(No Model.) 9 Sheets—Sheet 1.

H. C. & S. D. SNODDY.

TYPE SETTING MACHINE.

No. 489,834. Patented Jan. 10, 1893.

Fig. 1.

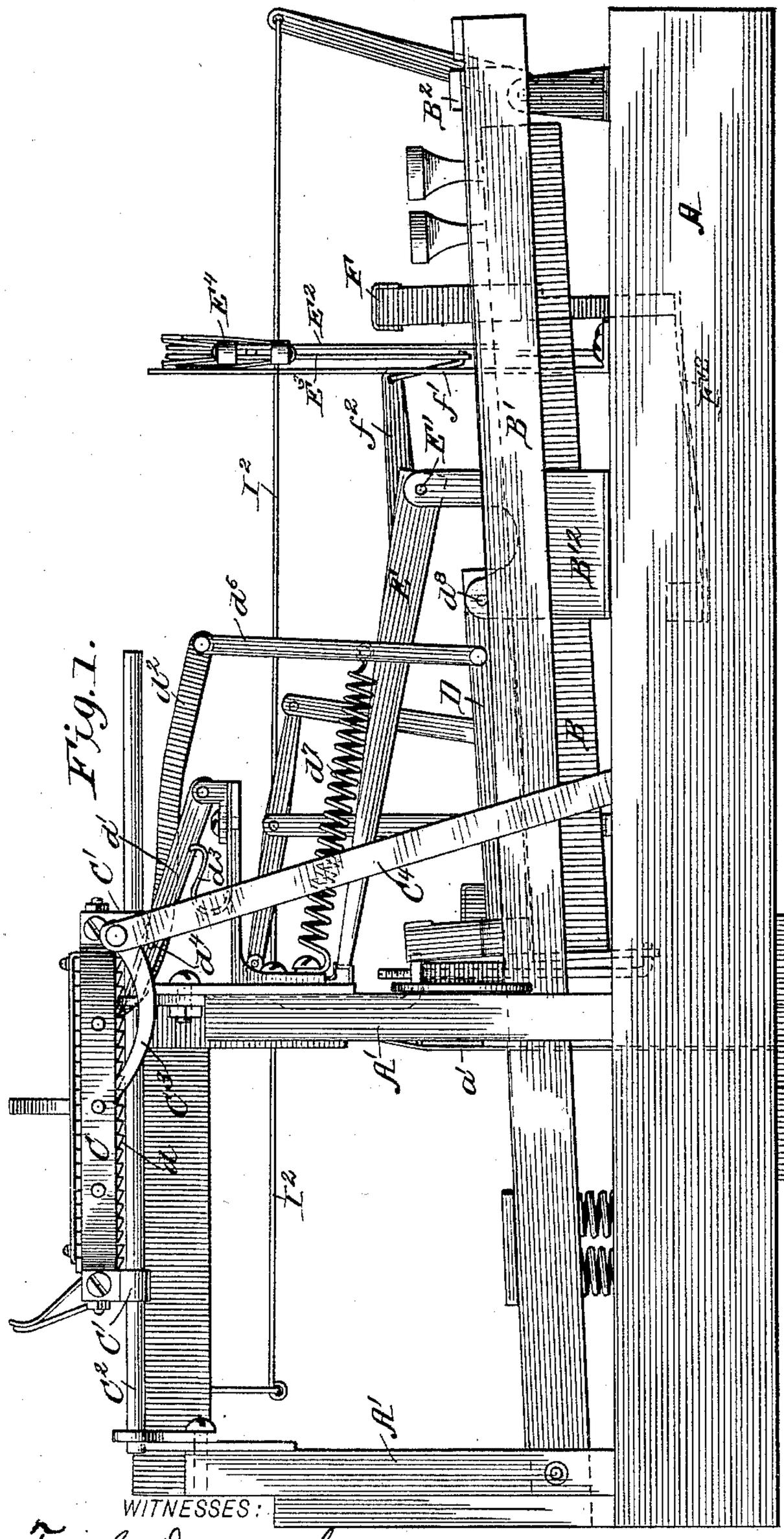
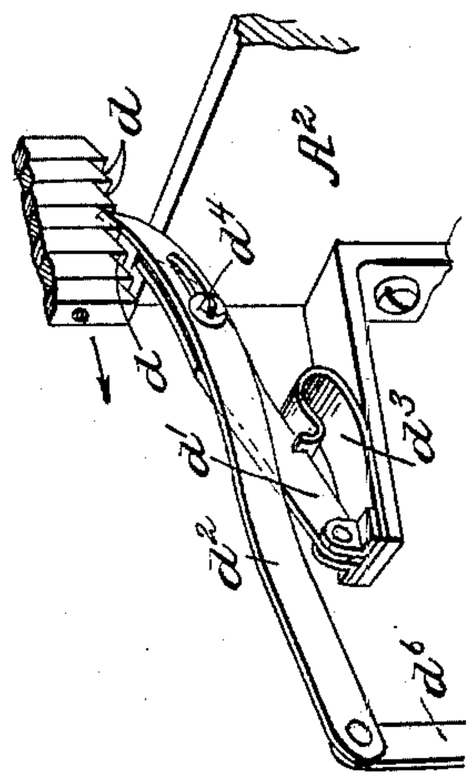


Fig. 17.



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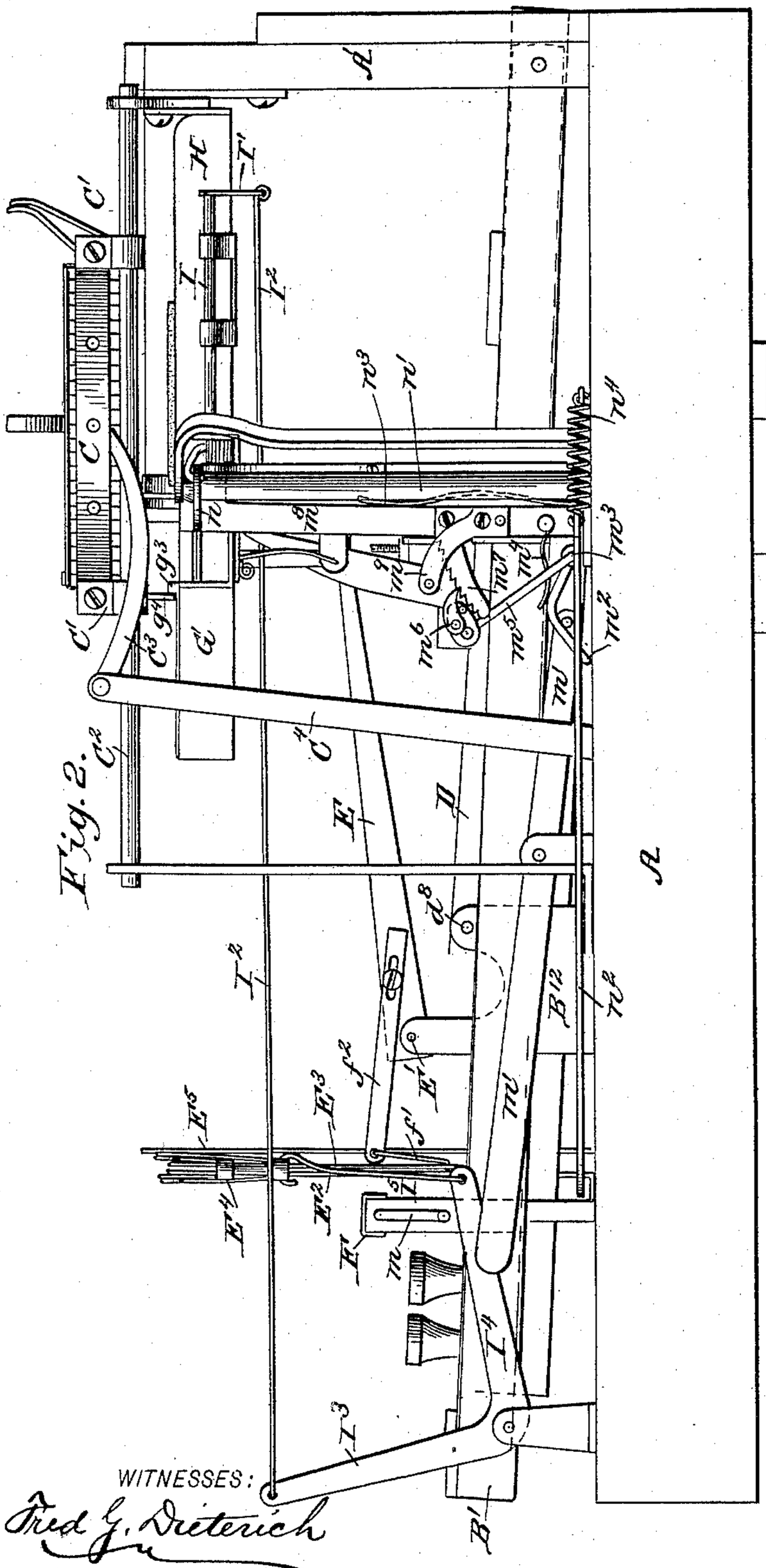

Fig. 2.

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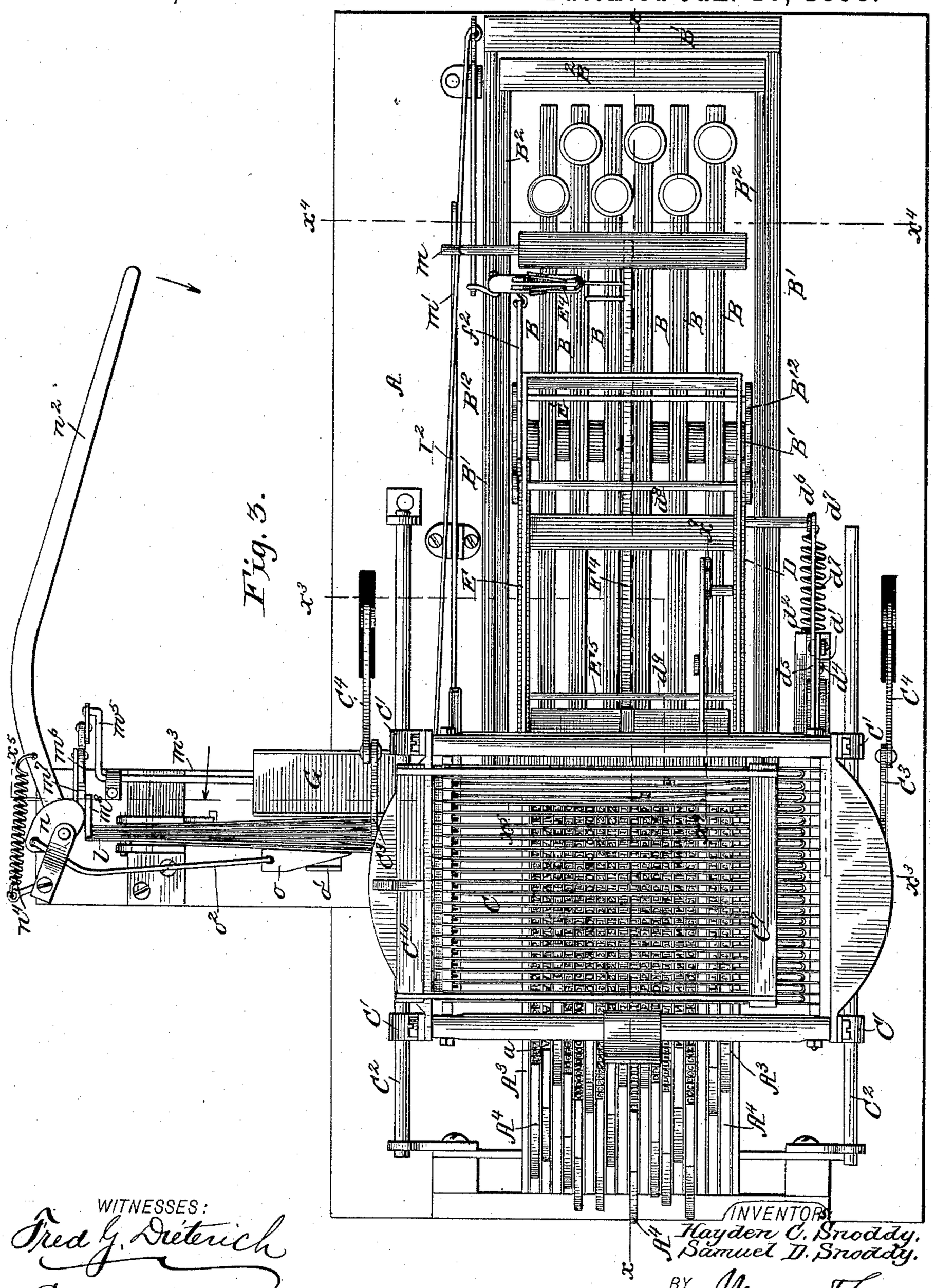

Fig. 5.

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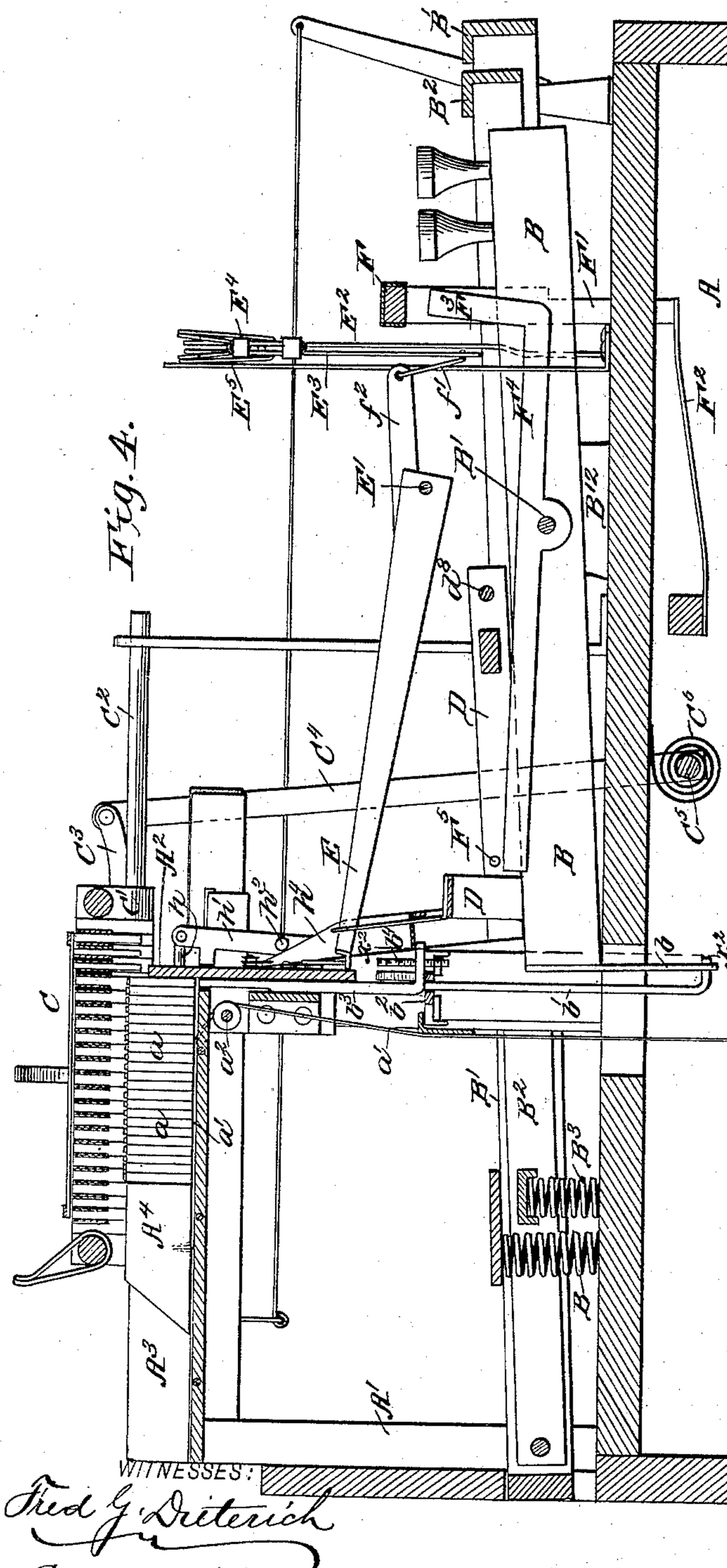

Fig. 4.

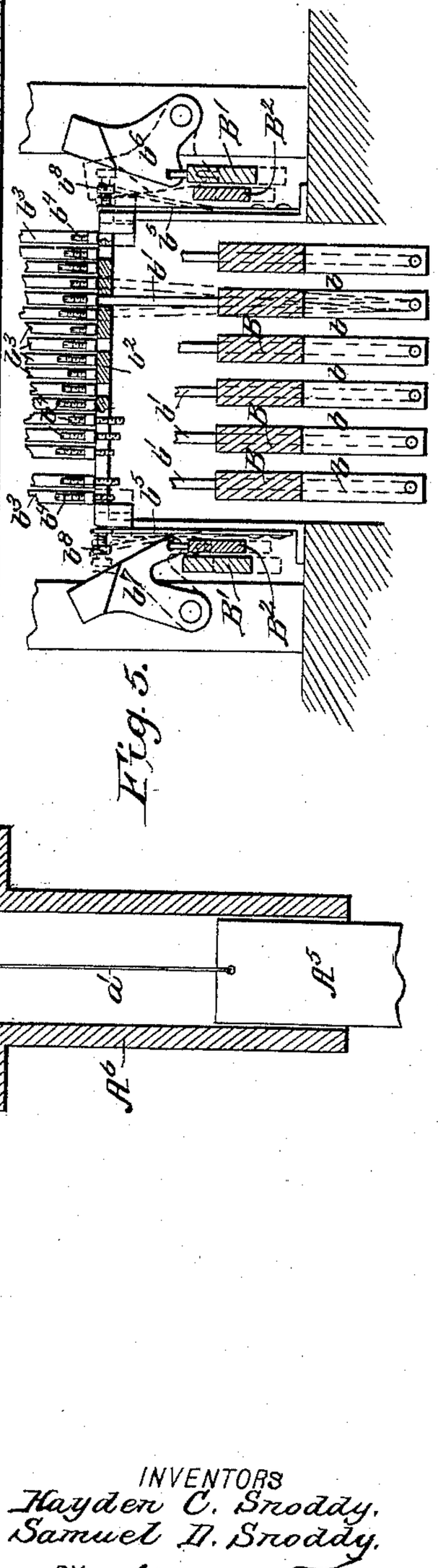

Fig. 5.

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TYPE SETTING MACHINE.

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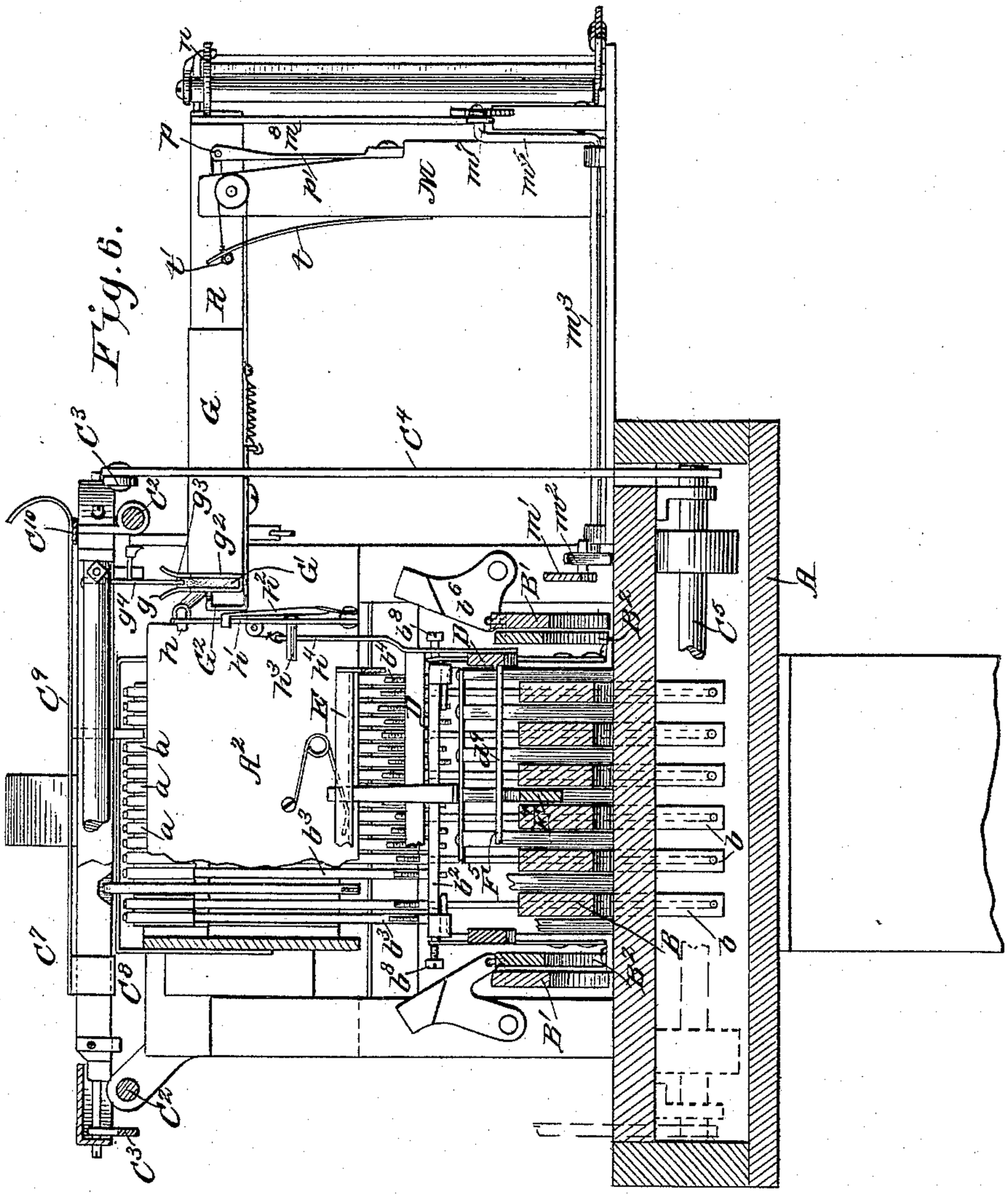

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TYPE SETTING MACHINE.

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Fig. 7.

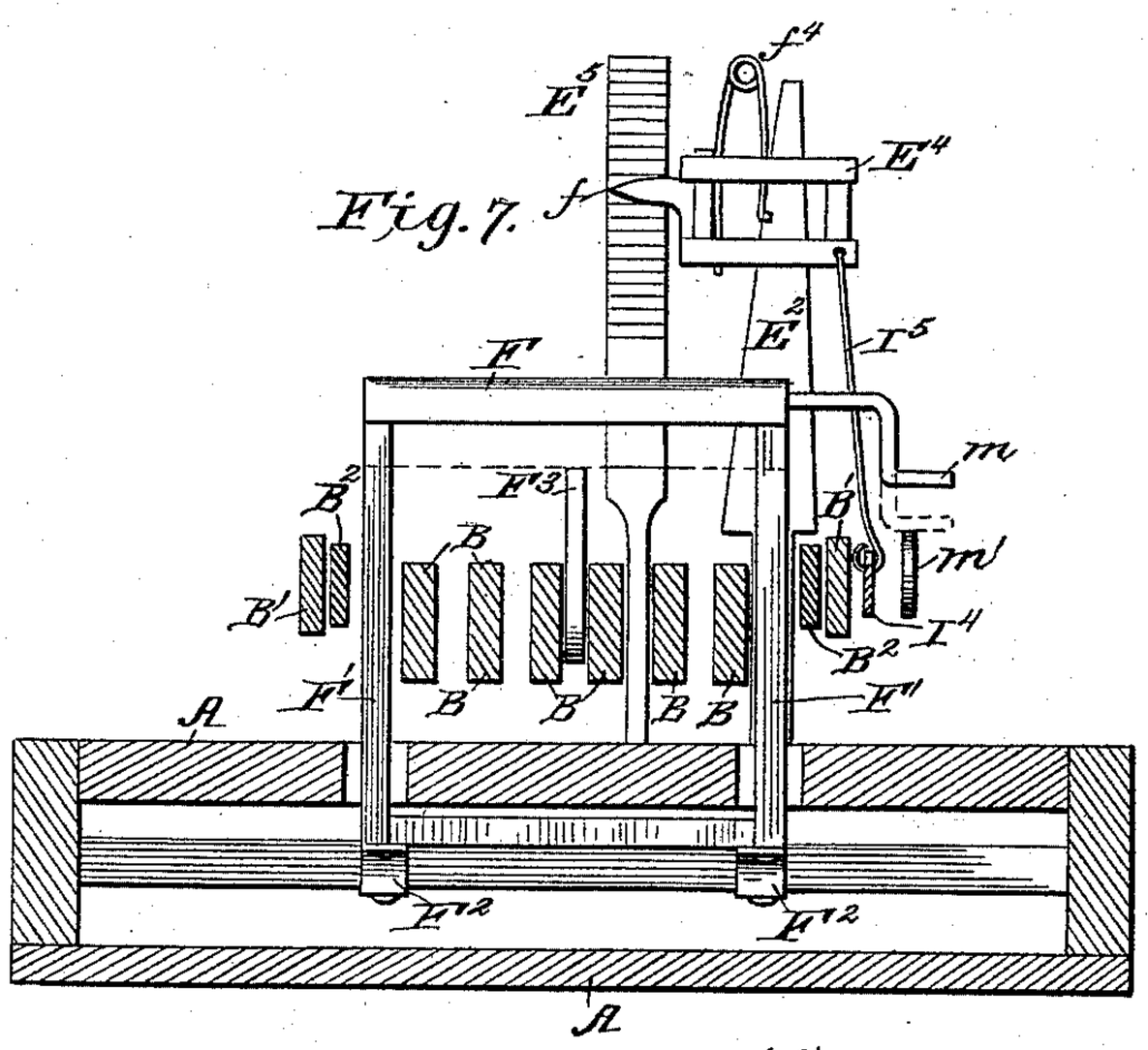
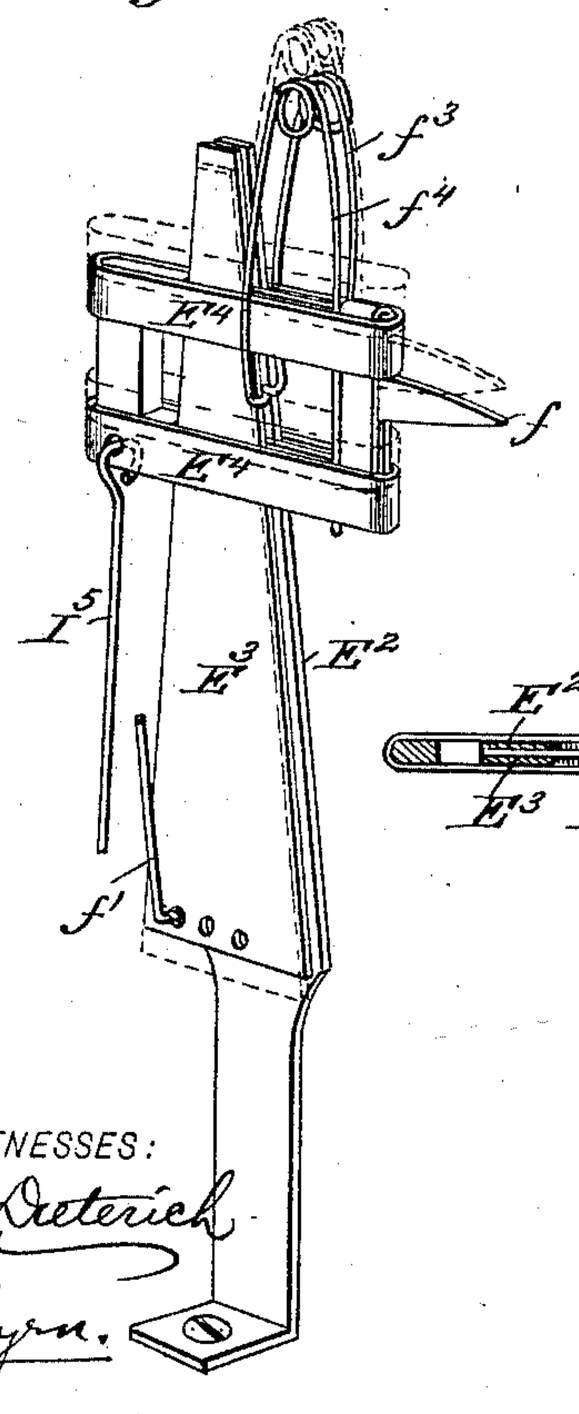
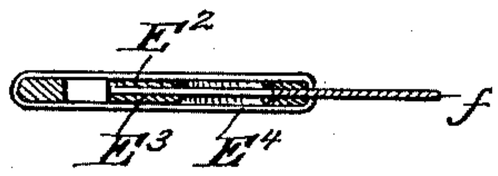


Fig. 8.





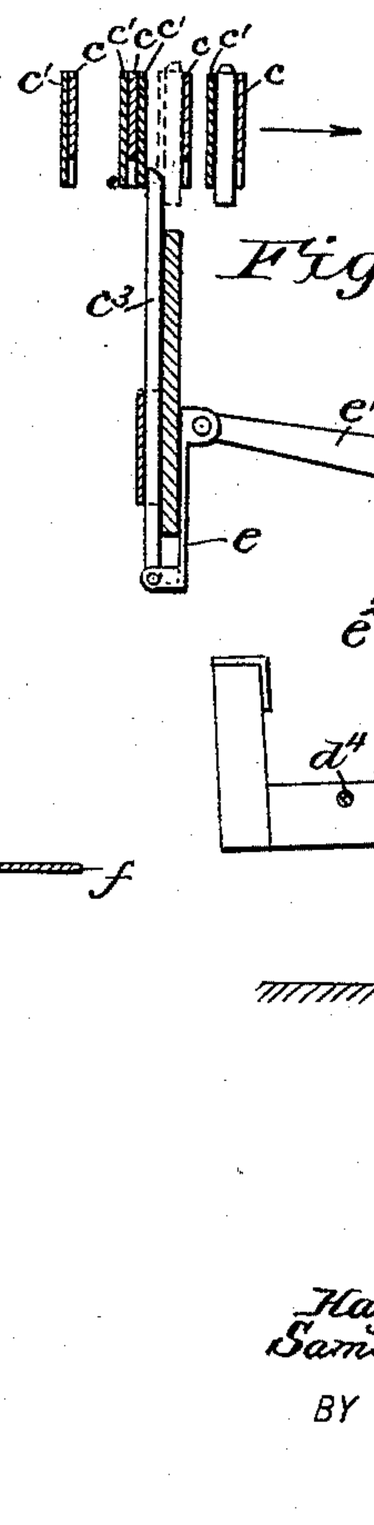
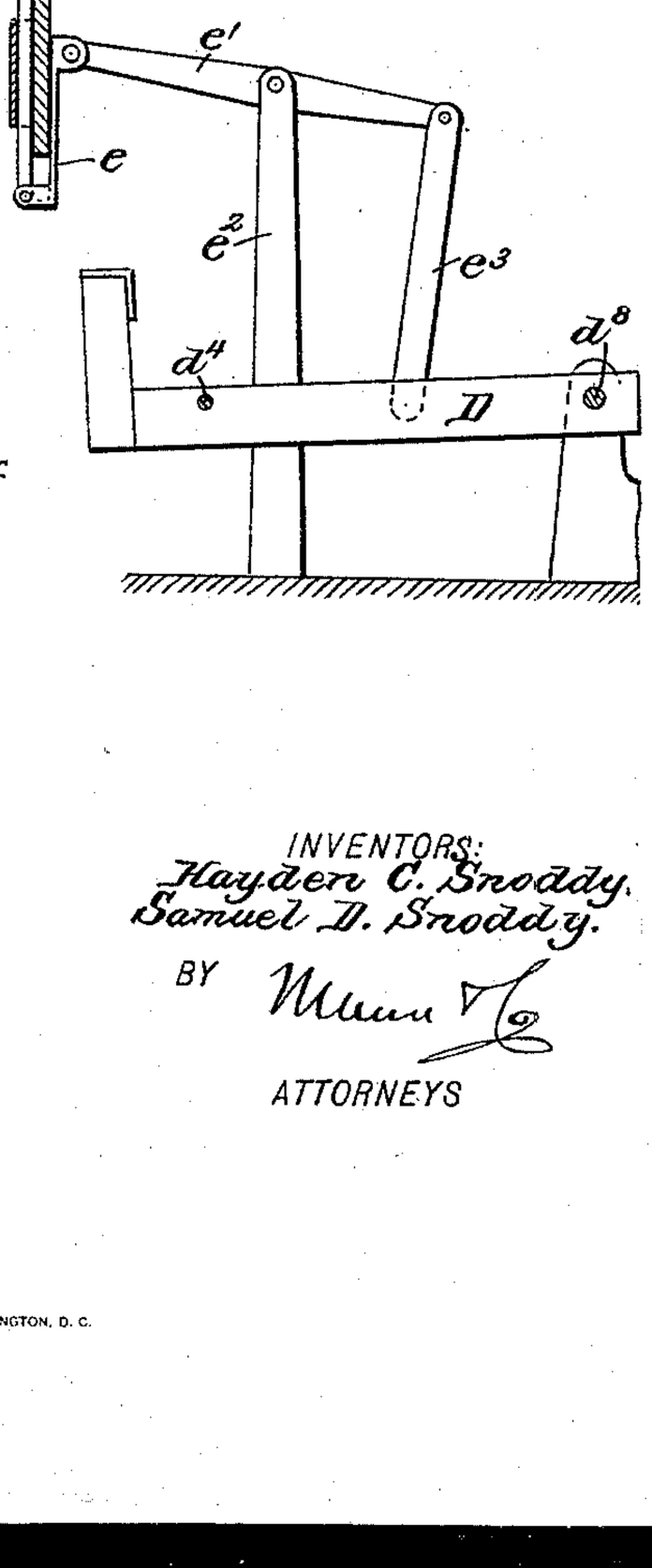


Fig. 9.



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TYPE SETTING MACHINE.

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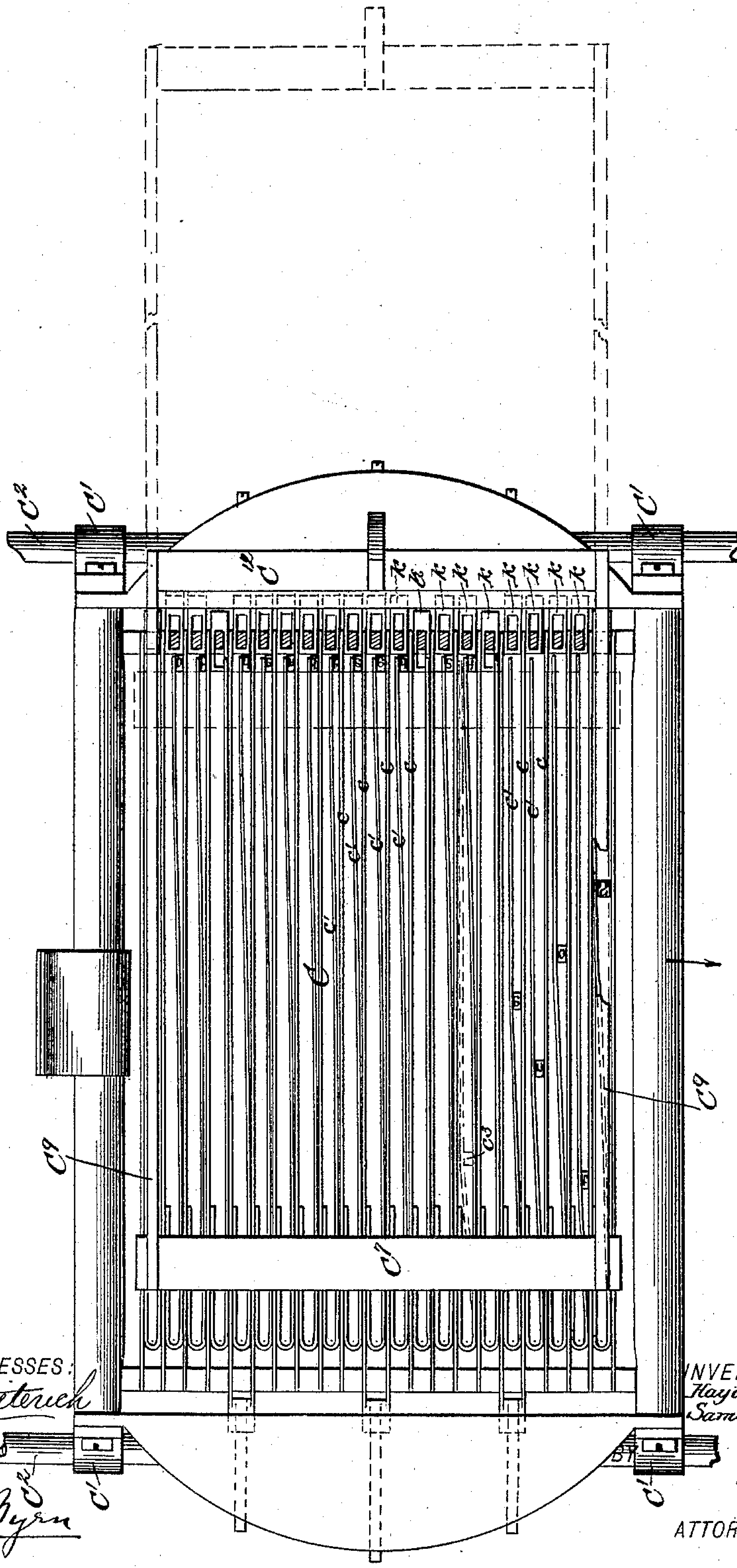
Fig. 10.



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TYPE SETTING MACHINE.

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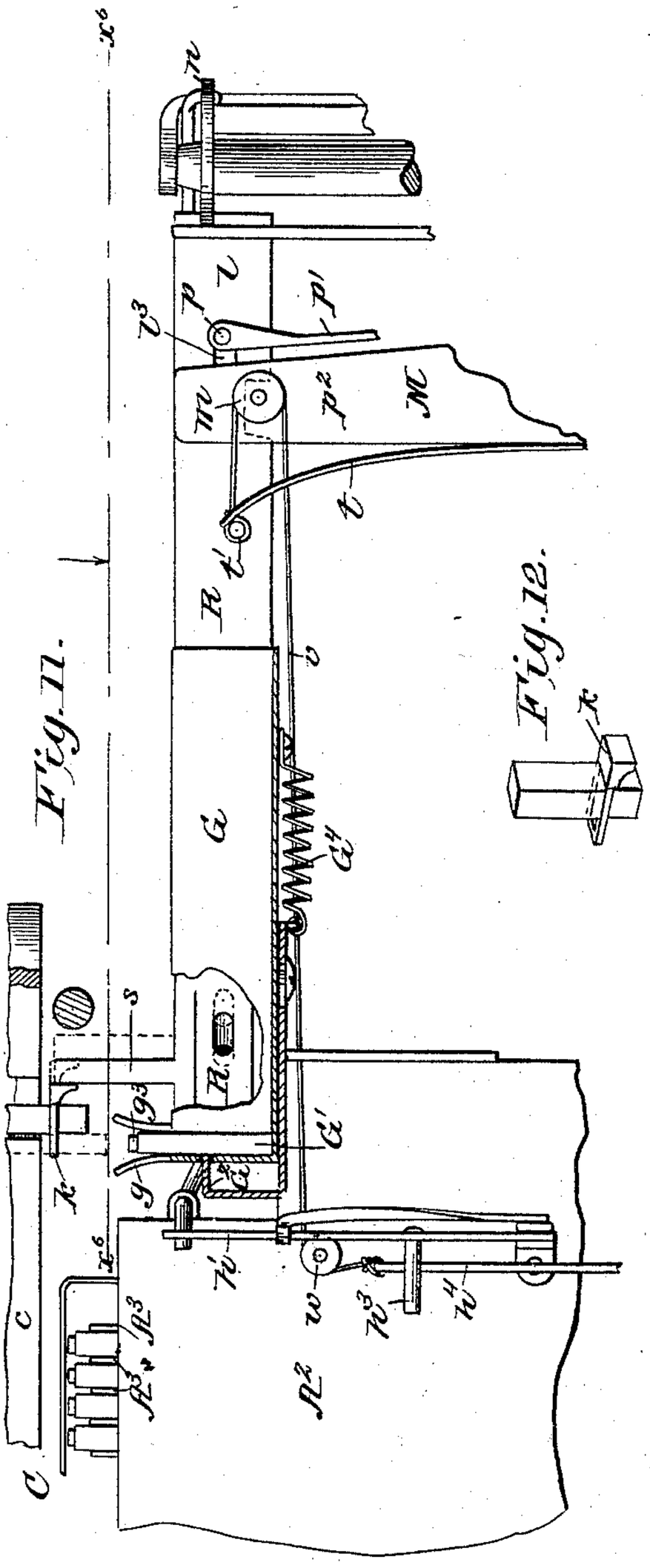

Fig. 11.

Fig. 12.

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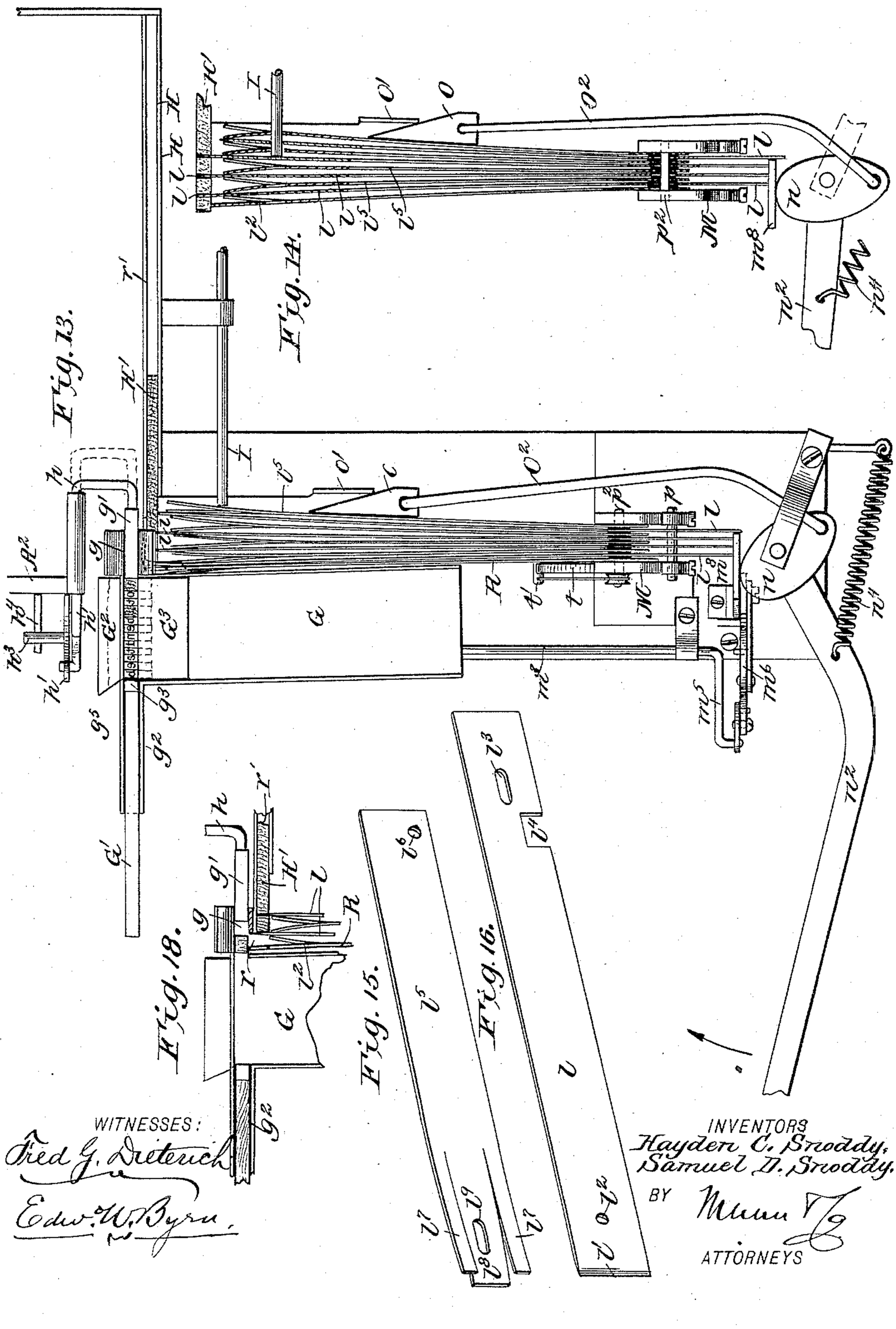

Fig. 13.

Fig. 14.

Fig. 18.

Fig. 15.

Fig. 16.

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UNITED STATES PATENT OFFICE.

HAYDEN C. SNODDY AND SAMUEL D. SNODDY, OF GREENVILLE, KENTUCKY.

TYPE-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,834, dated January 10, 1893.

Application filed June 6, 1891. Serial No. 395,337. (No model.)

To all whom it may concern:

Be it known that we, HAYDEN C. SNODDY and SAMUEL D. SNODDY, residing at Greenville, Muhlenberg county, and State of Kentucky, have invented a new and useful Improvement in Type-Setting Machines, of which the following is a specification.

The object of our invention is to provide a machine for rapidly setting type of the ordinary kind without mutilating or injuring the same, and also to provide means for spacing and justifying the lines of type automatically as they are set.

To these ends it consists in the novel construction and arrangement of the various parts which will first be fully described with reference to the drawings, and then pointed out in the claims.

Figure 1 is a vertical side elevation from the side of the machine to the left hand of the operator. Fig. 2 is a vertical side elevation from the side of the machine to the right hand of the operator. Fig. 3 is a top plan view of the machine. Fig. 4 is a vertical longitudinal section taken on line x—x of Fig. 3. Fig. 5 is a vertical section on line x^2—x^2 of Fig. 4. Fig. 6 is a vertical transverse section through line x^3—x^3 of Fig. 3. Fig. 7 is a vertical transverse section through line x^4—x^4 of Fig. 3. Fig. 8 is a perspective view of the type gage and indicator. Fig. 9 is a sectional view through line x^9—x^9 of Fig. 3. Fig. 10 is an enlarged plan view of the type carrier. Fig. 11 is an enlarged vertical section through line x^5—x^5 of Fig. 3. Fig. 12 is a detail in perspective of one of the temporary spacing slides at the end of the carrier frame. Fig. 13 is a plan view taken on line x^6—x^6 of Fig. 11. Fig. 14 is a somewhat similar view with the knives in section at their cutting ends. Figs. 15 and 16 are details in perspective of one set of the alternating springs and knives. Fig. 17 is a detail of the carrier escapement. Fig. 18 is a horizontal sectional detail of the type galley and its adjuncts.

The general features of our machine consist of a series of channels or magazines for holding the type, a series of ejectors for dislodging the type therefrom, which ejectors are operated by key levers provided with a bank of keys, and an intermediate carrier frame which receives the type successively until it contains a number necessary for a line of a column, which type are then moved up into a row at one end of the carrier and are successively dropped into the galley by the same operation which sets up the type in the carrier for the next row.

In the drawings A represents the base frame of the machine upon which are mounted vertical posts A′ (Figs. 1, 2, 4) sustaining at their upper ends a horizontal table composed of a series of parallel type channels or magazines A^3 (Figs. 3 and 4.) In these channels the type a are arranged with their printing faces up, the depth of the channels being equal to the length of the type, and the width of the channels being equal to the width of the type. At the ends of these channels is arranged a vertical abutment plate A^2 (Figs. 4 and 6) against which the type are forced and held with their lower ends exposed to the action of the ejectors beneath. These type are forced up to this plate in solid columns by means of followers A^4 of which there is one for each type channel, to which followers are attached cords a' that pass in grooves beneath the type and over pulleys a^2 and extend down through the base into a series of parallel pockets A^6 in each of which is a separate weight A^5 attached to each of said cords and which weights serve to press the followers A^4 up against their respective rows of type and compel the column of type to be fed along as fast as the type are removed from the ends thereof to be set.

The keys are mounted upon key levers B (Figs. 3 and 4) which are fulcrumed near the middle upon a bar B′ mounted in uprights B^{12} upon the base. These levers project under the abutment plate A^2 of the table (see Fig. 4) and have attached to their ends downwardly projecting plates b (Figs. 4 and 5) each of which has a hole in it through which the bent end of a lift rod b' extends. These lift rods extend through holes on a shifting bar b^2 which is arranged horizontally beneath the ejectors b^3. These ejectors b^3 correspond in number to the number of the type channels and they are arranged to reciprocate vertically in suitable guides just behind the abutment plate A^2 and immediately beneath the end types whose lower ends are exposed by being pressed from the column against said

abutment plate. Now when a key is depressed the rear end of lever B is elevated and the lift rod b' raises an ejector b^3 and forces out a type to the carrier located above it which receives it and disposes of it as hereinafter described.

To reduce the number of keys to a minimum, each key and lever is made to act upon three different sorts of type, the lower case, upper case, and a figure or character.

The lift rod b' from any lever is arranged to act normally upon a type ejector b^3 of the lower case and on one side of this type channel there is a channel provided with the same letter in upper case, and on the other side there is a channel provided with some figure or character. There are then groups of ejectors b^3 consisting of three, upon either one of which three ejectors the lift rod b' may be made to act (see Fig. 5).

The lift rod b' is made to act normally upon the middle one of the group representing the lower case letter as these are most frequently used but by shifting the bar b^2 to one side or the other, the lift rod b' may be made to act upon the ejector b^3 representing the capital of that letter, or upon a character or figure, dependent upon which way the bar b^2 is moved, the long lift rod b' and its pivotal connections to the plate b of lever B permitting this adjustment. The bar b^2 is held in its normal position by being mounted at one or both ends upon a spring b^5 and it is adjusted in one direction by a press plate b^6, and a shifting frame B′ (Figs. 2, 3, 5, 6) and in the other direction by a press plate b^7 and a shifting frame B^2. These shifting frames are hung to the press plates which are pivoted to the frame work and said shifting frames extend around the bank of keys and are normally held up (see Fig. 4) by springs B^3 and B^4 near their rear ends. The press plates b^6 and b^7 do not bear directly against the end of shifting bar b^2, but bear against set screws b^8 (Figs. 5 and 6) thereon which permit of an adjustment for wear or displacement.

C (Figs. 3, 4, 10) is the carrier frame which receives the type as they are ejected from the subjacent channels and hold them until a line is set up. This carrier is provided with guide eyes C′ C′ C′ C′ which slide upon horizontal parallel rods C^2 C^2 supported upon suitable portions of the frame work and arranged to hold the carrier close to the upper edges of the type channels. This carrier is arranged cross wise the type channels but is moved on its guide rods C^2 in direction longitudinal to said channels. This motion is provided for as follows (see Figs. 1, 2, 3, 4, 6). To each end of the carrier is jointed a curved link bar C^3 which is attached to the upper end of a vertical arm C^4 on each side of the machine. These arms work through slots in the base and are rigidly connected to a rock shaft C^5 (Figs. 4 and 6) under the base which is provided with one or more coil or spiral springs C^6 whose tension is such as to cause the arms C^4 to constantly pull the carrier frame C off from the type table and toward the bank of keys. A step by step escapement is given this carrier as it moves toward the operator by each movement of a key as a type is forced up from the type table into the carrier, but before we can intelligently describe this it will be necessary to first describe the construction of the carrier (see Fig. 10). It is a rectangular frame having a series of thin parallel partitions c running transversely to the type channels (see Fig. 3). In the spaces between these partitions are arranged flat springs c' which run the full length of the partitions and ordinarily lie flat against the same. The lower edge of each partition c is cut away at c^2 (see Fig. 9) at a point just above a movable detent c^3 which plays vertically just behind the abutment plate A^2. The flat spring c' is not cut away at such points and when the detent c^3 is up and the carrier is fed toward the operator (in the direction of the arrow, Figs. 9 and 10) it will be seen that the detent allows the partition c to pass but catches against and holds back the flat spring c', leaving an opening between said spring and the partition to receive the type as it is ejected from the table beneath. This opening is shown in full lines in Fig. 9, and in dotted lines, Fig. 10. After the type is forced up into this space by the ejecting mechanism heretofore described, the detent c^3 is withdrawn, and the flat spring c' being released it clasps and holds the type (as shown in Fig. 9) and in this way the type are successively received and held in the spaces between the partitions until enough for a full line has been set up.

We will now describe the means for giving the step by step feed to the carrier and the means for operating the detent c^3. Upon the under side of one end of the carrier frame C, is formed a series of ratchet teeth d (Figs. 1 and 17) made wide enough to receive the ends of two pawls d' and d^2. The pawl d' is fulcrumed to a bracket offsetting from the main frame and is forced upwardly by a spring d^3. The other pawl d^2 is connected to this pawl d' by a fulcrum pin d^4 and a slot d^5. The outer end of this pawl d^2 is connected by a rod d^6 with a feed frame D and this rod d^6 and pawls d' d^2 are strained toward the type table by a spiral spring d^7. The feed frame D is fulcrumed upon a shaft d^8 and its transverse bar d^9 (Fig. 3) at its end lies across all the key levers so that the operation of each one of the key levers raises the frame D and releases the carrier which through its escapement pawls d' and d^2 is allowed to move one space from the tension of the actuating arms C^4 every time a key is operated. This is accomplished as follows (see Figs. 1 and 17). When a key lever lifts frame D, the rod d^6 throws the pawl d^2 out of the ratchet d, while d' is engaged therewith. When the key lever and frame D fall, the descent of the attached rod d^6 throws the tooth of pawl d^2 into the ratchet and d' out of

engagement, and as d^2 has a slotted or slip connection at its fulcrum d^4, pawl d^2 slips back with the carrier frame the distance of one tooth of the ratchet. On the next movement the pawl d^2 is again released and slips forward over its fulcrum from the tension of the spiral spring d^7 ready to take a new hold. In this way a step by step feed is given the carrier over the feed table to bring a new type space of the carrier over the type ejectors. Acting simultaneously with this feed motion is that of the detent c^3 which by catching against the springs alternating with the partitions c of the carrier holds them open to receive the type. This detent c^3 (see Fig. 9) is connected at its lower end to a metal stirrup e attached to a lever e' fulcrumed upon a post e^2 and having its other end jointed to a rod or link e^3 connected at its lower end to the feed frame D so that every time this feed frame D descends after being raised by the operation of a key it simultaneously feeds the carrier forward and causes the detent c^3 to be elevated to catch against a spring c' of the carrier and hold it open for the reception of the type, and on the reverse movement the detent is withdrawn to allow the spring to clamp the type and allow the carrier to move forward again.

In order to enable the operator to know when a sufficient number of type have been temporarily lodged in the carrier we provide an indicator gage for this purpose and as the type vary in thickness it is obvious that this gage must be adapted to make a differential feed *i. e.* a feed that varies with the thickness of each type. For this purpose (Figs. 4, 5, 6) the ejectors b^3 have upon their feet screw stems b^4 of different heights, the height of each stem of each ejector being adapted to the width of the type which that ejector is intended to dislodge. These stems when the ejectors are lifted are made to act upon a gage frame E fulcrumed at E′ and are made to move it more or less according to the length of the stems b^4, a long stem b^4 representing a thick type giving a long movement to the gage, and a short one representing a thin type giving a short movement to the gage, thus making the movement of the gage commensurate with the thickness of each type. The gage (see Fig. 8) consists of two triangular or tapered bars E^2 E^3 having a sliding frame E^4 moving thereon and provided with an index finger f. One of these bars E^2 is stationary, and the other one is movable, being connected by a link f' at its lower end to an arm f^2 attached to the gage frame E (as in Figs. 1, 2, 4). As the gage frame oscillates from the lift of the ejector stems b^4 it causes the movable bar E^3 to rise and fall. The index frame E^4 has channels or guide holes through it that receive the two bars E^2 E^3 which lie side by side. This frame E^4 is provided with two springs f^3 f^4 which bear respectively upon the tapered edges of the two bars. E^5 (Fig. 7) is a graduated bar which lies behind the index finger f of the frame E^4 and whose graduations are pointed to by the finger to indicate the length of the line or width of the column to be set up. The action of this gage is as follows: When the movable bar E^3 is raised it raises the frame E^4 and its finger with it (as shown by dotted lines in Fig. 8) because the spring f^3 slides up to a smaller portion of bar E^2, the spring f^4 in this movement being prevented from slipping on the bar E^3 because it would have to rise onto a larger portion of bar E^3 and it prefers therefore to rise with said bar. On the downward movement of bar E^3 it slips down through the frame E^4 because it draws its smaller portion down under the spring f^4 thus leaving the frame E^4 and its index hand up to the position to which it was moved, and it matters not how much or how little movement is given to the bar E^3 this exact quantity is measured on the graduated bar to just the extent required by the type that is set, no matter how thick or thin this may be. It will therefore be seen as this gage is commensurate in its adjustment with the space occupied by the ever varying type in the line, the operator is always enabled to know at what point to terminate a line in order to justify it properly. As shown this gage is arranged in a vertical position, but it may be arranged horizontally or be otherwise disposed to suit the convenience of the operator or the construction of the machine.

After a word is set up, it is necessary to feed the carrier C a step to give a space between this word and the next. For this purpose a transverse bar F (Fig. 7) extends across the key levers and is held up by uprights F′ sustained upon springs F^2. This bar when depressed is arranged to strike a projection F^3 on a lever F^4 (Fig. 4) which latter lifts a cross bar F^5 fixed in the feed frame D, which moves the carrier one space as hereinbefore described, but without ejecting any type.

We will now describe the means for dislodging the type from the carrier C and feeding them to the galley. When all the openings between the partition c of the carrier are provided with type (except the openings corresponding to the spaces between the words) these type are by a single adjustment slid up to one end of the carrier where they are still held by the springs in perfect alignment. For this purpose we provide an alignment frame (Figs. 3 and 13) consisting of a metal bar C^7 arranged transversely above the partition of the carrier and a similar bar C^8 (Fig. 6) arranged below the same which two are connected to side bars C^9 C^9 connected at the other end by a cross bar C^{10} with a thumb piece for operating the same. Now when the type have been set in the carrier they are necessarily out of line (see first five spaces in Fig. 10) being held by the springs at points opposite to the channels in the magazine table. These type are simultaneously drawn to the discharge end of the carrier and main-

tained in line by drawing the alignment frame to one side by hand as indicated by the dotted lines in which movement the cross bars C^7 C^8 catch against the top and bottom ends of each type and drag them along in vertical position to the end of the carrier where they are still held by the springs c'. The alignment frame is then pushed back and the carrier frame is restored to its farthest position from the operator, so that the first type space of the carrier is over the ejectors again, and when the carrier is again fed to the operator the detent c^3 in dragging back the first spring c' of the carrier to make room for the first letter of the next row, releases the first letter of the aligned row at the end of the carrier and drops it into a hoppered receiving chamber g (Fig. 6) whence it is transferred to the galley G by operations which will be hereinafter described. Each successive step of feed, of the carrier in like manner performs for each space in the carrier the double function of dropping a type out of the aligned row and inserting another type behind the spring c'. In Fig. 10 in the position shown one row of type has been aligned and the first five letters of the next row have been set up into the carrier and in being set have dropped the first five letters of the aligned row.

From the chamber g into which the type falls it is transferred to the galley G as follows—(see Figs. 6, 11, 13): On one side the chamber g opens into the galley (Fig. 13) and on the other side of the chamber g is a plunger g' which advances to push the type into the galley at the right time against a receding bar G′ moving stiffly in a channel g^2 at right angles to the galley. This receding bar holds the type in upright or vertical position until a row of type is set up in the end of the galley and then a push plate G^2 moves up and forces this row into the galley as in dotted lines, Fig. 13 in order to make room for the next row's entrance into the end of the galley. The means for accomplishing these movements are as follows—The plunger g' is attached to a horizontal longitudinal sliding rod h which is jointed to the upper end of a vertical arm h' (Fig. 4). The latter is pivoted at its lower end to an offset from the abutment plate A^2 and is forced toward the abutment plate by a spring h^2 (Figs. 6 and 11) which holds the type plunger g' back away from the receiving chamber g. Upon the side of the arm h' is a horizontal pin h^3 against which bears a wedge shaped cam plate h^4 fixed to the feed frame D which is lifted by each movement of each key lever. This furnishes means for operating the type plunger. The receding bar G (Fig. 13) is pressed back by the advance of the row of type from the action of the plunger and moves stiffly, being clasped with a frictional contact by the sides of the channel in which it slides. This receding bar has at its inner end at the top a lug g^3 against which a downwardly projecting arm g^4 (Figs. 2 and 6) on the carrier strikes to carry the receding bar G′ forward again to the receiving chamber g whenever a new line of type is to be set up in the end of the galley. It will be remembered that the previous row of type in the galley had been forced up into the galley in direction longitudinal to the galley by a push plate G^2 which forces the column of type against a block G^3 (Fig. 13). This advance of the push plate is effected by a spring G^4 (Fig. 11) beneath the galley. To force the push plate back again out of the way of the incoming row of type the edge of the push plate G^2 is made beveled at g^5 (Fig. 13) and against this beveled edge the receding bar G′ bears to throw the push plate G^2 back out of the galley whenever the receding bar is dragged forward by the pendent arm on the carrier preparatory to setting a new line of type.

We will now describe the means for spacing the words and automatically justifying the lines of the type. At one end of the carrier C, there are a series of spacing slides k (Figs. 10, 11 and 12) one end of each of which projects into the space between the partitions c of the carrier, and the other end of which projects outside of the end of the carrier frame. There is one of these slides for each space in the carrier and their ends are square and exactly fill the space between the partitions c. At the beginning of the setting of type these spacing slides k are all forced into the spaces between the partitions and when the type for a single line have been set in the carrier and are forced up to the end of the carrier by the alignment frame, it will be seen that the type push out the spacing slides k wherever type are found in the spaces of the carrier but in the space which has no type in it, which represents the interval between two words, the slide k is not forced out but remains projected in, as shown at three places in Fig. 10. The difference in the positions of these slides is made the means of operating the spacing devices as hereinafter described.

Before describing the spacing devices themselves we would state that our spacing material and devices effect the automatic justification of the line of type. In setting up type in the ordinary way by hand, after a line has been set up, it will be found that the last letters of each line will not always come to the same point, and when there is some space to spare at the end of a line, but not enough for another syllable, the printer does what he calls "justifying" the type, *i. e.* he takes this fragment of space at the end of the line and divides it up or apportions it to the other spaces in the line by putting in "spaces," so that the last letter of each line will come in a vertical line. Our devices accomplish this difficult problem in an automatic manner. For this purpose we cut the spacing blocks for each line as it is set, the spacing blocks being cut of such width and in such number as shall not only space but also "justify" the

line. We prefer to use for these spacing blocks strips of any hard fine grained wood, which strips are sawed across the grain so that the cutting of this strip into spacing blocks may be easily accomplished by a cleavage parallel to the grain and transverse to the strip.

H (Figs. 2 and 13) is a channel for receiving the strip of wood H′. This channel is arranged horizontally beside the type plunger. This strip of wood is arranged to be cut at its ends into spacing blocks by a series of knives *l* (Figs. 13, 14, 16) which are arranged horizontally and at right angles to the wood strip, the ends of the knives cutting like chisels. To determine the quantity of wood cut off, and the number of subdivisions into which it is split a stop bar I is arranged to slide horizontally beside the channel H and at right angles to the knives *l* and in line with holes in the same. This stop bar has an arm I′ (Fig. 2) that is connected to a long rod I^2 which extends to the front of the machine and is jointed to the top of a vertical arm I^3 of an elbow lever whose horizontal arm I^4 is connected by a rod I^5 with the gage frame E^4 (Figs. 2, 7 and 8). As the position of the gage frame indicates the amount of space in a line filled by type and also the amount of space not filled it will be seen that the amount of movement which it transmits to the stop bar I is made the means of determining how much of the wood strip is to be cut off to fill the aggregate quantity of space in each line. Whatever this aggregate space may be, it must be divided into a variable number of subdivisions according to the number of spaces between words of that line, and for this purpose a greater or less number of the knives are distributed over this space and made to cut in an automatic manner as follows: On the end of the spacing bar F is a tappet arm *m* (Figs. 2 and 7) which when the spacing bar is depressed strikes against a long lever *m′*. The other end of this lever *m′* is provided with a pin (Figs. 2, 3, 6) that lifts the arm m^2 of a rock shaft m^3 which latter is disposed at right angles to the lever and has its arm m^2 held down by a spring m^4 (Fig. 2). At the other end of the shaft there is rigidly attached an arm m^5 bearing a pawl m^6 which rests upon a curved segment of ratchet teeth m^7 attached to an intermediate press bar m^8 (Figs. 2, 3, 6, 13). As the rock shaft rocks, its pawl feeds up the segment, which is held from coming back when the actuating pawl recedes by means of a second pawl m^9 (Fig. 2) which acts as a detent. This intermediate press bar at its upper end is designed to pass immediately in rear of the knives *l* (Figs. 13 and 14) and is made to advance with each movement of the spacing bar F behind another knife so that after a line of type is set up the bar m^8 will rest behind as many knives *l* (three as shown) as there are to be spaces in the line. These knives are then advanced to cut just the number of spacing blocks from the wooden strip, the other knives not being acted upon. For this purpose the intermediate bar is pressed forward by a cam *n* on the upper end of a vertical rock shaft *n′* which is provided with a radial handle n^2 which is seized by the operator and deflected horizontally toward the keys to force the requisite number of knives forward and cut the requisite number of spacing blocks from the wooden strip for the spaces in that line. The intermediate press bar m^8 is moved in the opposite direction to its feed by a spring n^3 (Fig. 2) and the vertical rock shaft *n′* and its handle are forced in a direction opposite to its cutting movement by a spring n^4.

We will now proceed to describe how any given number of the knives are made to distribute themselves over the aggregate amount of space to be cut off the wood strip so as to make the spacing blocks of equal size. The knives *l* (Figs. 13 to 16) are in number equal to the greatest number of spaces that it is possible to have in a single line. These knives *l* are of the shape shown in Fig. 16 having cutting ends *l′*, a circular hole l^2 near their cutting ends, a slot l^3 in their opposite ends, and a notch l^4 in their lower edges near the slot. Alternating with these knives are a series of spreading springs l^5 (Fig. 15) which have a hole l^6 at one end, a slot l^9 at their other ends and slitted tongues l^7 l^7 l^8 which in tending to spring away from each other tend to separate or press apart the knives *l* between which they are placed. Ordinarily the knives and springs are pressed closely together by a wedge block *o* placed between the outer knife and a bracket *o′*. This wedge block is connected by a rod o^2 to the cam *n* so that the same movement that advances the knives to cut also withdraws the wedge block to allow the knives to spread out to their proper positions. The knives are supported at their outer ends by a pin *p* (Figs. 6, 11 and 13) which passes through the slots l^3 in the ends of the knives, which pin is sustained upon upright springs *p′* on a standard M, and which springs draw back the knives after being advanced to make the cut. The spreading springs l^5 which alternate with the knives are hung upon an axial pin p^2 which passes through the holes l^6 near the ends of the springs and is fixed in the standard M, the knives being notched or cut away at this point as shown at l^4 so as to make them wholly independent of the springs in their action. The holes l^2 of the knives and the slots l^9 of the springs normally coincide with each other and through them the stop bar I is adapted to pass which stop bar determines the number of knives that are to be worked. When the end of the line of type is reached the end of this stop bar forms a limit to determine the amount of wood strip to be cut off (equal to the aggregate spaces) and against this stop bar the knives are allowed to expand by the withdrawal of the wedge block. Just before this takes place, however, the cam *n* by its initial movement starts up as

many knives as there are spaces to be put in that line so that their holes l^2 are out of registration with the stop bar (see Fig. 14) the holes of the other knives and the slots of their springs being still in registration with the stop bar. The result is that when the wedge block is withdrawn, the knives all expand from the action of the alternating springs and the knives and springs which are not to be used in cutting spring over the stop bar (the latter passing through their holes) while the active knives (having their holes out of registration by their initial movement) are stopped against the end of the stop bar and are separated an equal distance from each other by the alternating springs, all as shown in Fig. 14. These active knives then advance on to the wooden strip and cut off into equal subdivisions the amount of wood strip required to fill all the spaces as measured by the stop bar, and into as many subdivisions as there are spaces in that line.

We will now describe the means for feeding these spacing blocks (which have been cut) into their appropriate places between the words of the line of type. Between the channel for the wood strip and the chamber in front of the type plunger there is an opening r Fig. 18 through which each spacing block is forced at the proper time so as to be forced up by the type plunger and incorporated in the line of type. This opening is closed during the cutting action by an adjustment given to one side r' of the channel for the wooden strip which is made to slide longitudinally. When the carrier C is moved back, however, this side is slid back and the opening r exposed. It is then only necessary to utilize the different positions of the slides k at the end of the carrier C to cause the spacing blocks to be fed into their appropriate places. In line with the opening r and parallel with the knives there is a spacing block plunger R (Figs. 11 and 13) which is made of the same general shape as one of the springs between the knives, but has an arm s (Fig. 11) which projects upward into range of engagement with the spacing slides k. This plunger R is pressed forward to feed a spacing block through the opening r by a spring t mounted on standard M and bearing against a pin t' on the plunger. Now as the carrier C moves along whenever one of its slides k comes opposite arm s and that slide is forced out by the presence of a type within the carrier, the plunger R cannot move forward to feed a spacing block through the hole r, but when a slide k comes opposite arm s and this slide is forced into the carrier to form a temporary spacer, then there is nothing to oppose arm s, and the plunger R advances and forces a wooden spacing block through the hole r into the chamber or front of the type plunger, as in Fig. 18. The plunger R is immediately drawn back by a cord v (Fig. 11) which is attached to pin t' and passes around pulleys u and w and connects with the wedge shaped cam h^4 (Figs. 6 and 11) attached to and operated by the feed frame.

In making use of our principle of cutting automatically the spacing blocks to the exact size required to justify the type we do not confine ourselves to a wooden strip but may use any other material capable of certain and easy subdivision.

With reference to the setting up of a line of type on the carrier frame, it will be perceived that by this means we are enabled to move the type the shortest possible distance prior to collecting them by one movement in a line.

In carrying out the various features of our invention we would have it understood that we do not confine ourseves to the particular construction and arrangements of parts as shown as many of the details may be changed without departing from the main principles of our invention.

Having thus described our invention what we claim and desire to secure by Letters Patent is—

1. In a type setting machine, the combination, with the type magazine, and the ejecting devices; of an intermediate carrier frame having longitudinal partitions arranged at right angles to the type magazines, and clasp springs arranged between the said partitions for holding the type, substantially as shown and described.

2. In a type setting machine, the combination, with the type magazine, and the ejecting devices; of an intermediate carrier frame having longitudinal partitions and springs arranged at right angles to the magazines, and an alignment frame moving longitudinally over these partitions, and adapted to transfer the type as set in the spaces between the partitions to an aligned position at the end of the frame, substantially as shown and described.

3. The combination in a type setting machine, of the type magazines, the ejecting devices, an intermediate carrier frame having partitions c arranged at right angles to the magazines with notches in their lower edges, clasp springs c' arranged beside the partitions, a detent operating through said notches on the springs to open them, and a feed mechanism for the carrier frame, substantially as shown and described.

4. The combination in a type setting machine, of a series of type magazines, a carrier frame with partitions and clasp springs arranged at right angles to the type magazines, and a series of spacing slides arranged at the end of the carrier and adapted to be projected into the spaces of the carrier frame and be expelled from the same by the pressure of the type when aligned, the slides which are not so expelled serving as temporary spaces for separating the words substantially as shown and described.

5. In a type setting machine, the combination, with the type magazines, and the corresponding ejectors b^3; of a horizontally arranged and longitudinally adjustable shifting bar b^2 having guide holes through it and arranged beneath the ejectors, a series of lift rods b' arranged to operate on two or more of the ejectors, and the key levers B loosely connected to the lift rods, substantially as shown and described.

6. In a type setting machine, the combination with the type magazines, and their ejectors; of a series of lift rods each arranged to operate upon two or more of the ejectors, shifting devices for the lift rods, and key levers connected to the lift rods, substantially as shown and described.

7. The combination, with the ejectors b^3, and the lift rods b'; of the longitudinally adjustable shifting bar b^2 carrying the upper ends of the lift rods, push plates arranged at the ends of the shifting bar, and actuating frames for the push plates, substantially as shown and described.

8. The combination, with the type magazines; of the carrier frame C, arranged upon the horizontal guides to move over the magazine and having a series of ratchet teeth on its under side, a pair of spring actuated rocking arms and links for drawing the carrier forward, and an escapement connected to and operated by the keys for releasing the teeth of the ratchet one at a time and giving a step by step progressive feed to said carrier, substantially as shown and described.

9. The combination, with the spring actuated carrier frame C, having ratchet teeth on its lower side; of a pair of pawls d' d^2, the pawl d' having a stationary fulcrum and forced upwardly by a spring, and the pawl d^2 being fulcrumed by a slot to d', the rod d^6 and the feed frame D operated by the key levers, substantially as shown and described.

10. The combination, with the type ejectors having stems or lifting projections b^4 made of a variable height adapted to the thickness of type which they represent; of a gage acted upon through these lifting projections to give a cumulative movement to the gage which shall be commensurate with the aggregate width of the type in this line substantially as shown and described.

11. The combination, with the type ejectors having stems or lifting projections b^4 of a variable height adapted to the thickness of the type which they represent; of a gage frame E, and the gage consisting of the two tapered bars E^2 E^3, one stationary and the other sliding, and the index frame E^4 sliding over the edge of bars E^2 E^3, with a frictional contact, substantially as shown and described.

12. The mechanism for measuring the progression of a line of type of variable thickness consisting of the two tapered bars E^2 E^3, one movable and the other stationary and an index or pointer frame E^4 having a frictional contact with the edges of the said tapered bars, substantially as shown and described.

13. In a type setting machine, the combination with the galley for receiving the type; of a spacing and justifying device arranged to cut and feed spacing blocks from a single continuous strip of material, which blocks are adapted automatically in number and size to suit the spaces of the line, substantially as shown and described.

14. A type setting machine having a continuous spacing block strip arranged to be cut into spacing blocks of definite size and number, in combination with means for cutting said strips into blocks and adjusting said blocks to place, substantially as shown and described.

15. In a type setting machine, having a continuous spacing block strip, the combination with a spacing mechanism and a series of knives for cutting the spacing blocks; of a press bar connected to the spacing mechanism and arranged to pass behind as many of the said knives as there are spaces in the line, and means for forcing the press bar and the specified number of knives into cutting action, substantially as shown and described.

16. In a type setting machine having a continuous spacing block strip, the combination with a gage mechanism for indicating the aggregate amount of spaces in a line; of a series of knives for cutting the spacing blocks, and a stop bar connected to and operated by the gage mechanism for determining the amount of material to be cut from the spacing block strip, substantially as shown and described.

17. The combination of the spacing block knives l, the alternating expanding springs l^5, the stop bar I, the wedge block o, the press bar m^8, and the cam n, substantially as shown and described.

18. The combination, with the carrier having temporary adjustable spacing slides k; of the spacing block plunger R having arm s adapted to engage with the slides and means for operating said plunger, substantially as shown and described.

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