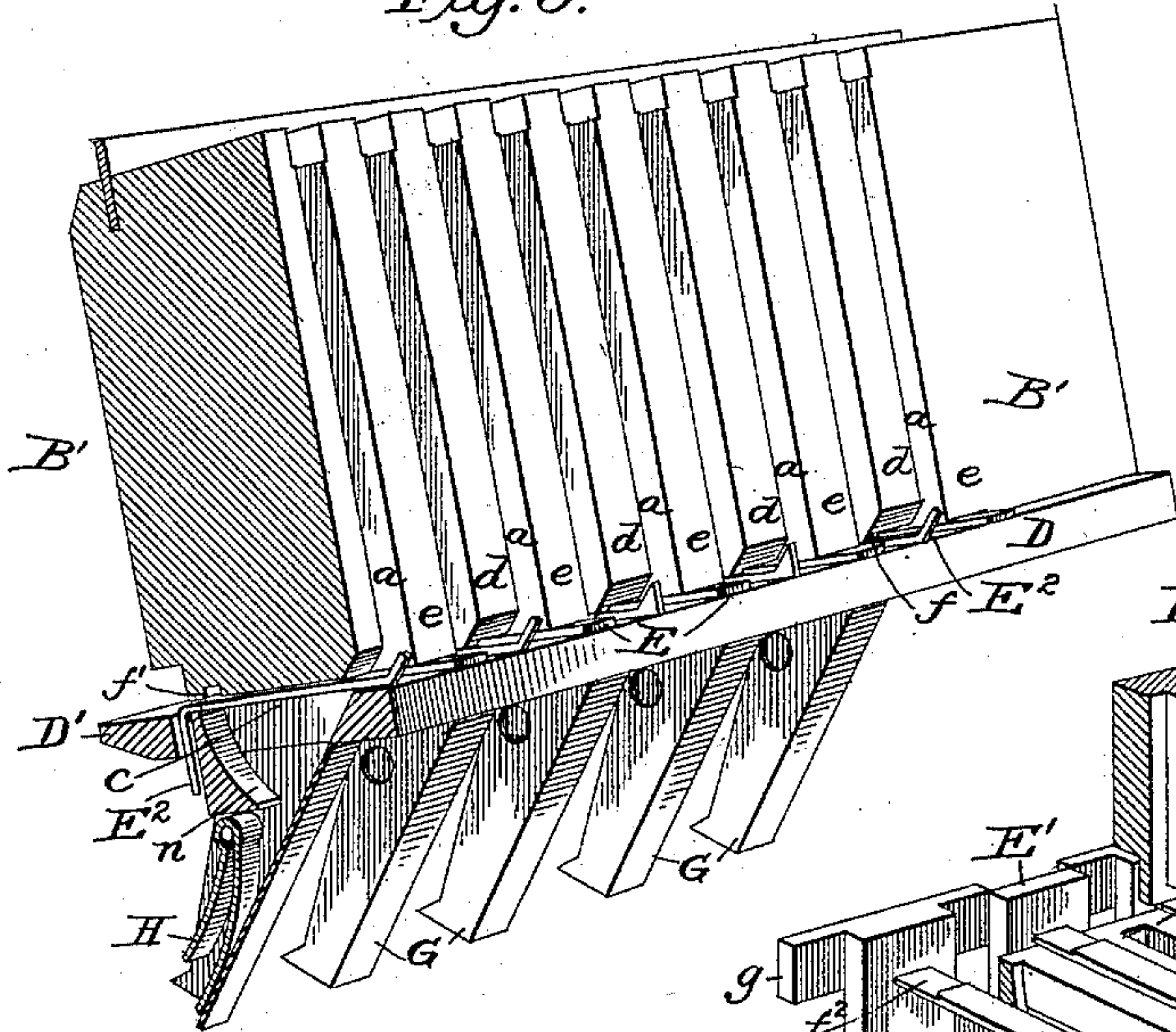


Fig. 13.

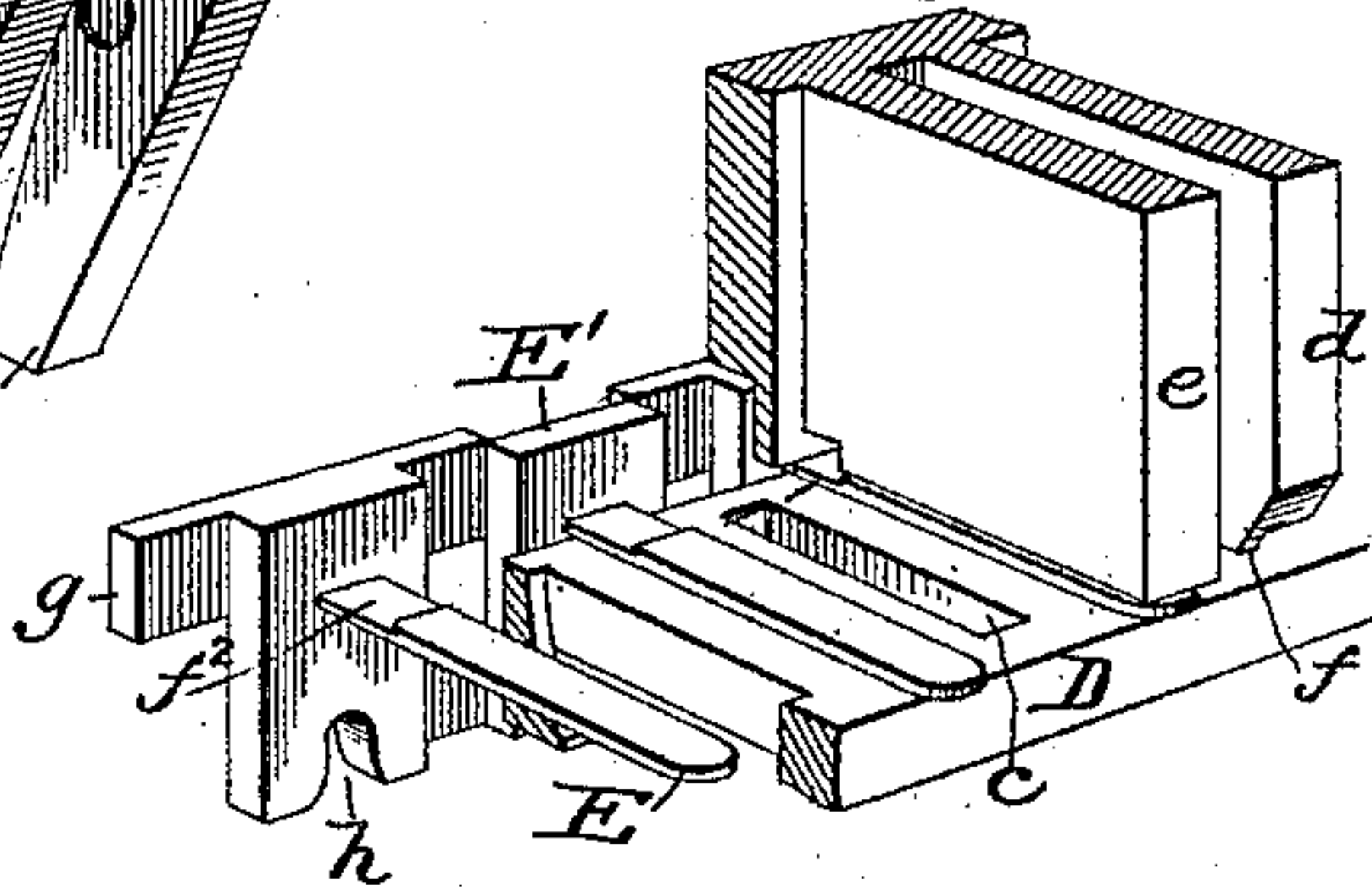


Fig. 10.

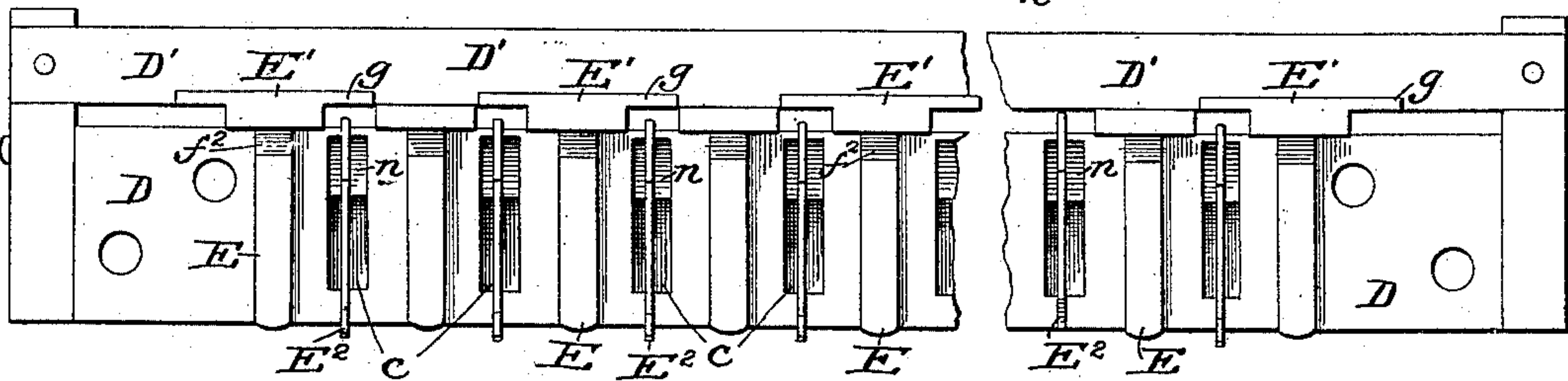


Fig. 11.

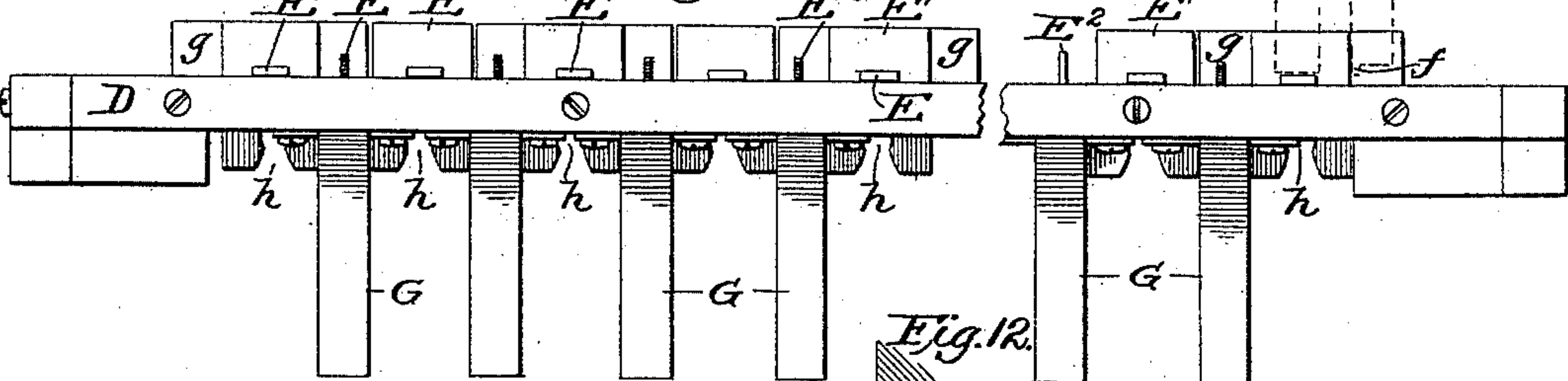


Fig. 12.

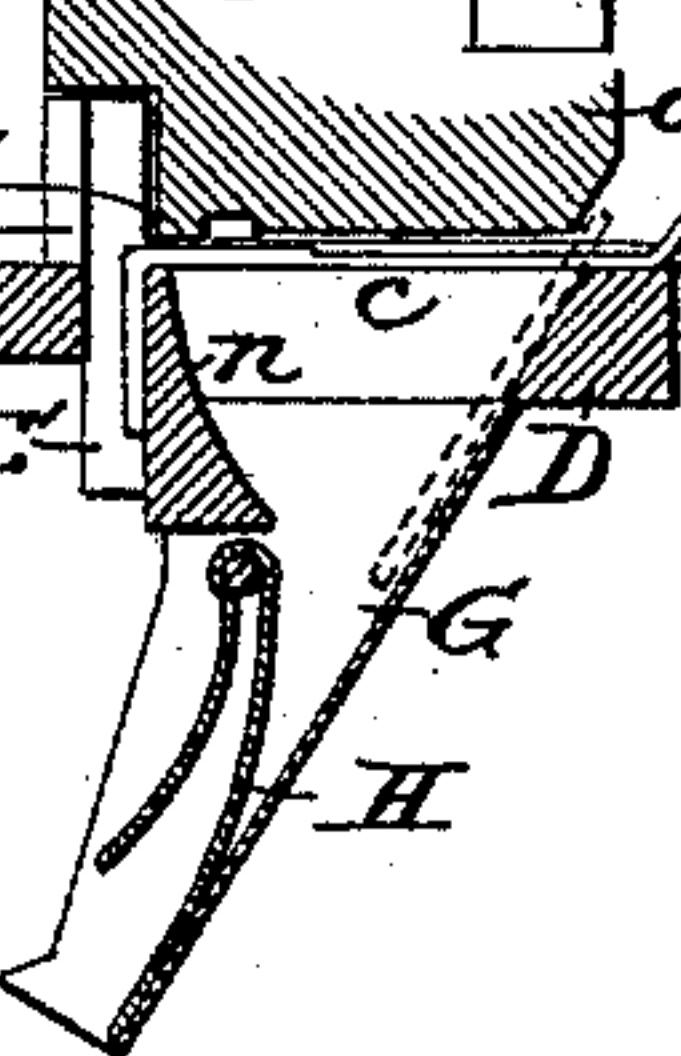
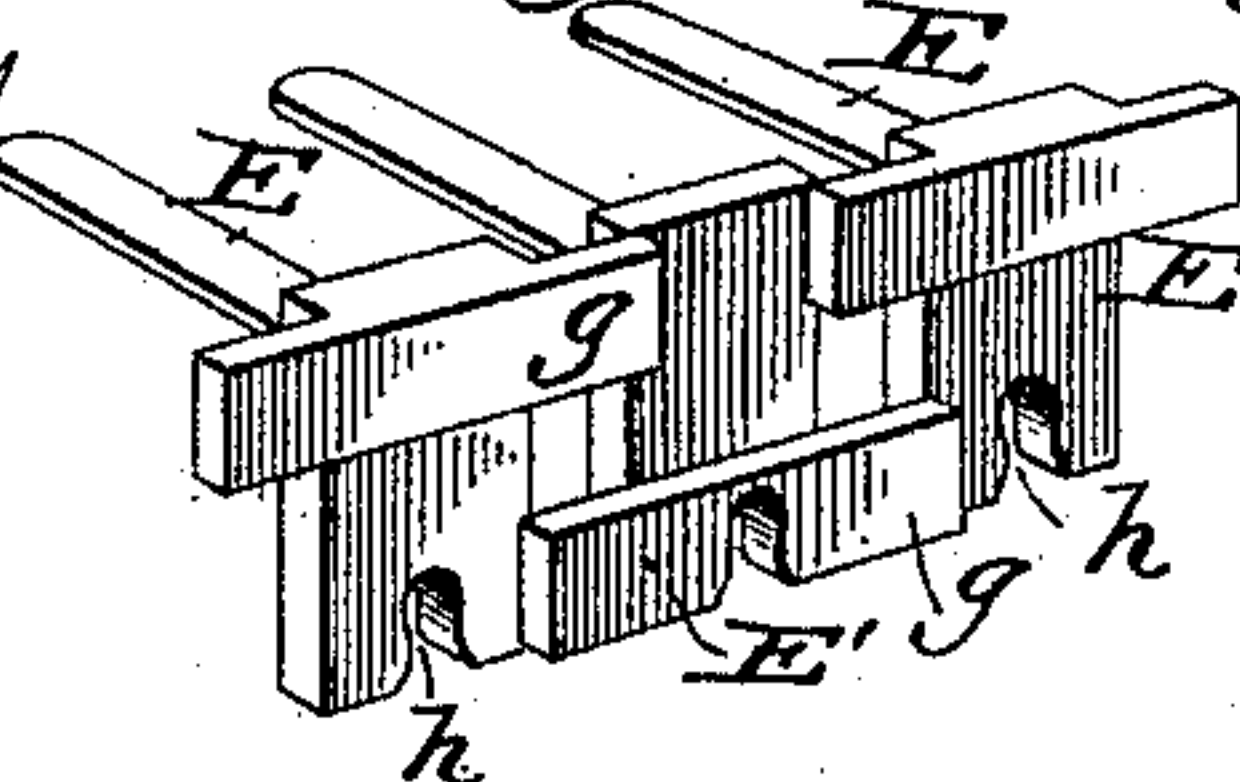


Fig. 14.



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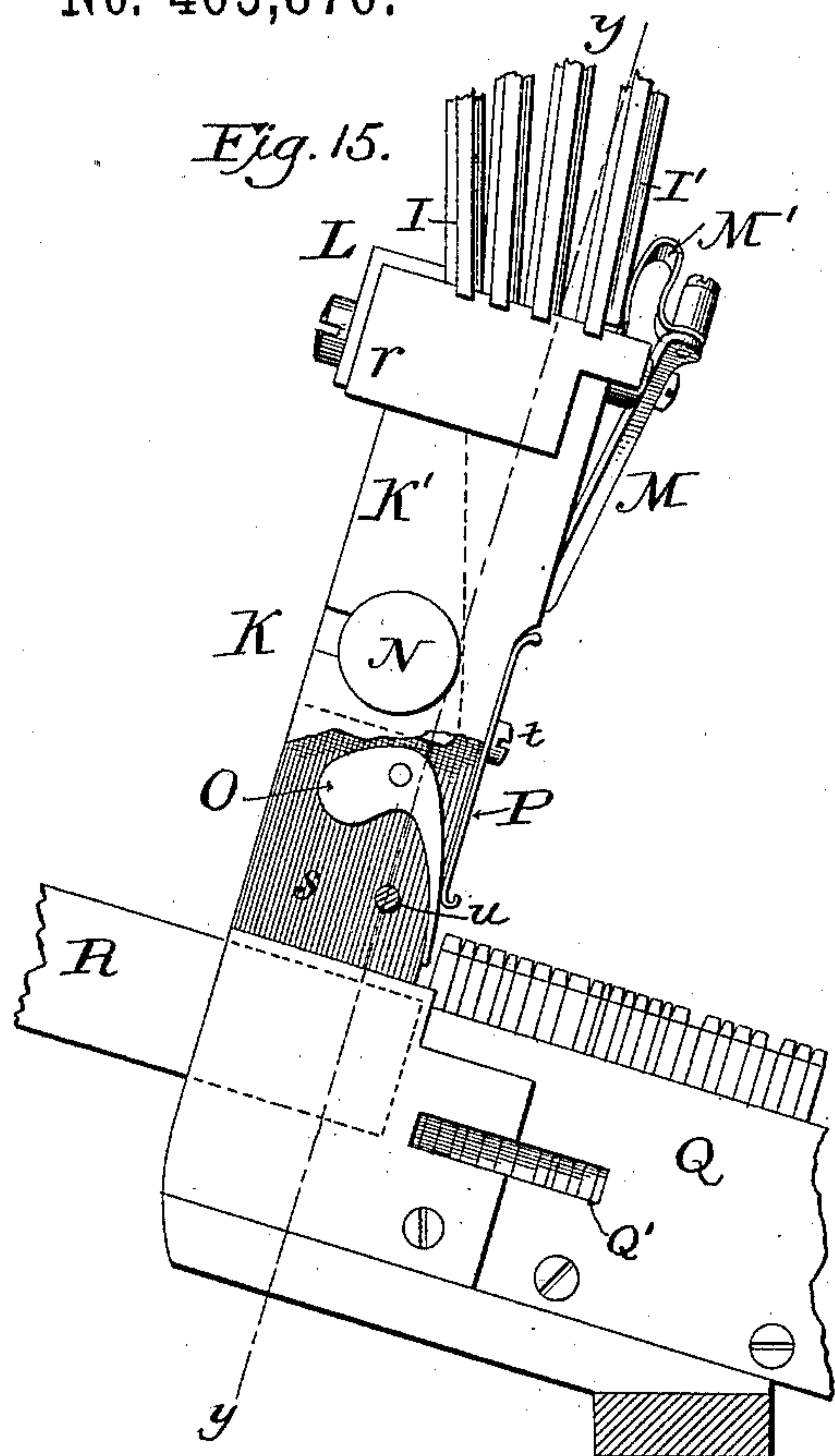
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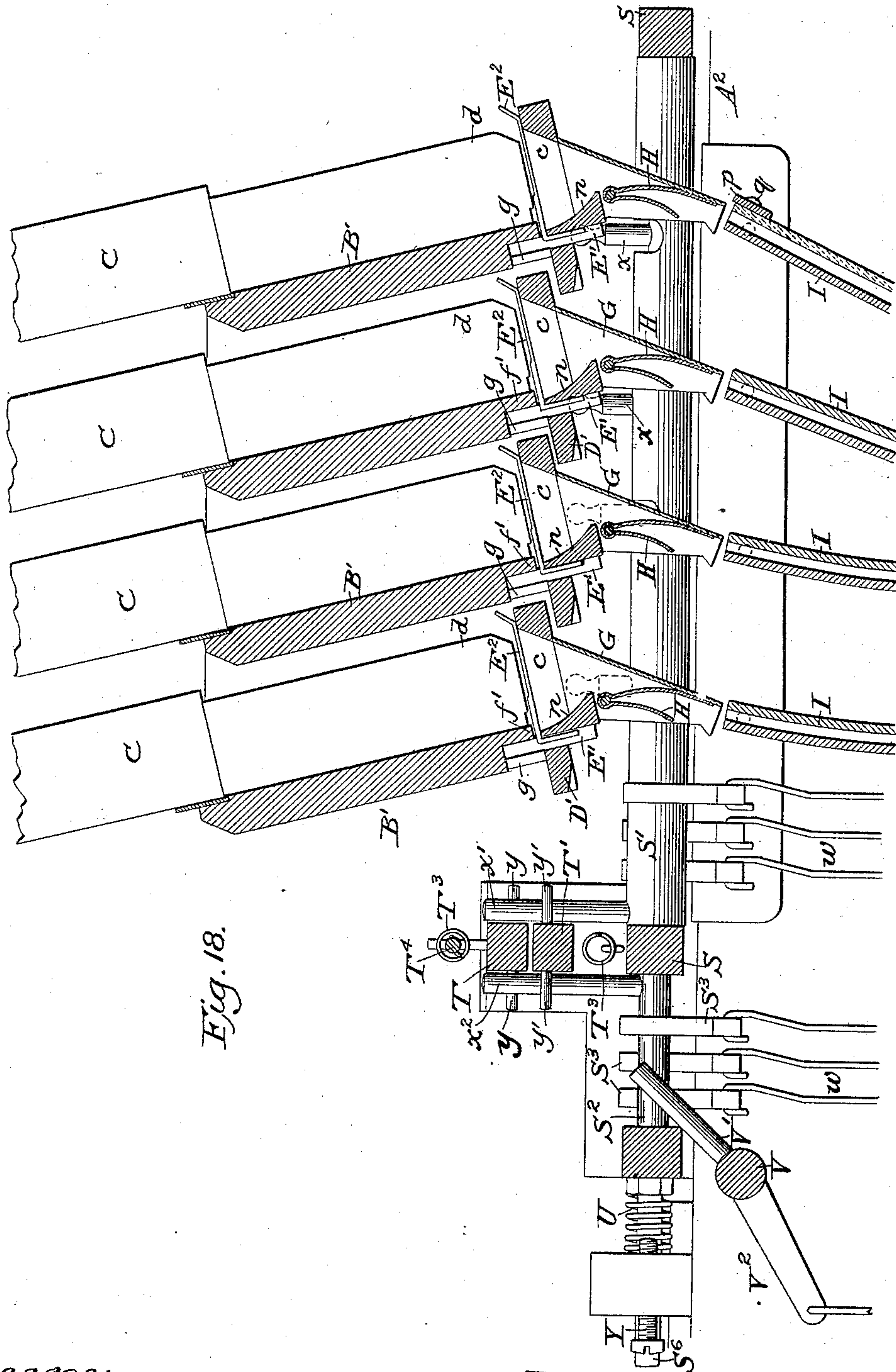


Fig. 18.

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UNITED STATES PATENT OFFICE.

JOHN LOUDON McMILLAN, OF ILION, NEW YORK.

TYPE-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 465,876, dated December 29, 1891.

Application filed November 28, 1890, Serial No. 372,906. (No model.)

To all whom it may concern:

Be it known that I, JOHN LOUDON McMILLAN, a citizen of the United States, residing at Ilion, in the county of Herkimer and State of New York, have invented certain new and useful Improvements in Type-Setting Machines, of which the following is a specification.

This invention relates to machines for setting movable type; and it consists in various original features, new combinations, and details hereinafter set forth, whereby a simple, compact, and highly-efficient machine is produced. In some respects the machine resembles that for which Letters Patent of the United States were issued to John L. McMillan, bearing date of August 17, A. D. 1886, No. 347,626; but in various matters the machine is a radical departure from all prior plans. Among the salient features of novelty and importance may be mentioned the use of a single key-board or set of keys to liberate and eject type from two or more independent sets of cases or reservoirs containing, respectively, upper and lower case type or plain type and Italics. This feature is deemed broadly new, and is intended to be claimed and covered, whether embodied in the precise form hereinafter set forth or in any equivalent form. Thus the type reservoirs or cases may be made movable or adjustable relatively to the releasing and ejecting devices, or the releasing and ejecting devices may be made movable in relation to the reservoirs or cases. So, too, there may under either plan be two, three, or a greater number of positions for the ejecting and releasing devices or for the reservoirs or cases, or both may be made adjustable, so as to multiply the variations possible to be made and increase the number of sets or series of reservoirs or cases controlled by one set of releasing and ejecting devices and one key-board. It is a matter of option or convenience to divide the type reservoirs or cases into groups containing upper and lower case, plain and Italics, thick type and thin ones, letters and figures, punctuation-marks, &c., or upon any other line or basis that may commend itself. In practice it has been found convenient and advantageous to group nearly or all of the upper-case type in one series and nearly all of the lower-case types in the other

series, placing the figures and the punctuation-points, respectively, in one or the other of said groups, and it has also been deemed best to have but two groups and two adjustments. Another prominent and novel feature is the employment of a single ejector between and common to two type cases or reservoirs. Still another feature of novelty is the utilization of one guiding race or channel between and for the accommodation of two type cases or reservoirs. An important feature of construction is the mounting of the type cases or reservoirs and the ejectors in separable frames, whereby access may be readily had to any one of the entire series, yet all may be compactly brought together and so retained normally. This may be effected by hinging the frames to swing together and apart, or they may be arranged to slide laterally, vertically, or facewise, or made separable in any equivalent manner. So, too, in order to give ready access to all the channels or races they are formed in separable plates adapted to be quickly brought together or thrown apart. It is very desirable to so construct and arrange the machine as that it may be readily operated by a large number of persons without long practice, and with this object in view the key-board of a type-writing machine is adopted without change or practically so and combined with the type cases or reservoirs and ejecting devices in such manner that any one familiar with such type-writer key-board may operate the type-setter with nearly or quite the same facility as a type-writer. In this way the machine is at once made available for general use, owing to the great number of expert type-writer operators to be found in all cities and towns. These and various other matters more fully explained further on give the machine great practical value and utility.

Referring now to the drawings, Figure 1 is a perspective view of the upper part of the machine; Fig. 2, a perspective view of the part immediately below, the two being separated to permit them to be made large enough to clearly show the parts; Fig. 3, a perspective view of the ejecting devices and of the shifting frame or carriage by which they are caused to act in conjunction with one or another group of type cases or reservoirs; Fig. 4, a side elevation of the machine complete;

Fig. 5, a perspective view showing the case or reservoir carriers separated; Fig. 6, a top plan view of the ejecting devices and shifting frame or carriage; Fig. 7, a vertical section on the line xx of Fig. 5; Fig. 8, a sectional view illustrating the manner of mounting, supporting, and centering the solid and the tubular rods, which carry the ejecting pins, studs, or fingers; Fig. 9, a sectional perspective view of one of the blocks which receive and sustain the type cases or reservoirs and of the chutes beneath the block, through which the types pass to the races or channels; Fig. 10, a top plan view of one series of ejectors, showing, also, the plate upon which they are supported and move and the mouths of the chutes just referred to; Fig. 11, a front or face elevation of the same; Fig. 12, a transverse sectional view taken through one of the chutes; Fig. 13 and 14, perspective views of several of the ejectors; Fig. 15, a side elevation, partly in section; and Fig. 16, a section on the line yy of Fig. 15, showing the construction and arrangement of the gravitating gate or follower, which prevents the turning of the type; Fig. 17, a view illustrating the construction and manner of mounting or hanging the race-plates, and Fig. 18 a vertical section from front to rear through the main working parts.

Before entering upon a detailed description of the machine it is proper to mention that the construction of the frame-work, and in many instances the mechanical appliances employed are susceptible of considerable modification or variation, the drawings and description setting forth the construction which has been actually adopted in practice and which has given excellent results.

Referring now to the drawings, and more particularly to Figs. 1, 2, 4, and 5, A indicates the main frame of the machine, composed of a bed plate or base A^1 , an elevated open frame or platform A^2 , supported by upright posts or columns A^3 , connecting the base-plate A^1 and frame or platform A^2 , and an upright post or column A^4 , rising from the upper frame or platform A^2 , preferably, though not necessarily, at the right-hand side of the machine. This frame-work is designed to receive and support the various parts which go to make up the complete machine, and may be furnished with legs or supports of its own or placed upon a convenient stand or table to bring it to the desired elevation.

B indicates a carrier for the type cases or reservoirs, consisting, essentially, of a frame hinged upon and arranged to swing about post A^4 , but to stand at an angle of from ten to twenty degrees from perpendicular, more or less. Four such carriers or holders are represented in the drawings, all alike in construction and having hinges of such respective lengths that all the carriers may be brought together face to face across the upper plate or platform A^2 , as in Figs. 1 and 4, or separated and swung apart, much after the manner of the leaves of a book, as indicated

in Fig. 5. The number and dimensions of the carriers may be varied as desired, though four are found to answer well. Each case-carrier is of rectangular form and consists of a horizontal lower cross-bar or block B^1 , an upper cross-bar B^2 , and two connecting side bars or rods B^3 . The construction of the lower cross-bar or block B^1 is best illustrated in Fig. 9, where it will be seen to consist of a substantial bar or block of metal, provided with grooves or channels a , extending from its upper to its lower side and from its front face backward or inward to within a comparatively short distance of its rear face, or, in other words, cut nearly through from face to face, but leaving sufficient metal at the back to properly sustain the walls or partitions between the channels a . At the upper side of the bar or block B^1 the grooves or channels a are widened or enlarged, as shown in Fig. 9, to receive the lower ends of a series of type cases or reservoirs C, which rest at a higher point, usually about their mid-length, against the upper cross-bar B^2 of the carrier and are separated and properly spaced by studs or pins b , projecting from said upper cross-bar, as shown in Fig. 1. The type cases or reservoirs are formed of sheet metal, bent or folded to produce or inclose a channel or space with bottom and side walls proper to sustain the feet or lower ends and the sides or edges of the types, essentially as in the patented machine above referred to. The width or measurement of each block or bar B^1 from its upper to its lower side is such that each groove or channel a , forming a continuation of the type case or reservoir, shall contain a considerable number of types, so that in the event of a case or reservoir becoming exhausted it may be removed and replaced by another without necessitating stoppage of the machine during the time of going for and returning with the filled case. This will be readily understood upon referring to Fig. 1, in which it will be seen that a line or row of types is contained in each channel or groove a below the lower end of each case or reservoir C, the number of types in the several channels varying according to the thickness of different types. Of the thicker type there will be ordinarily from fifteen to twenty in each channel a , which number is amply sufficient to cover the time required to obtain a fresh case or reservoir. The case-carriers B and the cases or reservoirs C stand at an angle of about fifteen degrees from perpendicular, as indicated in Figs. 1 and 4, so that the cases retain their proper positions in the carriers and the types keep down upon their heels in the cases without any tendency of either to get out of place. The slight inclination given causes each column of type to bear with nearly its entire weight upon the lowermost type of said column, pressing the latter down upon its support, and maintaining it in proper plane for the action of the ejecting device.

The necessary support for all the columns of types of each case-carrier is formed by a plate or type-rest D, Figs. 1, 9, 10, 11, and 12, which plate is secured beneath the cross-bar or block B' of the carrier-frame by tap-screws or other convenient fastenings with suitable space between. Each plate or type-rest D is formed with a series of openings *c*, Figs. 9, 10, and 12, of a length nearly equal to that of a type and of a width somewhat greater than that of a type. These openings *c* are arranged directly beneath alternate walls or partitions *d*, which separate the channels *a*, and the openings are themselves separated by solid portions having plane surfaces, upon which the type-columns rest, and which also form supporting and guiding surfaces for the ejecting-fingers E, as indicated in Figs. 9, 10, 11, and 12. This plane surface extends from one partition *d*, beneath the next partition *e*, to the second partition *d*, and so on throughout the series, the partitions *d* and *e* alternating, as indicated in Fig. 9. Beneath each partition *e* stands one of the ejecting-fingers E when the parts are in their normal position and no key is depressed. Each finger thus stands normally between the lowermost types of two type-columns, each type resting upon a portion of the plate or type-rest D between an ejecting-finger E and an opening *c*, so that if the finger be moved laterally in either direction it will bear against and carry before it one or the other of said two types, causing it to fall into the proximate opening *c*. Thus each ejecting-finger is made to serve two cases, or to eject type from two columns, and to act in either direction as often as is required, the movements of the fingers being controlled by mechanism and in a manner hereinafter explained.

Owing to the varying thicknesses of types in any font and to the inconvenience, if not the impracticability, of having in every instance types of like thickness on each side of the ejecting-fingers, such ejecting-fingers must be made a shade thinner than the thinner of the two classes of types upon which it is to act, and the space beneath the partition or wall *e*, separating the two columns of types and the plate or type-rest D, must be only sufficient to permit free play of the thin ejecting-finger. So, too, the wall or partition *d* next the thin type is advisably made with a lip or ledge *f*, Figs. 9 and 13, to prevent more than one type passing at a time beneath said partition and to the outlet-opening *c*, and to prevent the back ends or feet of thin types from working back beyond the rear ends of the openings *c* and into the space between the type-rest or plate D and the block or cross-bar B'. A rib *f'* is formed upon the under side of said block or cross-bar, and the ejecting-fingers E are formed with depressions or recesses *f''* near their rear ends to receive the rib *f'*, which thus extends low enough to preclude the entrance of types. The ejecting-fingers E are by preference made of steel, and being of

considerable width and subjected to strain only in the direction of their width there is ample strength and rigidity to meet all possible requirements and provide a wide margin of safety against breakage or bending. Each ejecting-finger E is formed with or upon a block E', each block formed with laterally-extending wings *g* of less thickness than the body of the block and designed to overlap the adjoining blocks E' in the manner indicated in Figs. 13 and 14, the wings of alternate blocks being on the upper halves and those of the intermediate blocks being on the lower halves of the blocks, as shown in said figures. By this construction and arrangement each block serves to support and keep in place the blocks adjoining, all being held in place between the rear edge of type-rest or plate D and a retaining strip or bar D', Figs. 9 and 10.

Each block E' has in its lower edge or end a notch or recess *h*, of the form shown in Figs. 11, 13, and 14, to receive studs or pins hereinafter referred to and described, by which the blocks and ejecting-fingers are moved laterally. To prevent the ejecting-fingers E from carrying a type entirely across any one of the openings *c* and landing it upon the type-rest at the side opposite the finger at that moment operating, there is placed between each two ejecting-finger blocks E' a laterally-movable guard E² of the form shown in Figs. 9, 10, and 11. Each guard E² is formed with a depending tail, which hangs down over the rear edge of plate or type-rest D, and which, by reason both of its weight and of its occupying a position between two adjoining blocks E', prevents the guard from tipping or turning. As any ejecting-finger E is moved, the type upon which it acts is carried against one of the guards E², which can freely move to the farther side of the proximate opening *c*, but is at that point stopped by reason of its depending tail or extension being pressed or clamped between the moving block E' and the next block E' in the direction of movement. The guard and its tail or extension being of rectangular form in cross-section, the pressure of the blocks E' upon the sides of the latter cause it to straighten into alignment with the side wall of the opening *c*, if this be not effected by the bearing of the type upon the side of the guard.

It has already been explained that the case-carriers B are arranged to swing either separately or collectively to and from the position indicated in Fig. 1, which is the normal or working position, and it will now be explained how the carriers are locked against movement or made free to be moved, as required. As shown in Figs. 1 and 4, the hinges by which the carriers B are supported consist, merely, of heavy lugs *i*, perforated to permit them to be passed over or about the cylindrical post or standard A⁴, and consequently the carriers may be both swung horizontally and lifted vertically, the lugs *i* moving horizontally about or sliding vertically upon the

standard A^4 , as one or the other adjustment is made. A^5 indicates a vertical plate rising from the frame or platform A^2 at the side opposite that at which post A^4 is located. This plate is formed with a series of seats or notches j open at top, and the rear wall of the rearmost notch or seat j is carried upward to form a stop-post k to limit the swinging of the case-carriers B . Projecting from the free end of each block or cross-bar B' of the several case-carriers B is a stem or lug l , each designed to drop into one of the seats or notches j when the case-carriers are brought to operative position, and by bearing upon the bottom of the seat or notch to assist in sustaining the weight of the case-carriers and cases, as well as locking them in position. To release the case-carriers preparatory to swinging them or any of them forward or out of operative position, a cam-lever F is provided, one end of which is jointed or pivotally attached to a collar m , Fig. 4, encircling and free to slide vertically upon the post or standard A^4 . The collar m rests normally upon plate or platform A^2 , and being located directly beneath the lower series of hinge-lugs i serves to sustain said lugs and consequently the case-carriers B . If therefore the cam-lever F be moved to raise the collar m , the case-carriers B will likewise be lifted, the range of movement being such as to carry the stems or lugs l thereof out of the seats or notches j and above the walls which separate them. In the drawings the lever F is represented as arranged to swing or move in a vertical plane, and the curvature and movement are such that upon fully depressing the lever its bearing-point upon the frame A^2 shall be carried inward beneath or beyond the vertical plane of the pivotal axis of the connection between lever F and collar m , so that the lever shall become automatically locked and prevent the fall of the collar or of the case-carriers supported thereon until the lever is manually operated to unlock it.

Immediately beneath each opening or outlet c of the type-rest D is a chute or spout G , (best shown in Figs. 9, 11, and 12,) the office of which is to receive the types delivered to the openings and to direct and guide them to races or runways, by which all are finally conveyed to a given point.

As shown in Figs. 9 and 12, the forward lower corner of each partition d —that is to say, the partitions which are directly above the openings c —is beveled or cut away, leaving the face of the bevel parallel with the inclined inner face of the chute G or approximately so, the extent to which each is cut away depending upon the thickness of the types which pass beneath that particular partition. When a type is moved by one of the ejecting-fingers E laterally over the opening c and beneath the partition d , the head of the type projects somewhat beyond the forward end of the opening c , and resting upon the edge or angle of said forward end tips or swings thereon

as a pivot or center, the heel or foot of the type swinging downward until the side face of the type reaches or nearly reaches the flat inclined face of the chute G . During this operation the head of the type is afforded due play or movement by reason of the beveling or cutting away of the lower front corner of the partition d , but is prevented from turning or twisting out of proper position by reason of the contracted space between the lowermost angle of said partition and the edge or angle of the front end of opening c , upon which latter the type bears and swings. In practice it is found that this swinging is generally completed before any longitudinal movement of the type begins; but to insure proper swinging and to guard against turning or displacement of the types a curved wall n is formed at the rear end of each opening c concentric with the forward edge or angle of said opening on which the types rock or swing, or struck from a point just above said angle. This is a feature of great practical importance, because the turning of a type is liable to clog the race and interrupt the working of the machine, and is the difficulty most frequently encountered in the practical operation of type-setting machines in general.

Just below the lower extremity of the curved wall n of each opening c is a pendulous gate H , the curved front face of which reaches to and bears against the inclined front wall of the chute G , as shown in Figs. 9 and 12. A type sliding down the inclined face or wall of the chute scarce more than leaves the bearing or turning point at the front of opening c before its heel or foot enters between the wall of chute G and the face of gate H , which latter, though offering an infinitesimal resistance to the descent of the type, nevertheless bears sufficiently thereon to preclude the turning of the type.

Directly in line with and just below each series or line of chutes G is a race-plate I , composed of a plate of metal or other suitable material having in its face a series of races, grooves, or channels o , one extending centrally from the upper to the lower end of the plate and the others joining the same from points each side of the middle, as plainly indicated in Fig. 1. Each race-plate I is hung or hinged at its upper end to the plate A^2 of the main frame or to other convenient support, as shown in Fig. 7, and is free to be swung backward or forward at its lower end, so that the several plates may be readily brought together or separated at their lower ends, as required. The journals or lugs upon which the plates are hung rest in seats or bearings, one of which is open at the top, as shown in Fig. 7, so that by first lifting one side of the plate and then moving it slightly sidewise the plate may be removed from the machine.

The construction and arrangement of the race-plates I is illustrated in Figs. 1, 2, 4, 15,

16, and 17. Referring now to Fig. 17, it will be seen that each plate I is provided with a covering-plate I', of glass, mica, isinglass, or other transparent material, through which the races may be inspected and their condition or the condition of type therein may be ascertained. The cover-plates I' are free to be swung away from the race-plates I, so as to give ready access to the races and permit them to be cleared in the event of clogging, though this is found to happen very rarely in actual operation of the machine as now constructed. The transparent cover-plates have converging sides and are hung between ears p' of a cross-bar p , hung upon journals q in the main frame A, the construction being shown in Fig. 17. Extending across the base-plate A' of the main frame is a raised bar J, upon which is mounted or formed at or about the mid-length of the bar an upright race-block K, Figs. 2, 4, 15, and 16. At the top of the race-block K are two side bars r , the upper edges of which are beveled, as shown in Fig. 16. These side bars serve to guide and support the lower ends of the race-plates I, which are notched to fit said side bars, as shown in Fig. 16.

L indicates a stop against which the rear-most race-plate I rests, the several plates bearing one against another, and all being clamped and held in place by a locking-lever M, having a spring end piece M' to give an elastic pressure and avoid breakage of the cover-plates I'. When it is desired to release and separate the race-plates, it is only necessary to swing the locking-lever M about its pivot until it clears the lower end of the forward race-plate, when all are made free. It is desirable to have the upper end of each race-plate in substantially the same plane as the inclined wall of the chutes G, communicating therewith; but as the race-plates are separated some distance at their upper ends and brought close together at their lower ends, while the type-cases C and chutes G are advantageously and usually made of uniform inclination, it is necessary in order to attain the result mentioned to gradually curve the third and fourth plates counting from the front, as indicated in Fig. 4. This construction, while not essential, is quite advantageous, because it lessens the chance of any type turning and causes all the types to travel at the same rate.

The race-block K is provided directly beneath and in line with the central races or channels of the several race-plates with a main or gathering race s , Figs. 15 and 16, the rear wall and one side wall of which are formed by the body of block K, and the other side wall of which is formed by a removable covering-plate K', which latter is secured in place by a clamping or binding screw N. The inclined rear wall of the main race s forms a continuation of the central race of the rear race-plate I, and the front wall is sufficiently distant therefrom to permit types to enter

from all the race-plates. The inclined rear wall of the main race s terminates a short distance below the lower ends of the race-plates I, and just below its lower end is hung a counterweighted gate O, the front face of which forms practically a continuation of the said rear wall of race s .

P indicates a light spring-plate, forming the front wall of the lower end of race s , just in front of the swinging gate O. This spring-plate is held in place by a screw t and can be swung aside to give access to the race s or to the gate therein.

Extending forward from and perpendicular to the race-block K, or practically so, is a line-galley Q, into which the types fall one after another as they pass between gate O and plate P. The line-galley extends forward to a suitable point and then curves or bends off, as indicated in Fig. 2, delivering the line of matter either to an attendant or to a specially-constructed galley, which it is intended to embrace in an independent application.

To prevent undue play of the gate O, a stop u is provided, against which it strikes in its rearward movement. This stop is preferably made in the form of a stud projecting from the inner face of the removable plate K', so that when said plate is removed the gate shall be free to move back as far as desired. The gate serves the double purpose of preventing the types from turning and of preventing the rebound which would otherwise occur were a type dropped to the foot of the main race and into the line-galley.

For the purpose of constantly advancing the line of matter set up in the line-galley and making room for the incoming type I employ a reciprocating pusher or bunter R, which is connected by a pitman R' with the adjustable crank-pin v of a wheel R², carried by a shaft R³, to which motion is imparted by belt and pulley, as indicated, or in any equivalent and well-known way, power being derived from any convenient source outside the machine or from a shaft driven by treadle by the operator of the machine. The front end of the bunter on its forward stroke reaches a point just about on line with the front face of gate O; but by adjusting the crank-pin v the range of movement may be varied as desired. A slot or opening Q' affords access to the bodies of the types in galley Q and enables the attendant to free them if by any chance they become clogged therein.

Referring now to Figs. 1, 2, 3, 4, 6, 7, and 8, the mechanism for actuating the ejectors will be explained.

S indicates a rectangular frame, in which are mounted two series of rocking rods S' and S², the former being of tubular form and encircling the latter, as shown in Figs. 6, 7, and 8. Each rod S' and S² carries, preferably near its rear end, a cross-bar S³, having two laterally-projecting arms or branches, with each of which is connected an operating-fin-

ger key-lever T^6 , the connection being made, as indicated in Figs. 1, 2, 4, and 7, by means of wires or pull-rods w , preferably having the take-up or adjusting turn-buckle used in a like connection in type-writing machines, and shown in Figs. 4 and 7.

Projecting from each rocking rod S' and S^2 are two radial stems or studs x , having spherical outer ends, as shown in Figs. 3, 6, 7, and 8. The stems or studs x are located in such positions relatively to the case-carriers B , and particularly to the notched blocks E' of the ejectors E , that one stem or stud of each tubular rod and one stem or stud of each solid rod shall stand normally with its spherical end in the notch h of one of said blocks E' . It will thus be seen that each stem or stud x will, as the rod which carries it is rocked to the right or to the left, serve to move the block E' and ejecting-finger E , which it controls, to the right or the left, and that said finger will eject a type at each movement from its normal position from one or the other of the two cases which it commands, as above explained.

To permit free and independent rocking of the concentric rods S' and S^2 , the tubular rods S' are circumferentially slotted or cut away at the points where the pins project from the central rods, as shown in Figs. 3, 6, and 7. Each rod S' is furnished with a vertical stem x' , and each rod S^2 is similarly furnished with a vertical stem x^2 , those of the rods S' being upon one side and those of the rods S^2 being upon the other side of two sliding bars T and T' , mounted one above the other and arranged to move longitudinally in supporting blocks or posts T^2 of the frame S . Bar T carries two series of horizontally-projecting pins y , one series on its forward and the other on its rear side, as shown in Fig. 6, and all of them on the right-hand side of the stems x' and x^2 , against which the pins y bear. The bar T is drawn longitudinally to the left by a spring T^3 , one end of which is attached to the bar T , and the other end of which is made fast to a threaded rod or stem T^4 , passing through the block T^2 or through a lug or clip thereon and furnished with an adjusting-nut T^5 , by which the tension of the spring may be varied as desired. The pins y' of bar T' are all arranged to bear against the left-hand side of the stems x' and x^2 , and the bar is itself drawn longitudinally to the right by a spring T^3 , attached at one end to the bar and at the other end to a threaded rod T^4 , provided with an adjusting-nut T^5 , the same as in the case of the companion bar T . As bar T' and its pins y' are nearer the center of motion of the stems x' and x^2 than the bar T and pins y , the spring T^3 of said bar T' will naturally require a slightly greater tension than the spring of bar T , in order to cause the two springs to counterbalance each other and act with equal effect. The stems x' and x^2 of the outermost bars S' and S^2 of the series rest

normally against the blocks or posts T^2 , which limit their motion and cause them to stand normally in a vertical position, as indicated in Figs. 6 and 7. As the pins y and y' bear directly against the stems x' and x^2 , it will be seen that the longitudinal movement of bars T and T' , occasioned by the springs T^3 , will be also determined and limited by the contact of stems x' and x^2 with the blocks T^2 , though the bars are themselves shouldered to engage with the blocks or posts T^2 . It is important that the bars T and T' move freely and with as little friction as practicable, for which reason the ends of each are carried upon anti-friction rollers y^2 . (Shown in dotted lines in Fig. 7.)

It is apparent that, instead of providing the bars T and T' with pins y and y' , they may be formed with slots or elongated openings or with recesses in their vertical faces to receive the stems x , though the construction shown is preferred.

To prevent undue friction, and particularly to avoid the turning of either of a pair of the concentric rods S' and S^2 by the other, the construction illustrated in Figs. 6 and 8 is adopted. As there represented, the front bar of the frame or carriage S is tapped to receive a series of screws S^4 , each having its inner end fashioned into a pivot or center pin to enter a central socket in the end of the rod S^2 , the pivot or center pin thus serving both to center and to sustain the end of said rod. The tubular rod S' has an internal groove or recess to receive a bushing or collar S^5 , which fits upon the end of the central rod S^2 and serves at once to center and support the outer or tubular rod S' and to prevent contact of its interior with the central rod or of its end with the front bar of frame S . Similar bushings are applied at the rear ends of the tubular rods S' ; but the central rods S^2 being carried back beyond the rods S' to afford space for application of the heads S^3 , by which the rods are rocked or turned, the screws S^4 , if used at all, will be applied at the rear ends of the central rods. In practice, however, the screws are found unnecessary at that point.

The platform or plate A^2 of the main frame is provided with perforate lugs A^6 , through which are carried guide-stems S^6 , extending horizontally from the front and rear bars of frame or carriage S . Between the rear lugs A^6 and the rear bar of frame or carriage S the rear guiding-stems S^6 are encircled by springs U , which serve to press the carriage forward and to hold its front bar normally in contact with the forward lugs A^6 , as shown in Figs. 1, 3, 4, and 6.

V indicates a rock-shaft journaled in the main frame and provided with radial arms V' , which extend upward and bear against the forward side of the rear bar of frame or carriage S , and with a rearwardly-projecting arm V^2 , which is connected by a wire or draw-rod w with a special shift-key X , correspond-

ing in position and arrangement with the shift-key of the Remington standard type-writing machine. Obviously, however, the position of the shift-key X may be varied
 5 as circumstances suggest or require. By depressing the shift-key X the carriage S is moved backward until its rear bar comes into contact with adjustable stop-screws Y. The result of such rearward movement is to carry
 10 those of the studs or pins α which have been previously in engagement with certain of the blocks E' of the ejecting-fingers out of engagement therewith and to carry those of the pins α which have previously been out of
 15 engagement with the blocks E' into engagement with such of the said blocks as were previously out of engagement with pins α and consequently inactive.

As the great bulk of all the characters used
 20 are of the lower case or small letters, it is preferred to have the carriage S stand normally in such position as to cause the engagement of those pins α and those blocks E' which control the ejecting-fingers of the lower-case-
 25 type reservoirs or cases; but manifestly the arrangement may be reversed. So, too, the frame or carriage may be made to normally occupy a medial position and be provided with two shift-keys, one serving to recede and the
 30 other to advance it; or the frame S may be fixed and the rods S' S² made movable, or the case-carriers B may be made movable relatively to the ejecting-pins α , the changes necessary to carry out these variations of the general idea
 35 being within the province of the mechanic and within the present knowledge of persons at all skilled in the art to which this invention relates. In other words, this part of the invention consists, broadly, in moving either
 40 the ejectors or their actuating devices one in relation to the other, and is not restricted to any details, though the embodiment illustrated is found quite efficient and satisfactory.

45 To render the movements of the carriage S free and easy, it is provided with rollers Z, which travel upon the bed or plate A², two such rollers being shown, but the number and location being optional. The key-bars are
 50 lifted to and held in normal position by weights applied thereto at or near their rear ends, it being preferred to make said weights in the form of depending flat bars, as shown in Fig. 4. Stop-screws z limit the play of the
 55 bars T and T', as actuated by the key-levers, and thereby also limit the play of the ejecting-fingers, the keys, and the rocking rods or shafts S' and S². These screws may be adjusted as required. It is apparent that the springs for
 60 moving carriage S and the stops for limiting its travel need not be duplicated, as in the drawings, though the arrangement shown is preferred. So, too, the post or standard A¹ may be given a long bearing, or two or more
 65 bearings in frame A, and arranged to be bodily raised and lowered with the case-car-

riers B, in which latter case said carriers need not slide upon the post or standard. It is not absolutely necessary to employ removable cases C, but it is very desirable to do so, in
 70 order to permit the ready renewal of the supply of type, and also for the reason that the cases C can be taken to and filled by the distributing-machine, with which this setter is
 75 commonly used.

Having thus described the invention, what is claimed is—

1. In a type-setting machine, the combination of cases or reservoirs for containing one class of type, cases or reservoirs for contain-
 80 ing another class of type, and releasing or ejecting mechanism common to both sets of cases, adapted and arranged to act in connection with either set of cases at will.

2. In a type-setting machine, the combina-
 85 tion of a plurality of sets of cases or reservoirs for containing types, releasing or ejecting devices for controlling the exit of types from said cases, and a key-board having finger-keys adapted to individually actuate a
 90 plurality of releasing or ejecting devices one at a time.

3. In combination with two or more sets of type cases or reservoirs and with releasing or ejecting devices adapted to control the exit of
 95 the types from the cases, a shift-key adapted and arranged to vary the position of the cases and ejecting devices one in relation to the other and thereby to cause said ejecting devices to deliver type from one or another set
 100 of cases at will.

4. In combination with two or more sets of type cases or reservoirs and with ejecting-fingers to deliver types therefrom, a shiftable
 105 frame or carriage provided with mechanism for actuating the ejecting-fingers, and a shifting device connected with said carriage and serving to move the same, whereby the mechanism for actuating the ejecting-fingers is caused to engage with and actuate the fingers
 110 of one or another set of cases at will.

5. In combination with type reservoirs or cases and with fingers E, carriage S, actuating-
 115 rods mounted in said carriage and provided with stems or studs α , rock-shaft V, connected with the carriage, and a shift-key X, connected with and serving to turn said rock-shaft.

6. In combination with type cases or reservoirs and with fingers controlling the exit of types therefrom, a shifting-carriage-carrying
 120 mechanism for actuating the ejecting devices, a spring for moving said carriage in one direction; and a shift-key connected with and serving to move the carriage in the opposite
 125 direction.

7. In combination with type reservoirs or cases and with fingers controlling the exit of types therefrom, a carriage movable relatively
 130 to said cases, actuating mechanism mounted in said carriage and adapted to move said controlling-fingers, a spring for moving the carriage in one direction, a shift-key connected

with and serving to move it in the opposite direction, and an adjustable stop to limit the movement of the carriage.

8. In a type-setting machine, the combination of a suitable supporting-frame and a series of frames or carriers containing type cases or reservoirs, said frames or carriers being movable toward and from one another, whereby their respective type cases or reservoirs may be exposed to view.

9. In a type-setting machine, the combination of a supporting-frame provided with a post or standard and a series of carriers or frames provided with type cases or reservoirs and hinged to swing about said post, substantially as and for the purpose set forth.

10. In a type-setting machine, the combination of a main frame, a series of type-reservoir carriers mounted upon said frame and movable toward and from one another, and retaining devices for holding said carriers in their normal positions.

11. In a type-setting machine, the combination, with a supporting-frame provided with a series of seats or notches, of a series of carriers provided with type reservoirs or cases and with lugs to enter the seats or notches, said carriers being movable, substantially as described and shown, to carry the lugs into and out of the seats or notches.

12. In a type-setting machine, the combination, with a main supporting post or standard, of a series of carriers provided with type-reservoirs and connected with the supporting-post by hinges of varying lengths, whereby they are adapted to fold one behind another, as described and shown.

13. In a type-setting machine, the combination of a supporting post or standard, a series of frames or carriers provided with ears to encircle said standard, and a cam working beneath said ears and adapted to lift them vertically and thereby to lift the frames or carriers.

14. The combination, in a type-setting machine, of a main frame A, provided with an upright post or standard A⁴ and recessed plate A⁵, carriers or frames B, having ears *i* encircling post or standard A⁴ and provided with lugs *l* to enter the recesses *j* of plate A⁵, and cam-lever F, located between the plate A² of the main frame A and the ears *i* of carriers B and serving to lift and hold up said carriers.

15. In combination with swinging carriers B, provided with lugs *l*, plate A⁵, provided with seats *j* and with stop *k*.

16. In a type-setting-machine, the combination of two type channels or reservoirs and a finger common to both of said channels, and serving to deliver type from either one at will.

17. In a type-setting machine, the combination, with two type channels or reservoirs, of an intermediate finger movable at will toward either channel and adapted to deliver a type therefrom.

18. In a type-setting machine, the combina-

tion of a block B', provided with channels *a* and intermediate partitions *d* and *e*, a type-rest or plate D beneath said block, provided with openings *c*, and fingers E, arranged beneath the partitions *e* and movable laterally in both directions.

19. In combination with block or body B', having channels *a* and partitions *d* and *e*, a type-rest or support beneath said partitions, ejecting-fingers located between the body B' and the type-rest, and depending lips or flanges *f*, formed upon one side of partitions *d* next to channels containing thin type, substantially as and for the purpose set forth.

20. In combination with block or body B', having channels *a* and intermediate partitions *d* and *e*, type-rest or plate D beneath said channels, provided with openings *c* directly below the partitions *d*, ejecting-fingers E, located beneath the partitions *e*, and guards E², extending over the openings *c*, substantially as and for the purpose set forth.

21. In combination with a block or body containing type-channels *a*, a type-rest or plate D beneath said channels, provided with openings *c*, a series of fingers E, provided with blocks E' and movable across the openings *c*, and guards E², having each a depending tail extending between two proximate blocks E'.

22. In combination with a block or body provided with type-channels, a type-rest or support beneath said channels, provided with type-outlets, and a series of ejecting-fingers located between the mouths of the channels and the type-rest, said fingers being provided with blocks E', having overlapping wings *g*, whereby they are caused to guide and steady one another in their movements.

23. In combination with a type-rest or support having openings for the escape of type, ejecting-fingers movable over the same and provided with depressions *f*², and a block or body above the ejecting-fingers, provided with type-channels *a* and with a rib *f*¹ to enter the depressions *f*² and prevent the type from working backward.

24. In combination with block B', having channels *a*, type-rest D, provided with openings *c*, ejecting-fingers E, provided with blocks E', and retaining-bar D', located in rear of the blocks E' and serving to retain them in place.

25. In a type-setting machine, the combination of block B', provided with channels *a*, a plate or type-rest D, having openings *c* shorter than the types and laterally offset from or out of line with the channels *a*, and a curved wall or guard *n*, extending downward below the plate from the rear end of each opening *c* to prevent backward movement of the types prior to their assuming a predetermined angle or inclination.

26. In combination with block B', having channels *a* and beveled lower front corner, type-rest or plate D, having openings *c*, laterally offset from the channels *a* of block

B', and curved guards or walls *n*, extending downward from the rear ends of the openings *c*.

27. In combination with block or body B', having channels *a* and partitions *d*, beveled or cut away at the lower front corner, a type-rest D, located beneath block B' and provided with openings directly through it from its upper to its lower side, said openings being laterally offset from or out of line with the channels *a*, chutes G, located beneath the openings *c* and provided with curved rear walls or guards *n*, and ejecting-fingers E, adapted to deliver types laterally from the channels *a* to the openings *c*.

28. In combination with plate or type-rest D, having openings *c* directly through it, chutes G beneath said openings, provided with curved walls or guards *n*, and gravitating gates H, located within the chutes immediately below said walls or guards and forming continuations thereof, substantially as and for the purpose set forth.

29. In a type-setting machine, the combination, with channeled block B', of the type-rest D, secured to but detachable from said block and forming a support for the ejecting devices, substantially as shown and described, whereby the block B' may be swung from its normal position without permitting escape of type from its channels, and whereby also access can be had to the ejecting devices when necessary.

30. In a type-setting machine, the combination, with the type-reservoirs and with ejecting-fingers, of a series of rods or rock-shafts, each provided with a stud or stem to engage with and move one of the ejecting-fingers when rocked or turned.

31. In combination with type-reservoirs, ejecting-fingers E, provided with blocks E', having notches *h*, and rocking rods or shafts provided with studs or stems *x* to enter the notches *h*.

32. In combination with type-reservoirs, ejecting-fingers E, controlling the delivery of types therefrom and provided with blocks E', having notches *h*, rocking rods or shafts S' and S², provided with studs or stems *x* to enter the notches *h*, and means for rocking or turning the rods.

33. In combination with type-reservoirs, ejecting-fingers E, formed with blocks E', having notches *h*, concentric rock-shafts S' and S², provided with studs *x*, and key-levers connected with and serving to rock said shafts independently.

34. In combination with two type-reservoirs, an intermediate finger for controlling the delivery of types therefrom, a rock-shaft connected with and serving to move said finger, and two key-levers connected with said rock-shaft and serving to rock the same in one or the other direction at will.

35. In combination with solid rod or rock-shaft S², tubular rod or rock-shaft S' encir-

cling rod S', both rods being provided with studs *x*, and type-delivering devices adapted and arranged to be actuated by said studs.

36. In combination with concentric rods or shafts S' and S², each provided with two studs *x* and adapted to be rocked in both directions, four type-reservoirs, arranged one behind another and each provided with ejecting-fingers adapted to be actuated by the studs *x*, said reservoirs being so located relatively that when one stud of each rod is in engagement with an ejecting-finger the other stud of each rod shall be not in engagement with an ejecting-finger.

37. In combination with two type cases or reservoirs located one in rear of another, ejecting-fingers controlling the delivery of types therefrom, and a rock-shaft or rod provided with two studs and movable substantially as set forth, whereby one stud may be carried into engagement with and the other stud be simultaneously carried out of engagement with the ejecting-finger which it controls.

38. In combination with four frames or carriers arranged one behind another and each provided with type-reservoirs, fingers for controlling the delivery of types from the reservoirs of each frame, a carriage located and movable beneath the reservoirs, and rock-shafts mounted in said frame and arranged in pairs, one rock-shaft within another, each rock-shaft being provided with two studs, whereby one finger of each rock-shaft is caused to engage alternately with the ejecting-fingers of two different carriers or frames as the carriage is moved to one or another position.

39. In combination with case or reservoir carriers B B B B and with fingers E, provided with blocks E', carriage C, movable beneath the carriers B, rock-shafts S' and S², mounted in said carriage and provided, respectively, with two studs *x x*, and finger-key levers T T, connected in pairs with each rock-shaft and serving to rock the same in either direction at will.

40. In a type-setting machine, the combination, with type-reservoirs and with suitable delivery devices controlling the discharge of types therefrom, of rock-shafts having studs to actuate the delivery devices and with radial stems, sliding bars provided with lugs to engage with said stems, the pins of the respective bars bearing upon opposite sides of the stems, and springs connected with the sliding bars and serving to hold their lugs in contact with the stems, substantially as and for the purpose set forth.

41. In a type-setting machine, the combination, with a rock-shaft (one or more) provided with a stud *x* and with a stem *x'*, of two sliding bars T and T', provided, respectively, with lugs *y* and *y'*, arranged to bear against opposite sides of the stems *x'*, and springs T³, connected with and serving to move the bars longitudinally.

42. In combination with type-reservoirs and

with fingers for controlling the exit of the types therefrom, a series of rock-shafts, each provided with a stud x to actuate one of said fingers and with a stem x' , bars T T' ,
 5 provided, respectively, with lugs or pins y and y' to bear against opposite sides of the stems x' , springs T^3 , connected with said bars, threaded stems connected with said springs, adjusting-nuts applied to the threaded stems,
 10 and key-levers connected with and serving to turn the rock-shafts.

43. In a type-setting machine, the combination, with rods or rock-shafts S' , of sliding bars T T' , springs T^3 , and anti-friction rollers y^2 for supporting the bars T T' .

44. In a type-setting machine, the combination of rock-shaft S' , stems x' , projecting from said rock-shaft, bars T T' , provided, respectively, with pins y and y' , springs T^3 , and
 20 adjustable stops z^3 to determine the movement of the bars T and T' .

45. In a type-setting machine, the combination of type-reservoirs, delivery devices for controlling the exit of types therefrom, central rods S^2 , provided with studs x to actuate certain of the delivery devices, tubular rods S' , encircling the rods S^2 and provided with studs x to actuate certain others of the delivery devices, pivot points or bearings S^4 for
 30 the central rods, and bushings S^5 , interposed between the central rods and the encircling rods to center and sustain the latter.

46. In combination with type-reservoirs and with controlling-fingers governing the exit of
 35 types therefrom, a series of separable race-plates located below the reservoirs, one behind another and converging toward a common point.

47. In combination with type-reservoirs arranged in groups or series, one group behind
 40 another, a series of separable race-plates, also arranged one behind another, said race-plates extending from the respective groups or reservoirs toward a common point.

48. In combination with type-reservoirs arranged in groups or series, one group behind
 45 another, a series of separable race-plates arranged one behind another and each provided with channels or races converging toward a common point, said race-plates extending
 50 from the respective groups of reservoirs toward a common point.

49. In combination with type-reservoirs arranged in groups or series, one group behind
 55 another, and with delivery devices controlling the exit of types therefrom, a line-galley to receive the types, and a series of race-plates arranged one behind another and extending from the reservoirs to the line-galley, said
 60 race-plates being adapted to be swung together or moved apart at their lower ends at will.

50. In combination with type-reservoirs arranged in groups, one behind another, swinging race-plates I .

51. In combination with a main frame and

with type-reservoirs arranged in groups, one group behind another, race-plates I , provided with lugs seated in bearings in said frame, race-block K , and a locking device for locking
 70 the race-plates in proper relation to block K .

52. In a type-setting machine, the combination, with race-block K , of a series of separable race-plates I , arranged one behind another and converging toward said block, substantially as and for the purpose set forth.

53. In a type-setting machine, the combination of a series of type-reservoirs arranged in groups, one group behind another, a series of race-plates arranged one behind another, each
 80 provided with a central race and with branch races opening into the central race, and a race-block K , having a single raceway coincident with the central races of the several race-plates.

54. In a type-setting machine, the combination of a series of race-plates I , provided with notches in their lower ends, a race-block K , with which the race-plates communicate, and guiding-ribs r , carried by block K and adapted
 90 to fit the notches of the race-plates and to guide said plates to and hold them in position.

55. In a type-setting machine, the combination of race-block K , race-plates I , and locking device M .

56. In a type-setting machine, the combination, with race-block K and race-plates I , of locking-lever M , provided with yielding extension M' .

57. In combination with race-plates I , covering-plates pivotally sustained and adapted to swing toward and from the race-plates.

58. In combination with race-plates I , having supporting lugs or journals, bars p , provided with supporting-lugs p' and carrying cover-plates I' .

59. In combination with race-plates I , arranged one behind another, and with race-block K , having raceway s common to all the
 110 race-plates, the pendulous gate O , located at the foot of said raceway.

60. In combination with race-plates I , arranged one behind another, race-block K , provided with raceway s common to all the race-plates, gravitating gate O , located at the foot of said raceway, and a stop to limit the play of said gate.

61. In combination with race-block K and its gravitating gate O , spring-plate P , located
 120 directly in front of said gate.

62. In combination with race-block K and its pendulous gate O , a cover-plate P , located in front of said gate and adapted to be moved aside to uncover the raceway and the gate.

63. In combination with race-block K , having a central raceway, removable plate K' , forming one side of said raceway.

64. In combination with race-block K , line-galley Q , provided with an opening in its side
 130 to afford access to the bodies of the types.

65. In a type-setting machine, the combina-

tion of a series of chutes through which types are delivered, and a series of intermediate race-plates extending from the chutes to the race-block, a portion of said plates being
5 curved, substantially as described, to cause them to join their respective chutes at approximately the same angle.

66. In a type-setting machine, the combination, with a line-galley, of a reciprocating

bunter and an actuating-crank therefor provided with an adjustable crank-pin, whereby the movement of the bunter may be varied.

In witness whereof I hereunto set my hand in the presence of two witnesses.

JOHN LOUDON McMILLAN.

Witnesses:

A. D. RICHARDSON,
FRANK S. HOEFLER.