J. S. BANCROFT & M. C. INDAHL.

JUSTIFYING MECHANISM FOR PATTERN CONTROLLED COMPOSING MACHINES.

APPLICATION FILED OCT. 23, 1908.

952,597.

Patented Mar. 22, 1910.

11 SHEETS—SHEET 1.

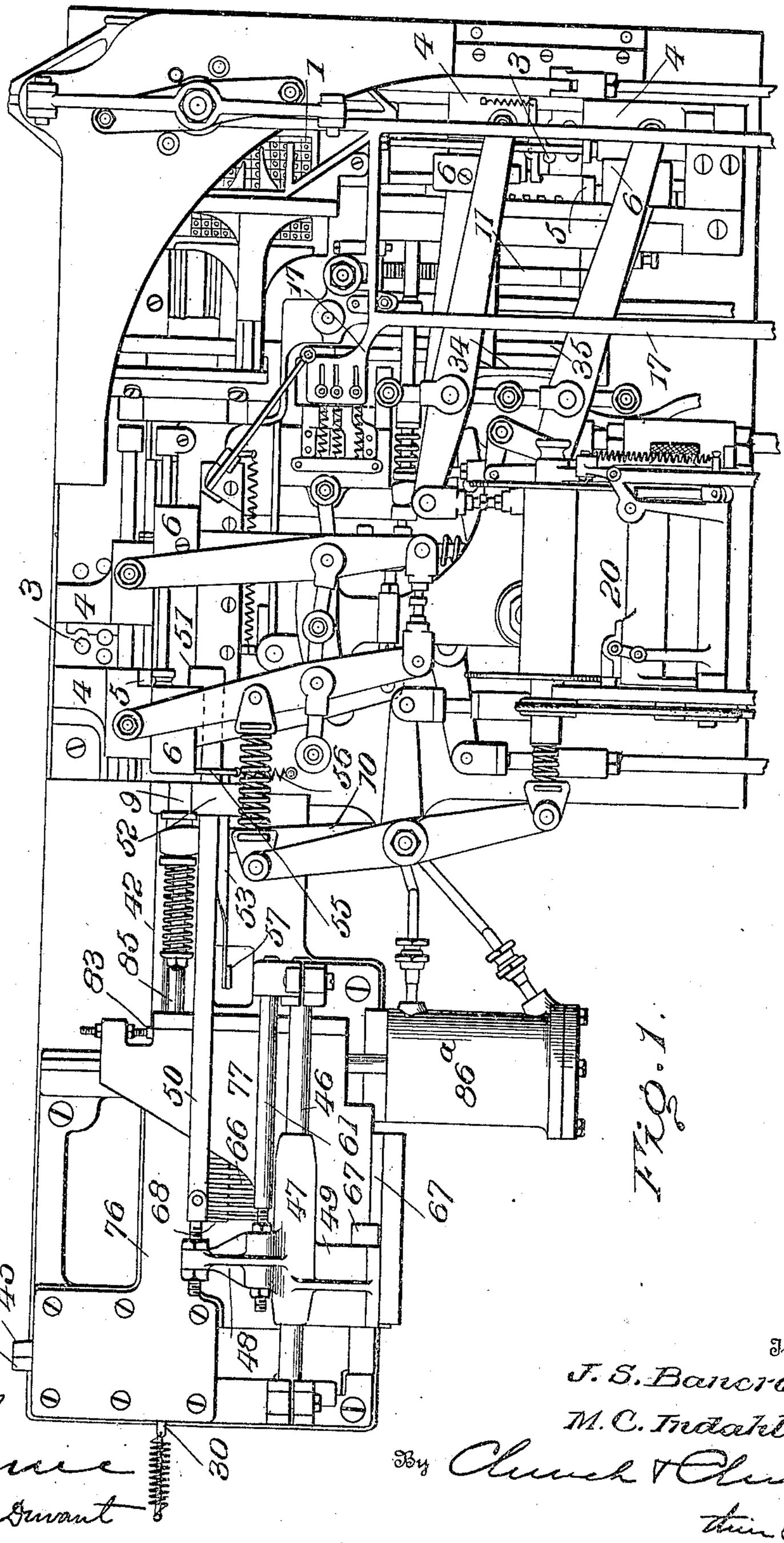

FIG. 1.

Witnesses

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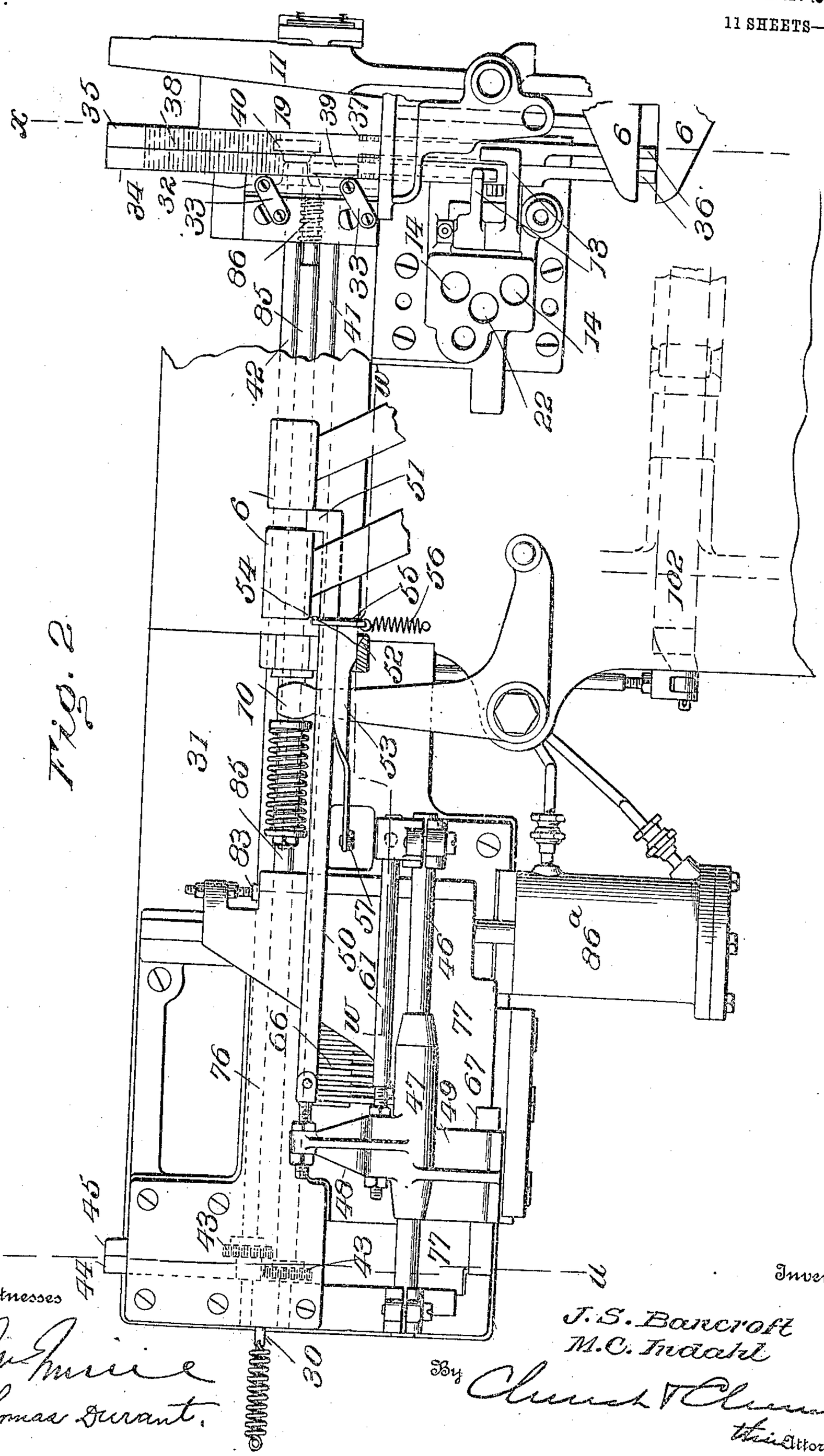

Fig. 2.

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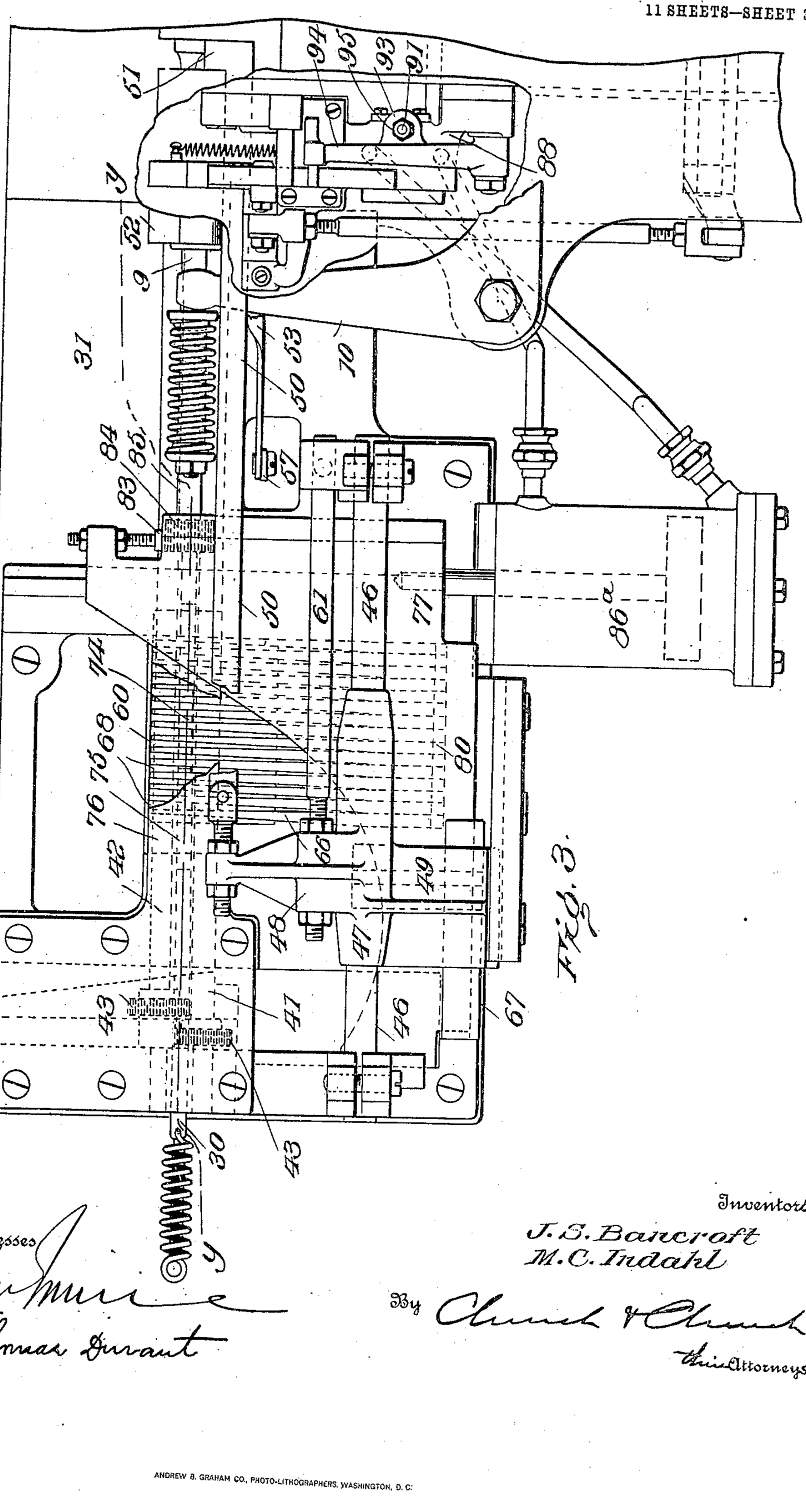

Fig. 3.

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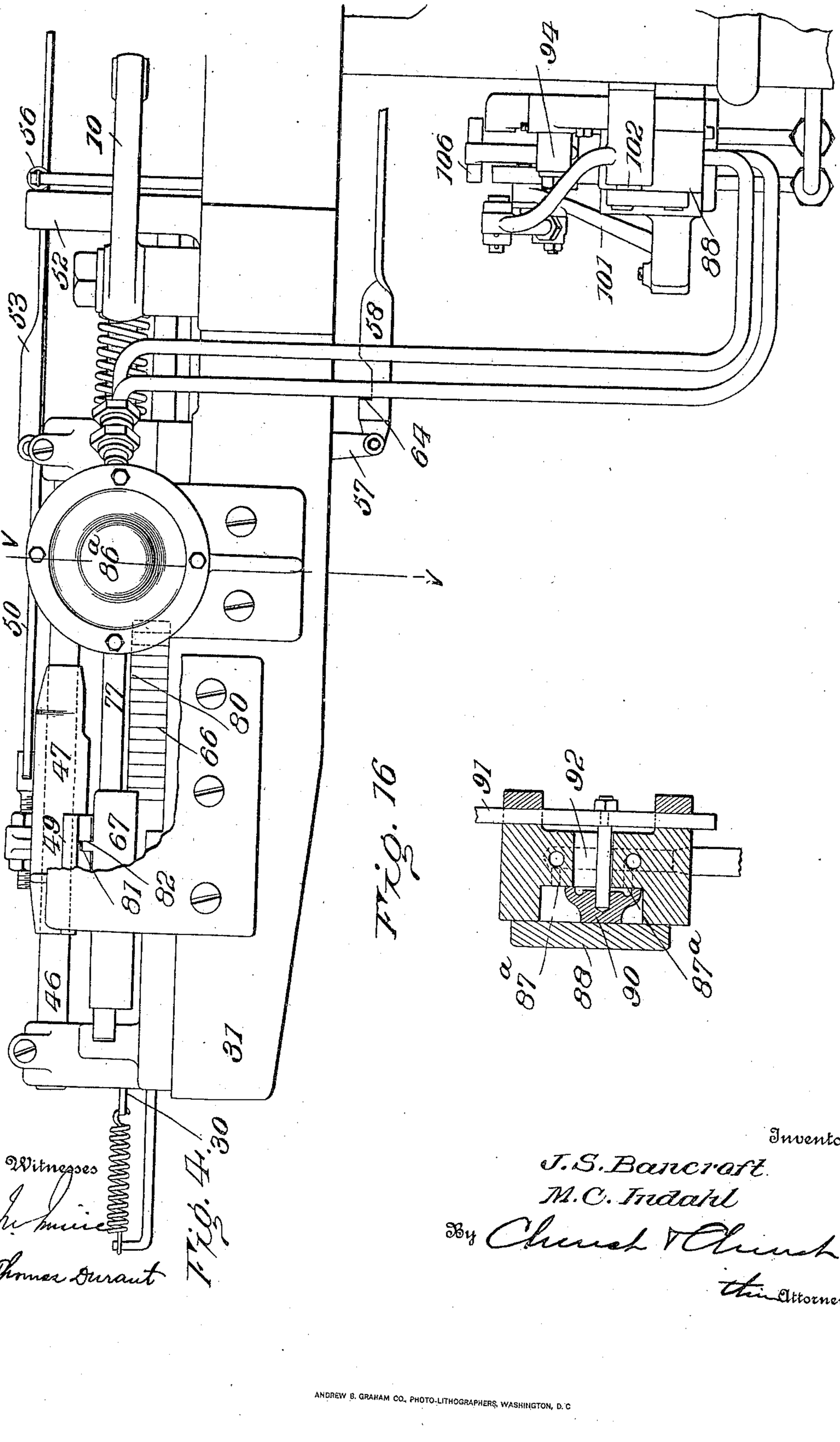

Fig. 16

Witnesses

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Fig. 4.

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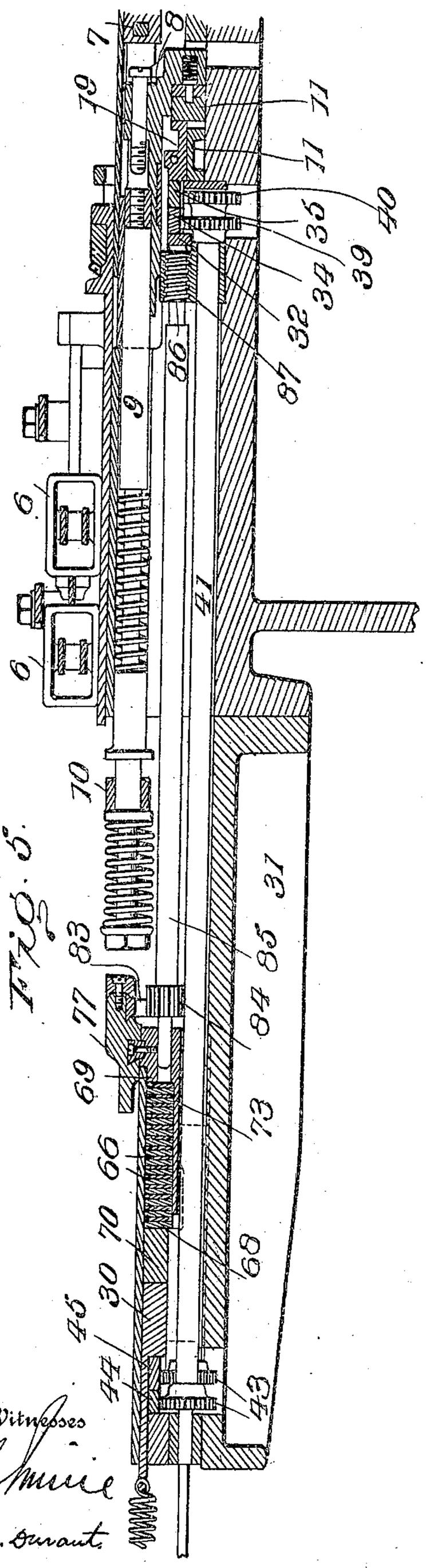

FIG. 5.

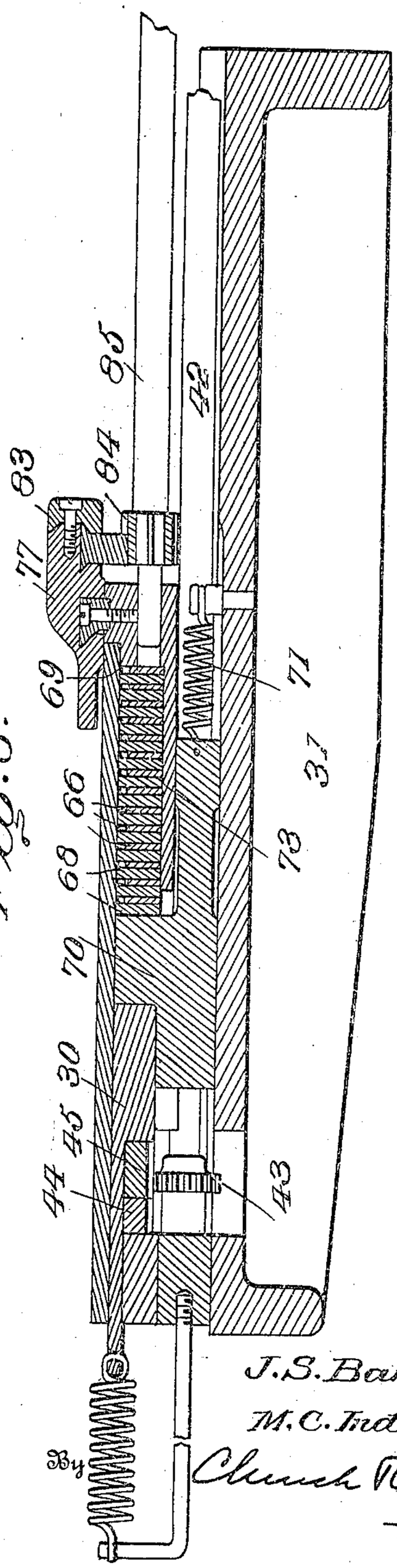

FIG. 6.

Witnesses

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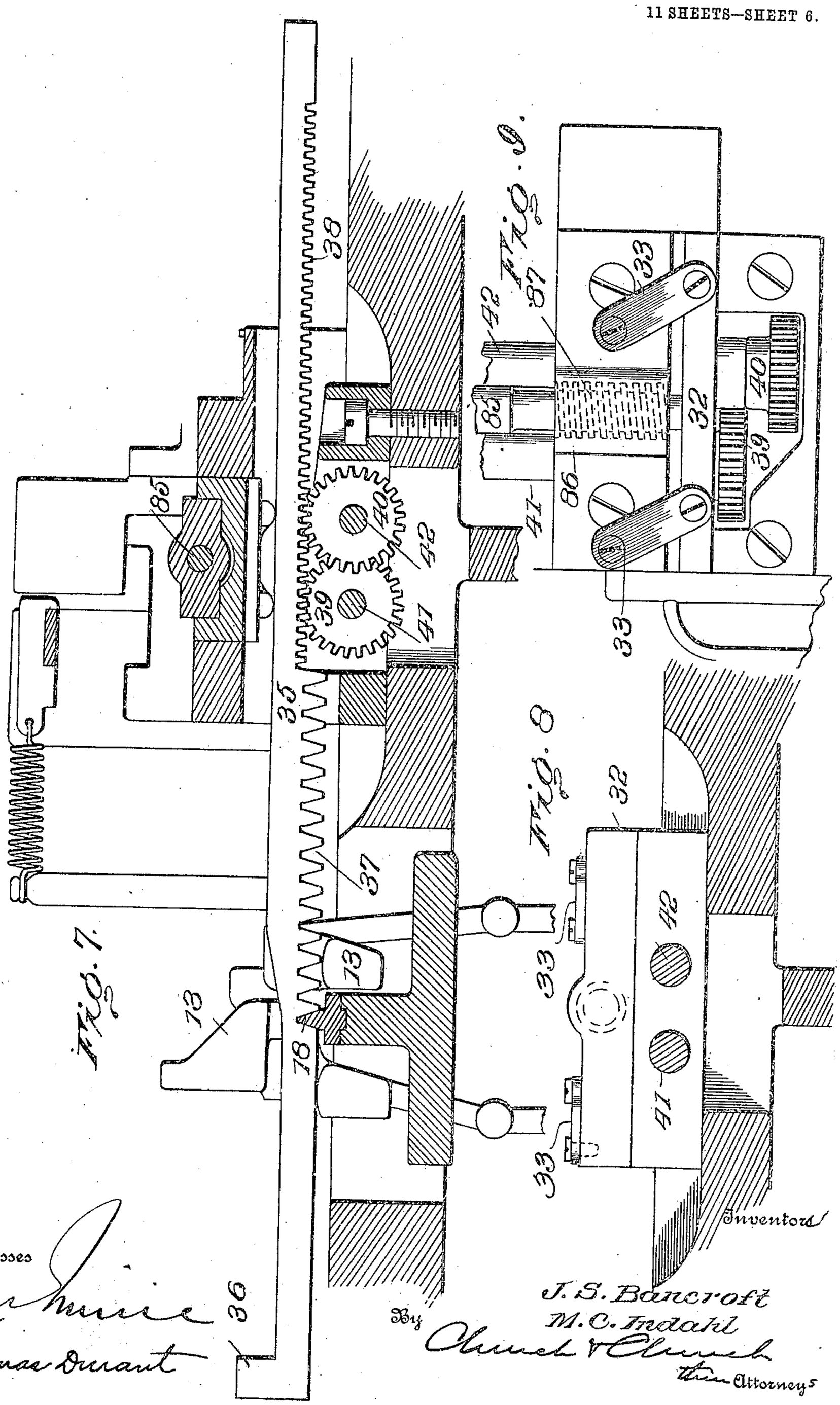

Fig. 7.

Fig. 8.

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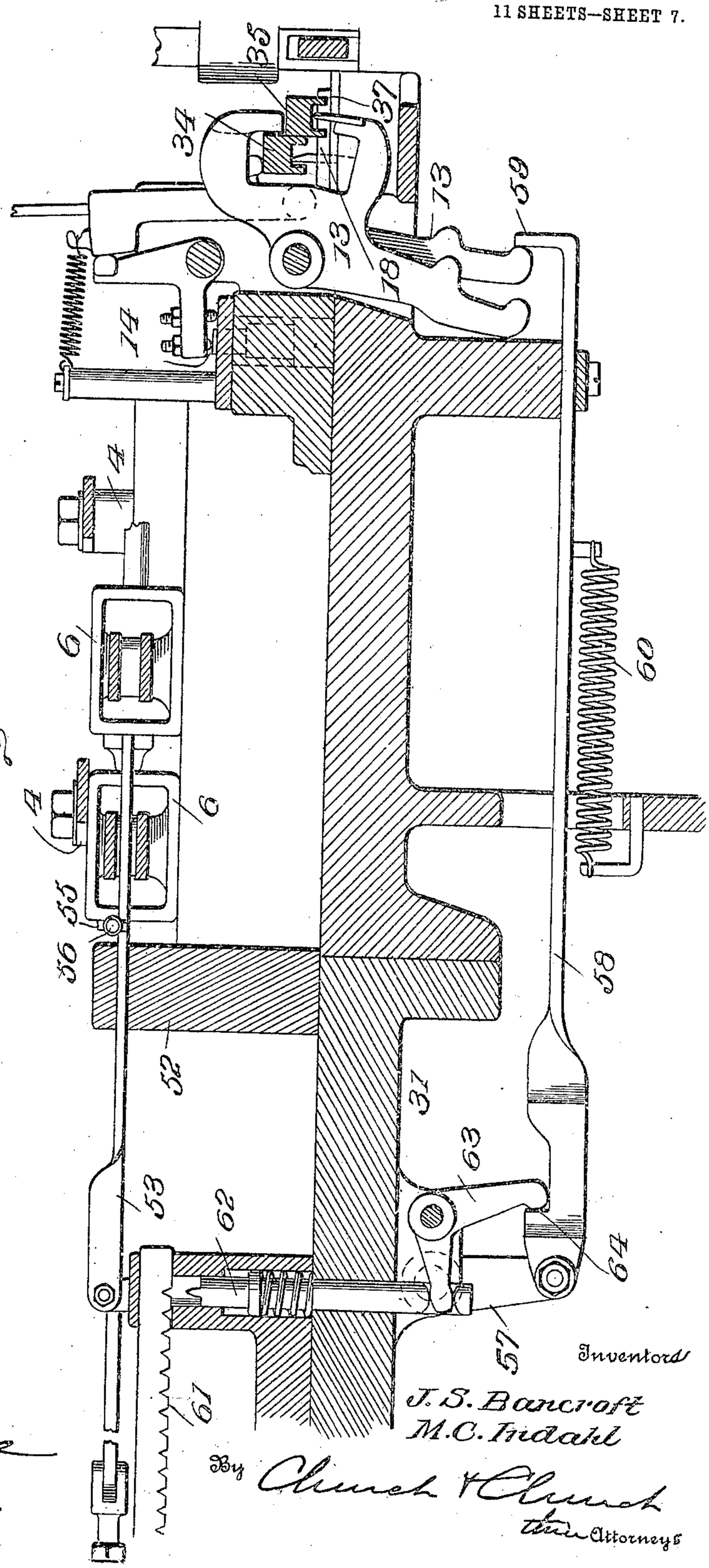

Fig. 10.

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Fig. 11.

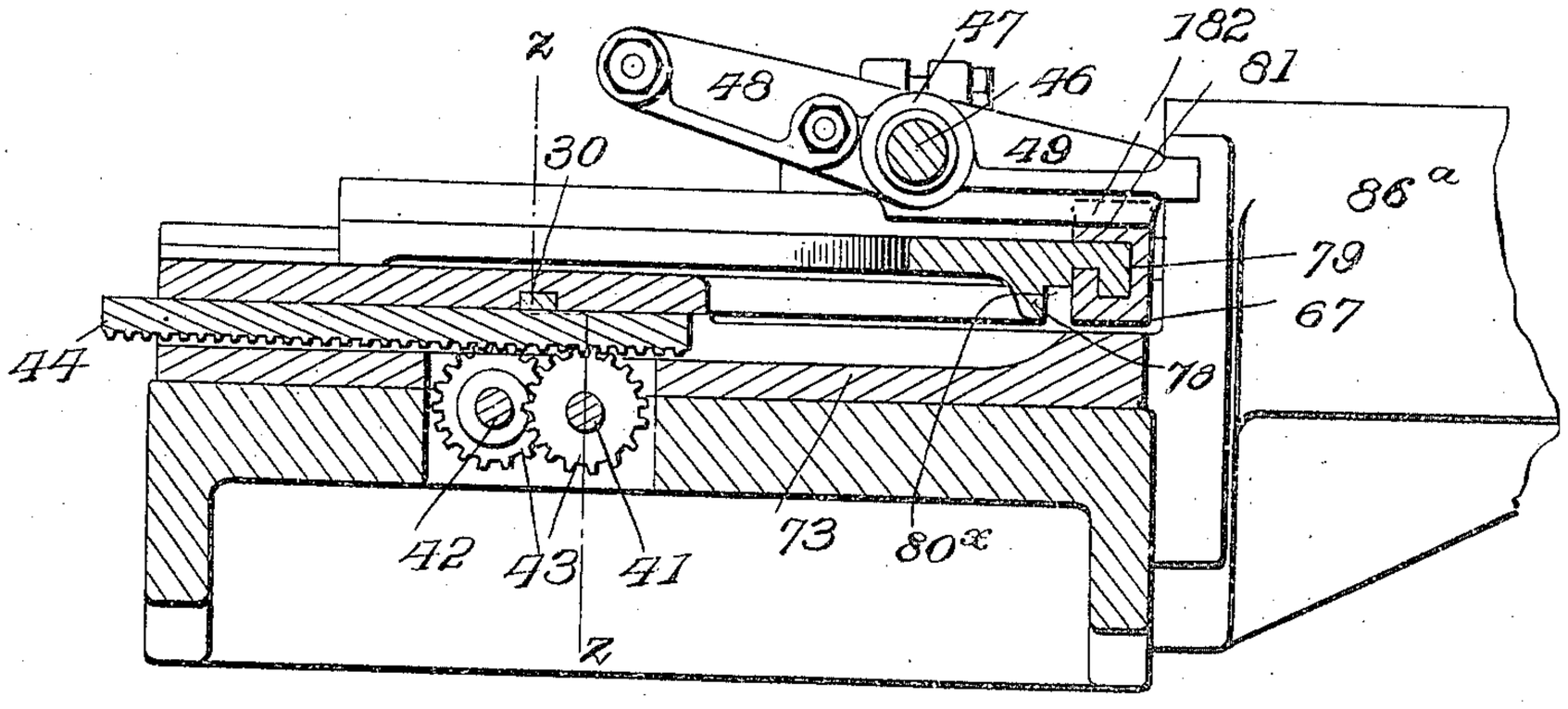

Fig. 12.

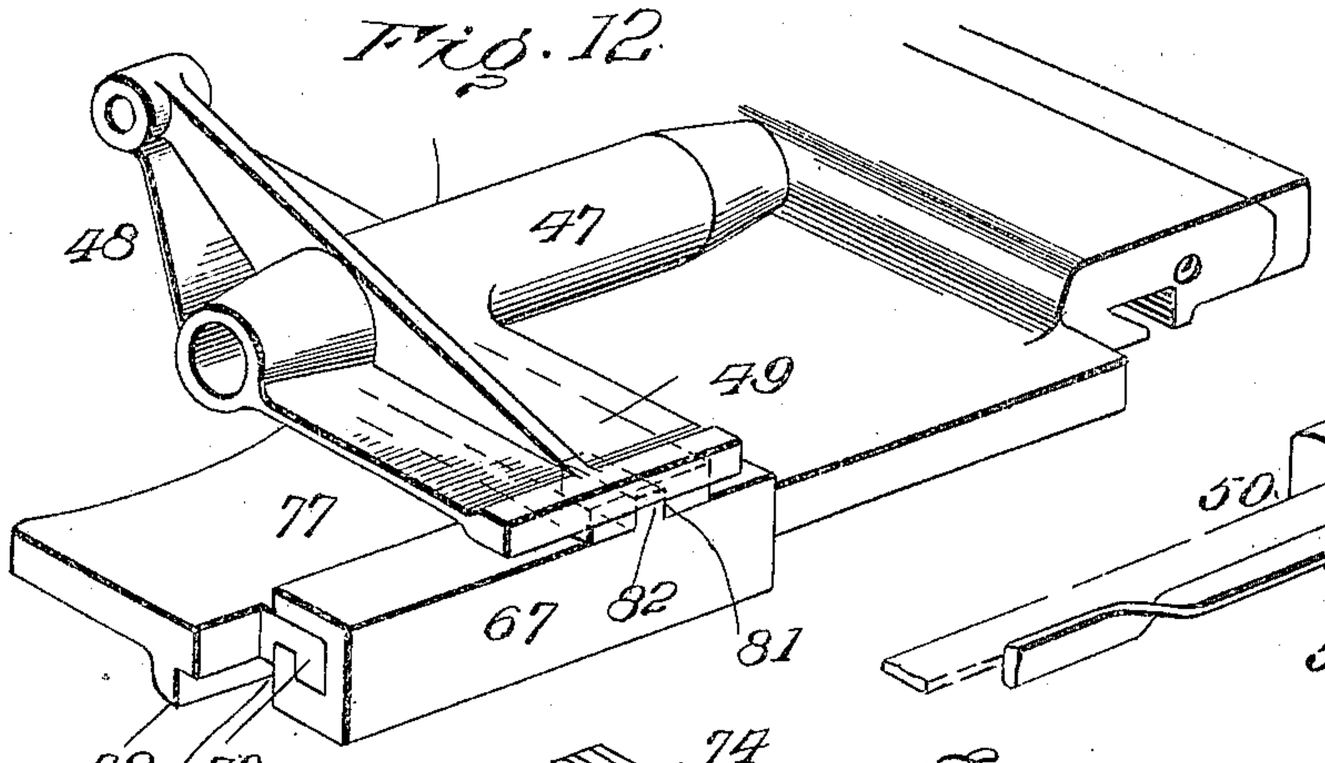

Fig. 13.

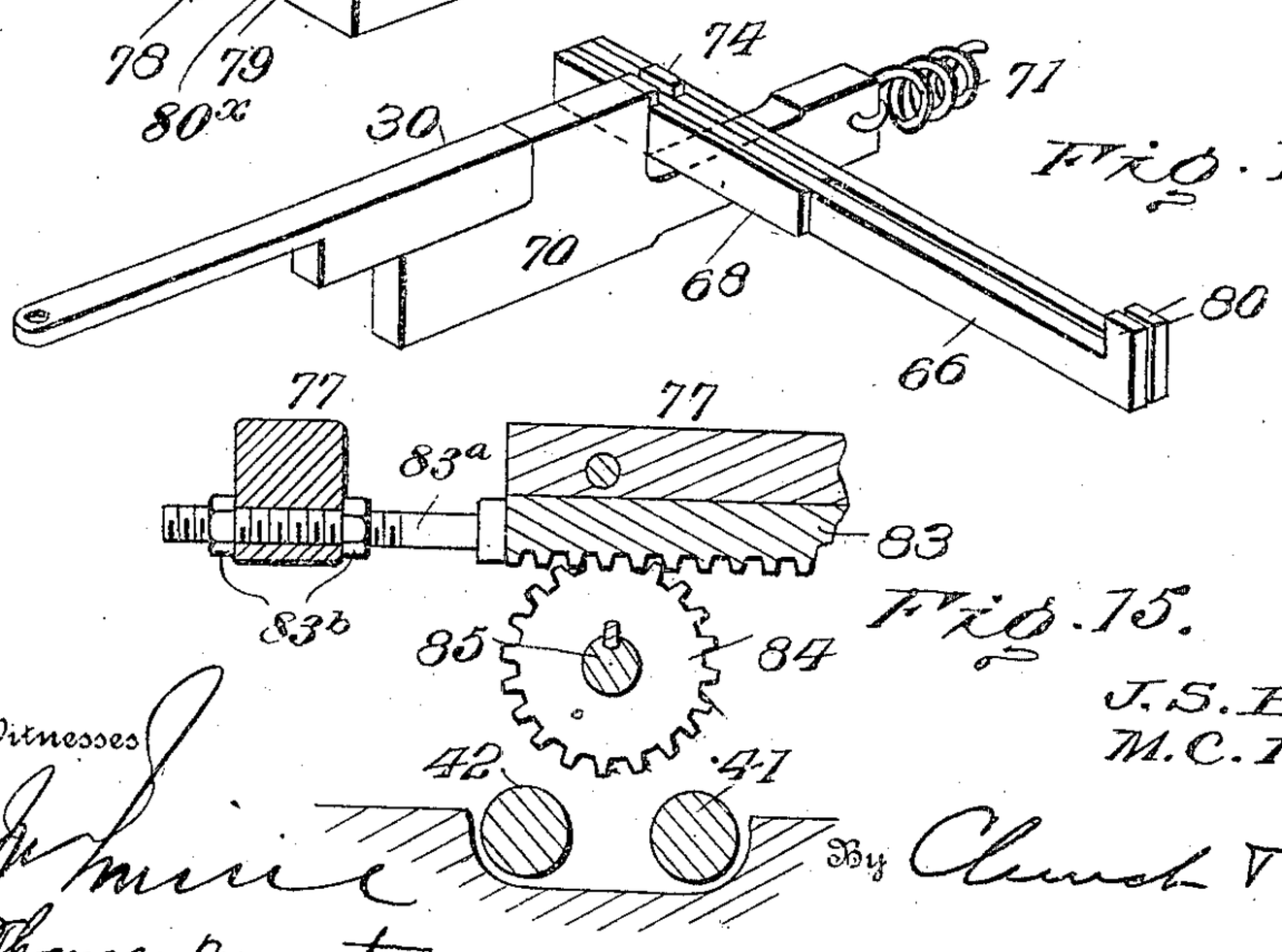

Fig. 14.

Fig. 15.

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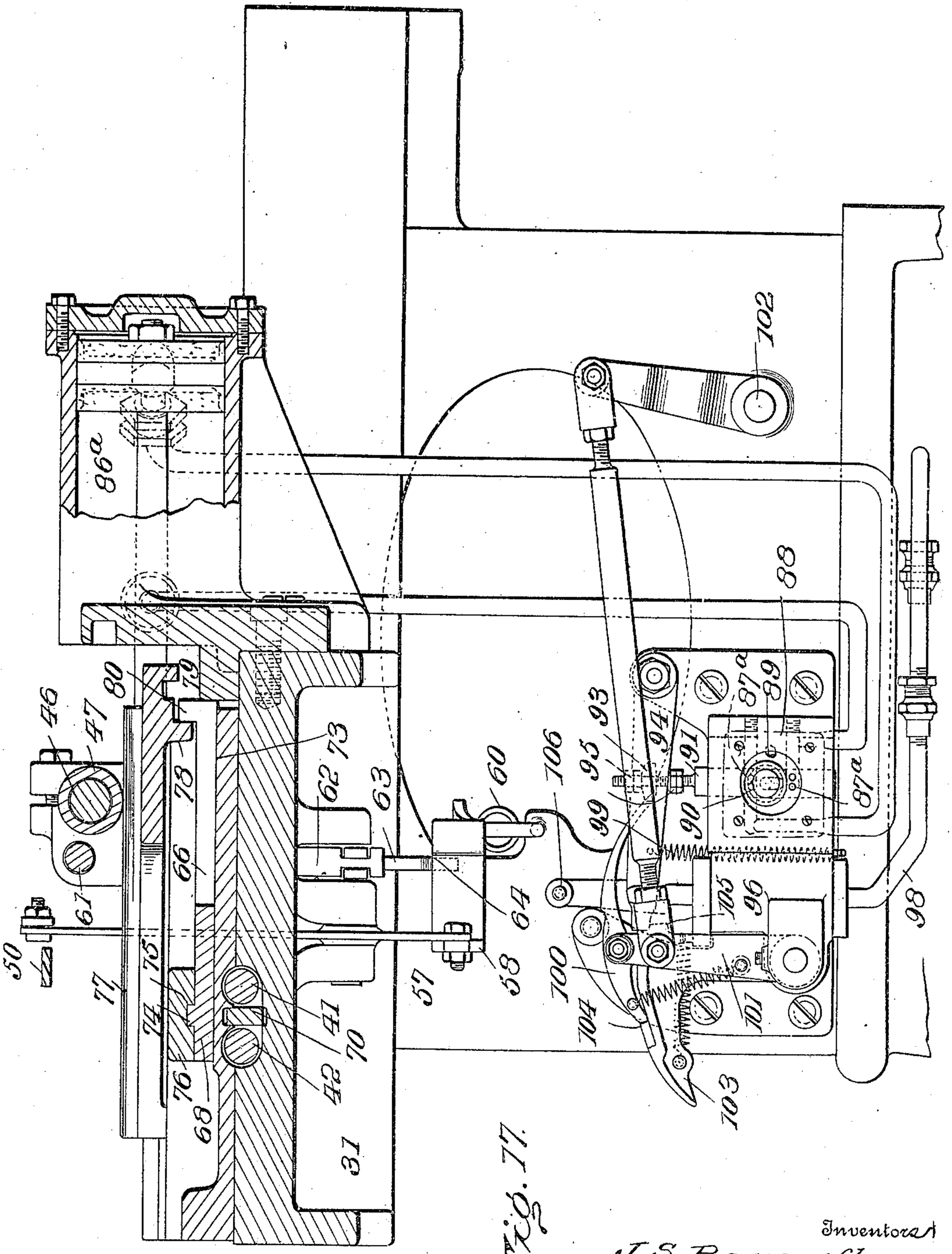

Fig. 17.

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Fig. 19.

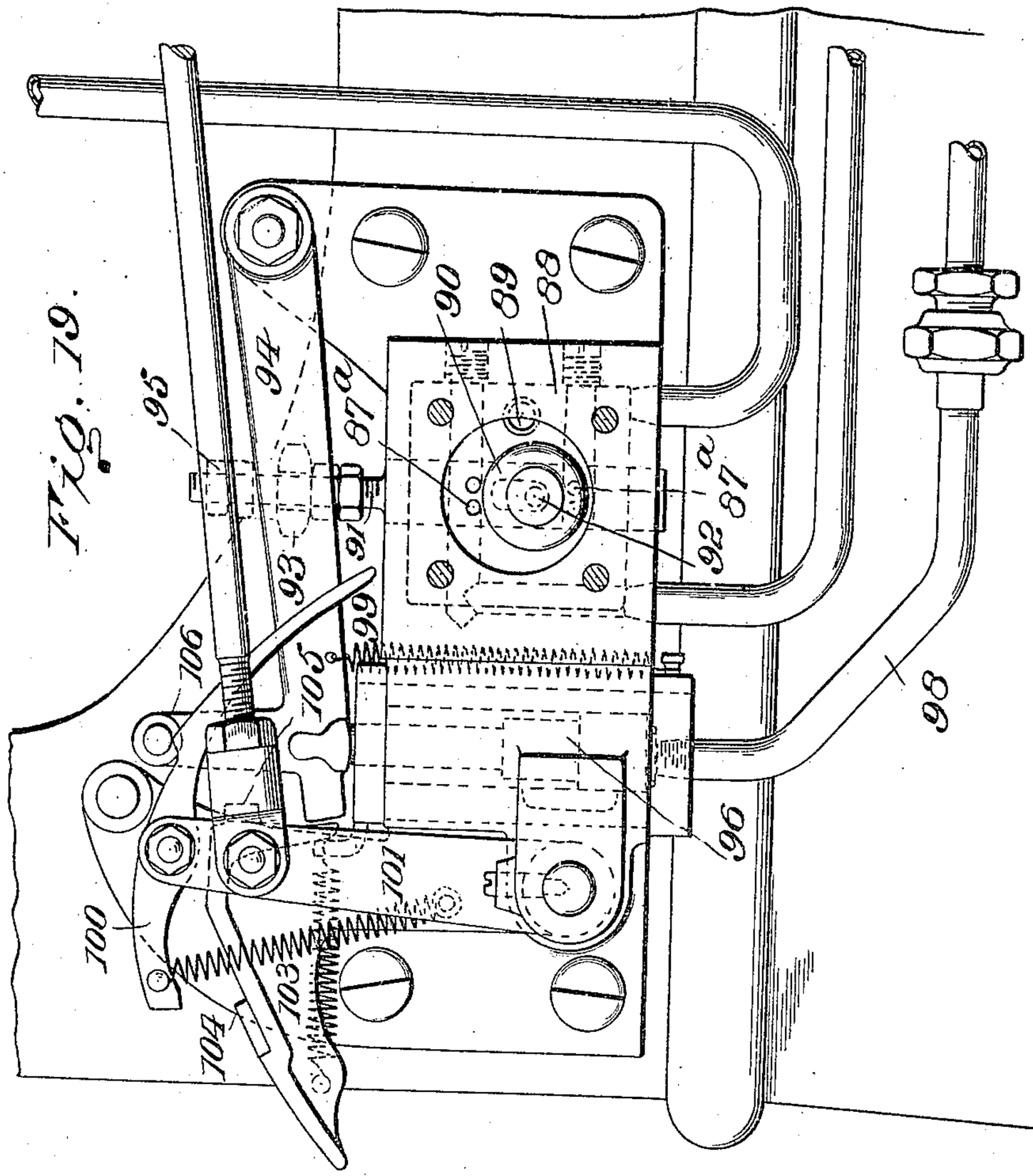

Fig. 18.

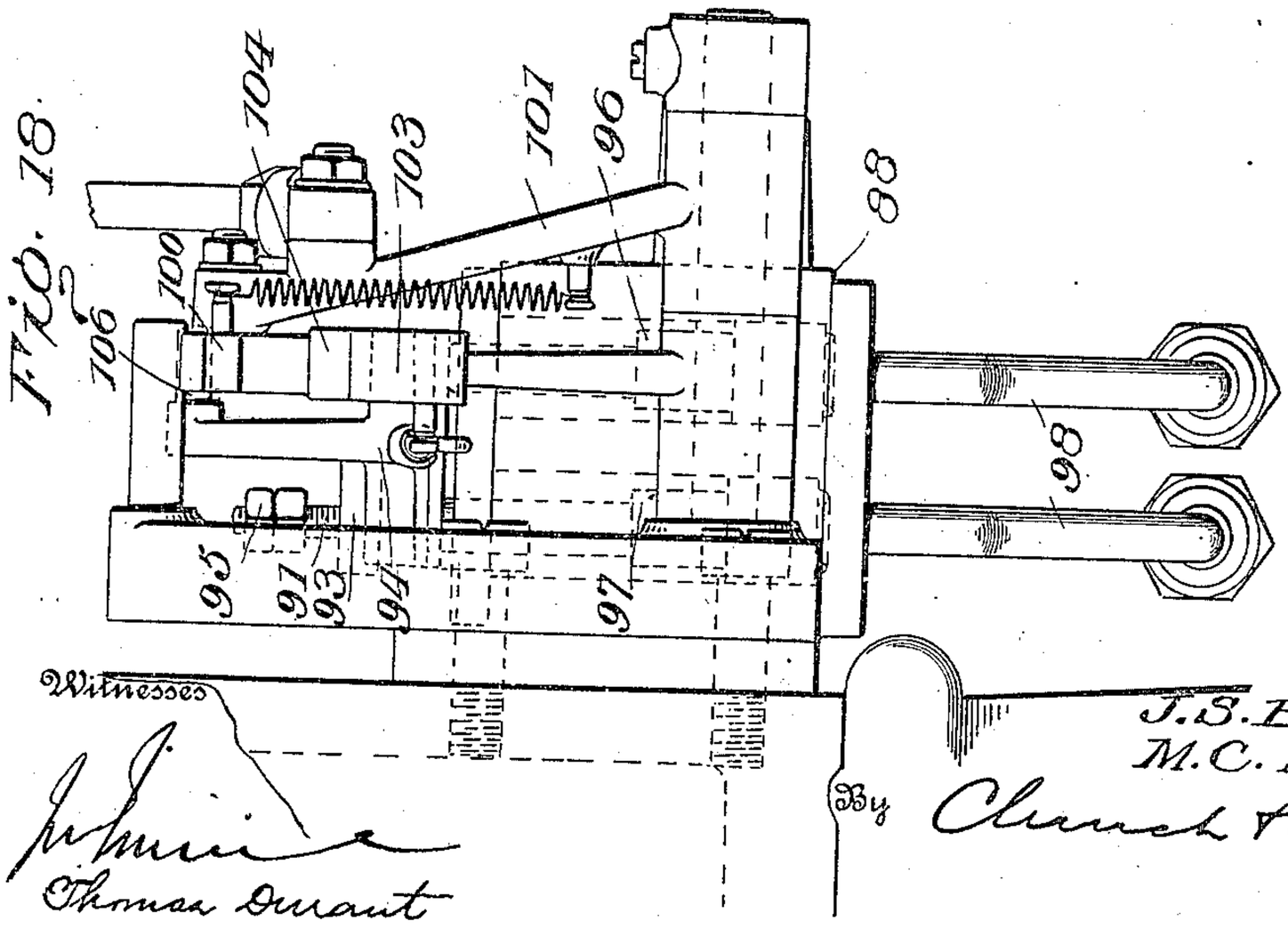

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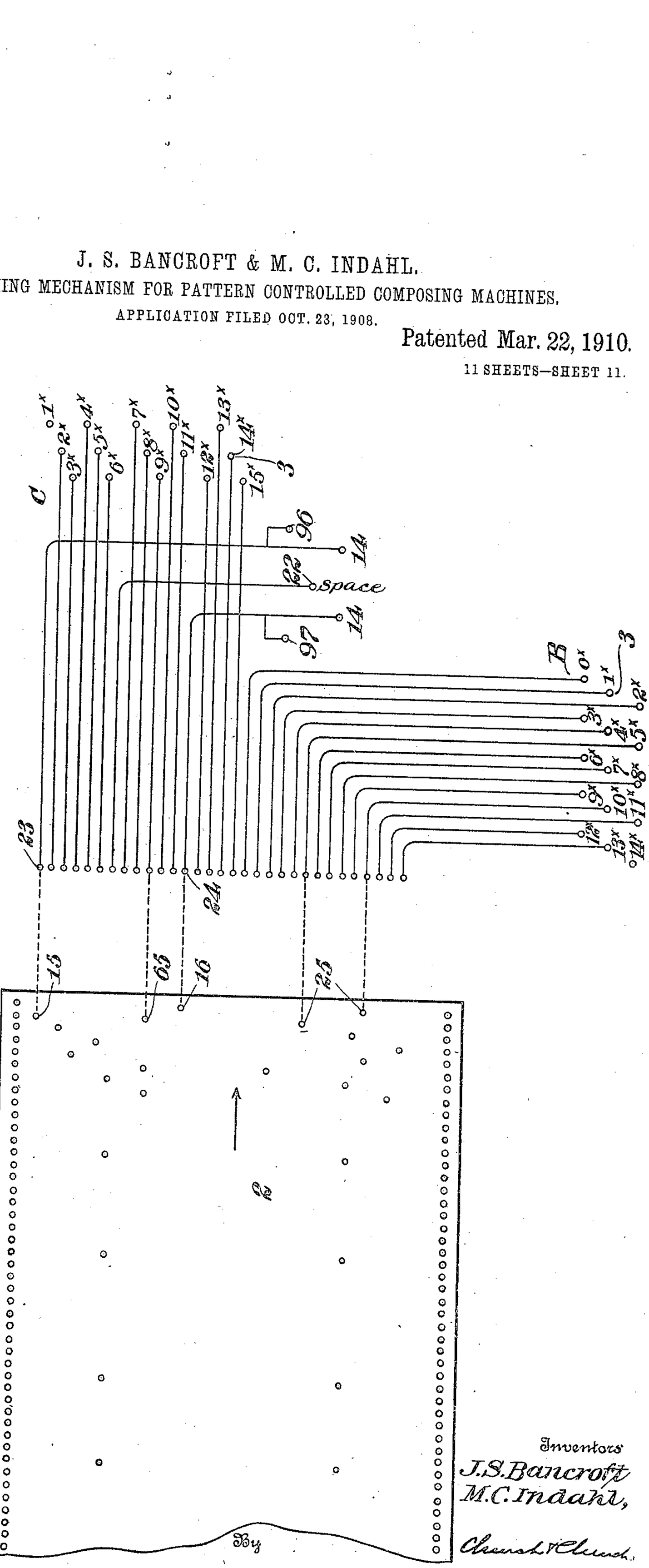
Fig. 20.



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UNITED STATES PATENT OFFICE.

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JUSTIFYING MECHANISM FOR PATTERN-CONTROLLED COMPOSING-MACHINES.

952,597. Specification of Letters Patent. Patented Mar. 22, 1910.

Application filed October 23, 1908. Serial No. 459,218.

To all whom it may concern:

Be it known that we, JOHN SELLERS BANCROFT and MAURITZ C. INDAHL, of Philadelphia, in the county of Philadelphia, State of Pennsylvania, have invented certain new and useful Improvements in Justifying Mechanism for Pattern-Controlled Composing-Machines; and we do hereby declare the following to be a full, clear, and exact description of the same, reference being had to the accompanying drawings, forming a part of this specification, and to the figures and letters of reference marked thereon.

In a companion application, Serial No. 443,247, filed July 13, 1908, there is disclosed a new method or system of dealing with the problem of automatic justification as applied to pattern controlled automatic composing machines, wherein and whereby the pattern or record strip is provided with line deficiency and space number signals, in lieu of the usual justification signals, and the automatic composing mechanism is equipped with apportioning and distributing devices controlled by said line-deficiency and space-number signals and operating to automatically distribute the line deficiency among the indicated spaces as the latter are produced.

The present invention relates to improvements in the apportioning and distributing mechanism for an automatic composing machine of the kind indicated and includes the several novel combinations, constructions, arrangements and adaptations of parts as hereinafter fully described and pointed out in the claims.

In the accompanying drawings: Figure 1 is a top plan view of a portion of a type casting and composing machine with the apportioning and distributing mechanism applied thereto. Fig. 2 is a top plan view, on an enlarged scale, of the apportioning and distributing attachment, the immediate co-operating elements of the type machine being indicated. Fig. 3 is a top plan view, on a still larger scale, of the attachment, a portion of the frame and mold-blade lever being broken away to disclose the controlling mechanism for the motor of the deficiency apportioning and distributing devices. Fig. 4 is a front elevation of the mechanism shown in Fig. 3. Fig. 5 is a vertical section on the line *z*—*z*, Fig. 11. Fig. 6 is a vertical section on the line *y*—*y*, Fig. 3. Fig. 7 is a vertical section on the line *x*—*x*, Fig. 2. Fig. 8 is an end view and Fig. 9 a top plan view of the adjustable abutment for the space transfer block or designating device. Fig. 10 is a vertical section on line *w*—*w*, Fig. 2. Fig. 11 is a vertical section on line *u*—*u*, Fig. 3. Fig. 12 is a perspective of a portion of the quotient member with the space-number interponent and its translating connections. Fig. 13 is a perspective view of the latch and cam bar for connecting the interponent to the positioning mechanism therefor. Fig. 14 is a detail in perspective of the deficiency measuring slide or abutment and the movable wedge slide, wedges and abutments. Fig. 15 is a detail showing the means for connecting and adjusting the transmitting devices and quotient member. Fig. 16 is a sectional view of the valve controlling the motor for the quotient slide or member. Fig. 17 is a section on the line *v*—*v*, Fig. 4. Fig. 18 is an end view and Fig. 19 a side elevation of the valve timing and actuating mechanism. Fig. 20 is a diagrammatic representation of the pattern or record strip and lines of communication between the tracker bar, stop pins etc.

The same characters designate like parts in the several views.

Although applicable in some of its principal features to other forms and varieties of composing machines, the invention is illustrated in a form specially adapted to the type composing machine of Patent 625,998, of May 30, 1899, and before attempting to describe the attachment it may prove advantageous to first designate some of the principal coöperative elements of said patented machine and explain briefly their functions and mode of operation.

A die case 1, Fig. 1, supported to reciprocate on transverse intersecting lines above the mold (not visible) is connected to a centering mechanism including two adjusting or positioning systems independently controlled by the signals (perforations) of the pattern or record strip 2 (Fig. 20) and acting, the one upon the die-case, and the other, upon its carrier, to bring the selected matrix in position above the mold. Each of said adjusting or positioning mechanisms includes the following elements, to wit; a

primary gage, in the form of a plurality of stop pins 3 serially arranged and individually controlled (save as to the fifteenth or last in the series) by separate signals (perforations) in the record strip; a primary positioning mechanism, in the form of oppositely movable jaws 4, whose closed position coincides with one of the pins 3; a secondary gage or stop bar 5 which is moved to position by jaws 4 and a secondary or final positioning mechanism, represented by oppositely movable jaws 6 closing on the stop bar 5 and coupled with either the die case or its carrier to shift the latter to the position indicated by the signal perforation and corresponding pin 3.

The mold is equipped with a movable member or mold-blade 7 (of which the rear section only is illustrated, Fig. 5) for dimensioning the mold cavity and, consequently, the type cast therein. The position of said mold blade is regulated and determined by a movable abutment 8 against which the mold-blade is drawn, at the proper time, by a rod 9 acted upon by a lever 10. Abutment 8 is set or adjusted through the agency of a main or normal adjusting means, *i. e.*, normal wedge 11, coupled with one set of final positioning jaws 6 (the right hand set in Fig. 1) and coöperating with a transfer block 12, said wedge and block being interposed between movable abutment 8 and a fixed abutment on the frame.

The machine of the patent was also provided with an abnormal or supplemental adjusting means in the shape of two justification wedges (here omitted and their places occupied by other devices, as will presently appear) each of said wedges being received between the jaws of one of two designating members or levers 13 (Figs. 2, 7 and 10) the latter acted upon by pistons 14 controlled by designating signals or perforations 15, 16, in the record strip, and operating through suitable connections to couple the designated lever with the center pin lever 17 of the die case centering mechanism, so that as said lever 17 was elevated, the justification wedge corresponding with the designated lever 13 would be brought into the path of the final positioning jaws 6 and by them shifted to the position indicated by the previously adjusted stop bar 5, after which, upon the next descent of lever 17, the adjusted wedge was deposited upon a fixed gaging bar 18, Fig. 7, and thus held in position, out of range of jaws 6, until again elevated. These justifying wedges were arranged side by side in series with the normal wedge and a second transfer block 19, Fig. 5, between a fixed abutment on the frame and the mold-blade abutment 8. Although adjusted at the beginning of each line, the justifying wedges were not brought into action until a space signal perforation, acting upon mechanism controlling the relative positions of the transfer blocks 12 and 19, retracted the first and advanced the second, thereby causing the two justification wedges together with the normal wedge to act upon the mold blade abutment 8 in place of the normal wedge alone.

The pattern or record strip 2 which controls or governs the action of the machine is advanced intermittingly by a paper feed mechanism 20, to present successive signals opposite a series of ports, and air is admitted to the performing elements through the port or ports uncovered by the perforation or perforations which go to make up individual signals.

There are two distinguishing features of this machine which, while materially affecting the adaptation, are not otherwise essential to the present invention, and these are,— first, the adjusting devices are so organized and arranged that the die case and wedges have no normal or zero position but are moved directly from one position of adjustment to another; and, second, the movement or adjustment of the die case and wedges called for and registered by the signal presented during one revolution of the driving shaft is not actually performed until the next succeeding revolution of said shaft.

To illustrate, let us assume the cycle of operations to begin with jaws 4 closed upon pins 3, thus locating stop bars 5 to correspond with the signal at the time operating to project said pins. At this period jaws 6 are open to the fullest extent, centering pin lever 17 is elevated to release the die-case, and the paper feed mechanism is set to advance the record strip and present the signal for the next type. The stop bars are now locked in position, followed by the opening of jaws 4 and simultaneous closing of jaws 6 on the stop bars, thus bringing the die-case to the position indicated by the latter. The new signal having in the mean time been brought to operating position, pressure is admitted to project pins 3 and centering pin lever 17 is depressed to adjust and hold the selected matrix upon the mold, where it remains until after the metal has been injected, whereupon said lever is again elevated, jaws 6 open and jaws 4 close upon pins 3 to set the stop bars for the type designated by the new signal. Thus during each cycle of operation, the type produced is that designated by the signal of the previous cycle and represented by the setting of stop bars 5, and the type of the next succeeding signal is designated by a resetting of said stop bars.

The coupling of levers 13 with the centering pin lever under the control of designating signal perforations 15, 16, is effected while said lever 17 is depressed and coincident with the projection of a pin 3 for setting stop bar 5, but as said lever 17 retains

its depressed position until after jaws 4 begin to close and jaws 6 to open, the tilting of levers 13 is not completed until after the stop bar 5 has been set and jaws 6 fully opened, to receive the justifying wedge or bar between them, hence said levers are retained in tilted position until the next descent of lever 17 following the closing of jaws 6.

The pattern or record strip feeding mechanism is equipped with a tracker board or bar, so-called, containing thirty-one ports, including two series of fourteen each communicating with pins 3, the remaining ports communicating with the pistons for coupling levers 13 and the transfer block shifting mechanism with the centering pin lever 17.

The arrangement of the ports is illustrated diagrammatically in Fig. 20, wherein the series of pins 3 pertaining to the diecase adjusting system acting upon the diecase carrier and normal and justifying wedges is lettered B, and the complemental series C, the pins 3 of the C series being numbered in sequence from $1^{\times}$ to $15^{\times}$, inclusive, and those of the B series from $0^{\times}$ to $14^{\times}$ inclusive, to designate successive stages of adjustment according to the present improvement. It is to be noted that the fixed pin 3 of the C series (marked $1^{\times}$) which comes into action where there is no perforation in the strip in register with one of the ports for that series, constitutes the first stage of adjustment of that series, whereas the corresponding fixed pin 3 of the B series, marked $14^{\times}$, represents the fourteenth or highest value in that series, the first or zero pin representing the datum line from which the adjustments are measured as will presently appear. The piston 22 connected with the shifting mechanism for the transfer blocks is controlled by port 21 and registers with a space signal perforation; while each of the ports 23, 24, controlled by perforations 15, 16, communicates with one of the pistons 14 for the shifting levers 13.

Heretofore the justification signals (formed or applied after each line of character and space designating signals but presented to the casting machine in advance of the line signals) comprised successive sets of perforations each including a designating perforation (15, 16) for selecting the justification wedge, and a dimensioning perforation 25 for determining the position of adjustment of the selected wedge, said positions representing the quotient of the line deficiency divided by the number of spaces. In a sense the pattern thus equipped was a justified pattern, in that it contained signals representing the distributive fractions of the line deficiency applicable to each space.

Now according to the scheme of the improvement disclosed in said application Serial No. 443,247, and embodied herein, the abnormal or supplemental mold adjusting means of the prior machine, *i. e.*, the two justification wedges, are omitted from the type or final composing machine, and the justification signals from the record strip 2, said elements being replaced by an automatic apportioning and distributing mechanism at the final or type composing machine, and by a line-deficiency and space-number signal at the pattern, the latter containing, in addition to its character and space designating signals, a record of the total deficiency of the line and of the total number of justifying spaces included therein.

The designating perforations 15, 16, together with any one of a series of dimensioning perforations 25, registering with the ports of the B series of pins 3, formerly employed to designate the justification fraction, are here employed for designating line deficiency, while one of a series of perforations 65 registering with the C series of pins registers the number of available spaces. To render these new signals (line-deficiency and space number) available at the final composing or type machine three things are necessary, first, a mechanism responsive to the line-deficiency component of the pattern, to set up or produce a measure of the space or interval represented by the line-deficiency signal; second, a mechanism responsive to the space-number component; and, third, mechanism coöperating with said first named mechanisms, or parts connected therewith or controlled thereby, for dividing the measured line shortage into as many fractional parts as there are spaces recorded, and applying the resulting product or measurement thus obtained to a supplemental or abnormal mold adjusting member acting upon the mold blade or other space dimensioning devices.

In the present instance the line-deficiency measuring or gaging element is represented by an abutment or slide 30 supported in guides upon a supplemental frame 31 and set or adjusted from the line deficiency component of the signal, as follows:—The two justification wedges and the fixed abutment therefor of the prior machine are replaced by a movable abutment 32, suitably guided, as by parallel links 33, and two parallel-sided bars 34, 35, the latter interposed in sequence between said movable abutment and the transfer block 19, Fig. 5. Each bar 34, 35, occupies the place of one of the justification wedges between the jaws of its lifting lever 13 and is provided with a shoulder 36, Fig. 7, for engaging the final positioning jaws 6, and notches 37 for engaging the gage bar 18, corresponding with like parts of the prior justification wedge and performing the same functions. In ad-

dition, each bar 34, 35, is provided on its under edge with rack teeth 38, meshing into one of two pinions 39, 40, fast upon one of two parallel shafts 41, 42, the latter supported in bearings on the main and supplemental frames and each carrying a pinion 43 in mesh with rack teeth upon one of two wedges 44, 45. The two wedges mentioned are located side by side between a fixed abutment or bearing on the frame and an opposed shoulder on slide 30. The arrangement is such that when either bar 34, 35, is elevated through its designating perforation 15 or 16 into the path of jaws 6, the wedge 44 or 45 coupled therewith, will be moved to the position indicated by the dimensioning perforation, that is, to a position corresponding with the location of the projected pin 3 of the B series. Thus to each wedge is assigned as many degrees or stages of longitudinal adjustment as there are pins in the dimensioning series 3. The two wedges differ in taper or angle, being so proportioned that the unit of the wider angle wedge 45, represented by one degree of movement, is a multiple of the unit of the narrower angle wedge 44.

Preferably the unit of wedge 44 corresponds with or closely approximates the unit of the set being composed, say, for example, .00333+ inch for pica in which case the unit of wedge 45 might be as 15 to 1 or .05 inch. The only object in employing two wedges is to reduce the total length of the wedge and the number of stations, otherwise a single wedge or its equivalent, such as a screw, lever etc. might be employed to accomplish this line measurement.

According to the special arrangement illustrated the normal or zero position of slide 30, that is, the position assumed when the line fills out, is, as indicated in Fig. 3, with both wedges inserted to the last or fifteenth stage of their adjustment, and as this happens to coincide with the first of the B series of ports, Fig. 20, the pin 3 controlled thereby is designated as the zero of the series, and the signal for a complete line will include perforations registering with this zero port associated with designating perforations 15, 16, in order to bring the wedges to this zero position. A measuring perforation registering with the port of pin 1^{x} employed in conjunction with designating perforation 15 operates to register one unit of deficiency, or, in connection with designating perforation 16, to register fifteen units of deficiency, and so on, each advance in the series adding one unit if associated with designating perforation 15 and fifteen units if associated with designating perforation 16, and by proper combinations any degree of line deficiency within the capacity of the machine can be measured, in units of the set, at slide 30.

The mechanism responding to the space-number component of the pattern signal includes the following elements: Mounted to reciprocate longitudinally of a guide 46 is a slide in the form of sleeve 47 provided with arms 48, 49, to one of which (48) is pivoted a latch 50 provided at its opposite or free end with an off-set portion or projection 51 adapted to be entered between and engaged by jaws 6 pertaining to the C series of pins 3, Fig. 2, that is the adjusting system complemental to that acting upon the line-deficiency measuring devices and normal wedge. Latch 50 passes through a guide 52 in front of a bar 53, the latter provided with an incline 54 and a stirrup 55 embracing latch 50 and engaged by a retracting spring 56. When in normal or advanced position incline 54 stands beyond guide 52 and spring 56 operates to hold latch 50 outside of the path traversed by jaws 6; and by a longitudinal movement of bar 53 whereby incline 54 is caused to ride upon guide 52, Fig. 3, the latch is shifted and held within the path of said jaws. Bar 53 is coupled to the upper end of a lever 57 and the lower end of said lever is connected to a bar 58 extending in front of levers 13 and provided with a shoulder 59 in position to be engaged by either of said levers when rocked in response to one of the designating perforations 15, 16. A spring 60 coupled with bar 58 operates to retract the latter and advance bar 53 to normal position when released. A notched bar 61 carried by sleeve 47 passes through a guide on the frame in position to be engaged by a spring-actuated bolt 62 to which is coupled one arm of a bell crank lever 63 whose other arm extends in front of a shoulder 64 on rod 58.

With the mechanism arranged as described it is apparent that if a dimensioning perforation 65 controlling one of the C series of pins 3 is associated with either designating perforation 15, 16, whenever the lever 13 corresponding with the latter is rocked bar 58 will be advanced, and, in so doing will withdraw locking bolt 62 and shift latch 50 so that when jaws 6 close upon the pin responding to measuring perforation 65, sleeve 47 will be brought to a position corresponding with the serial value of said perforation 65.

The mechanisms thus far described do not differ essentially from corresponding parts disclosed in the before mentioned companion application and are included herein merely as illustrative of a pattern controlled automatic composing mechanism with line-deficiency measuring or gaging and space-number indicating or counting attachments; and it is to be understood that other forms and constructions of said mechanisms are permissible and contemplated.

It is further to be noted that while in this

illustration the number of spaces which can be counted is limited to fifteen, corresponding with the number of controlling pins 3, in the C series, this amount can be increased by the addition of a supplemental latch and control mechanism after the manner disclosed in the said companion application.

It remains to describe the principal novel features of the organization, to wit; the mechanism coöperating with the line deficiency gage (30) and space register (47) for dividing the indicated line deficiency into as many fractional parts as there are spaces indicated, and setting the space dimensioning devices of the composing machine to coincide therewith. The chief components of said mechanism are a series of wedges (66) adapted by their movement to fill or absorb the measured line deficiency; a selecting interponent (67) coupled with the space registering devices and operating to bring into action as many of the wedges as there are spaces indicated; and means for converting the movement of the selected wedges into adjustments of the space dimensioning mechanism of the composing machine.

In the preferred form of embodiment illustrated a plurality of longitudinally adjustable and laterally movable wedges 66 are arranged between a relatively fixed bearing 69 and the line gage 30, and in order that the wedges may be maintained in parallel relation and in contact, separator blocks 68 are interposed between the proximate faces of contiguous wedges, and a slide 70, provided with a retracting spring 71 and guided to move in line with gage 30, is interposed between the latter and the terminal wedge or separator block of the series. The faces of the separator blocks are in parallel with the surfaces of the wedges with which they contact, and when the wedges are in normal retracted position, with their narrower ends in alinement with bearings 69 and slide 70 the outer face of the latter against which gage 30 contacts serves as a datum line for the measurements performed by said gage.

The wedges and separator blocks rest loosely upon a flat bed plate 73 and each separator block is held from movement in a direction lengthwise of the wedges and at the same time permitted free side motion, as by being provided with a projection 74 riding in a way 75 in a bar 76 located above and extending transversely of the wedges.

The wedges are moved longitudinally, to advance slide 70 until arrested by gage 30, by an actuator common to all the wedges and connected therewith through the medium of the interponent 67, the latter interposed between the actuator and series of wedges and controlled by the space registering devices to select and engage as many of the wedges as there are spaces indicated or registered. The actuator represented consists of a plate 77 supported in guides above the wedges to reciprocate in a plane parallel with the latter and provided with a rib or alining bar 78 and a guide or way 79 in parallel therewith and at right angles to the direction of motion of said plate 77. The interponent 67 is supported to reciprocate longitudinally of said guide or way 79 with its rear face in parallel with the alining bar 78 and somewhat removed therefrom to form a space or way 80* for the reception of bearings 80 with one of which each wedge is provided.

Interponent 67 is coupled with the space registering devices through the medium of arm 49 on sleeve 47, said arm being provided with a longitudinal groove or way 81 engaging a bearing 82 on the interponent, the arrangement being such that the interponent is compelled to follow the movements of sleeve 47 in registering the number of spaces, and, at the same time, is free to accompany the actuator in its movements longitudinally of the wedges.

Instead of providing a zero position for interponent 67, that is, a position to one side of and clear of the series of wedges, from which to measure successive stages of adjustment, the first or fixed pin 3 of the C series is employed to represent a single space, the second pin two spaces, and so on through the series up to fifteen, to which end the parts are so proportioned and adjusted that when stop bar 5 is moved to correspond with the fixed pin $1^{\times}$ of this series, interponent 67 will be positioned by jaws 6, to cover the first of the series of wedges 66, and when adjusted to correspond with pin $2^{\times}$ it will be positioned to cover two wedges, the first and second, and so on throughout the series. One result of this arrangement is that pin $1^{\times}$ operates to designate no space as well as one space, inasmuch as the omission of dimensioning perforations 65 in connection with any signal containing either designating perforation 15 or 16 will result in the closing of jaws 4 on the fixed stop pin $1^{\times}$ of the C series, and the adjustment of the interponent 67 to cover the first of the series of wedges 66. As, however, the justification devices are inoperative to affect the dimensioning of the mold until called into action by a justifying space signal, and as such signal would only appear in a line containing at least one such space, it becomes a matter of no importance where the interponent is located or how many of the wedges 66 are covered by it so long as the parts affected thereby are not brought into action.

It is obvious that by a proper proportioning of the parts interponent 67 might be given a zero or no space position at one degree beyond the first of the series of wedges 66, to be designated by the fixed pin of series C, but as this would reduce the number

of spaces which might possibly be indicated to fourteen, the arrangement illustrated is to be preferred.

Obviously the degree of motion permitted the actuator under different line deficiency adjustments of gage 30 will be proportional to the interval between gage 30 and slide 70 divided by the number of wedges selected and engaged by the interponent, which movement will coincide with or be in proportion to the amount to be added to each normal space to justify or fill out the line.

The movement of the actuator is communicated to a supplemental or abnormal mold adjusting member, *i. e.*, the movable abutment 32, through suitable transmitting devices, such as rack 83 adjustably connected with the actuator (as by a threaded extension 83[a] of rack 83 passing through an orifice in actuator 77 and held to position thereon by nuts 83[b] engaging opposite sides of said actuator as illustrated in Fig. 15,) and engaging a pinion 84 on shaft 85, the latter mounted to move longitudinally in bearings and provided with a threaded section 86 engaging a threaded aperture 87 in a block secured to the frame. The end of shaft 85 contacts with abutment 32 and serves to locate the latter to correspond with the movements of the actuator as limited and controlled by wedges 66 and gage 30.

The special form of embodiment and adaptation described renders it necessary that the actuator be held in its forward or adjusted position during the composition of the line, to retain abutment 32 in adjusted position; that it be retracted or returned to normal or zero position after the line is completed, to permit readjustment of gage 30 and interponent 67; and that it be again advanced before the composition of the next succeeding line is begun. The mechanism for effecting these actions is best seen in Figs. 2, 3, 4, 7 and 16 to 19 inclusive.

Mounted upon the supplemental frame and coupled through its piston rod with actuator 77 is a motor 86[a], the latter connected on opposite sides of the piston with ports 87[a] in a valve chest 88 provided with a supply inlet 89 in open communication with a source of pressure. A valve 90, coupled with a rod 91, is arranged to alternately uncover one port 87[a] and place the other port in communication with an exhaust passage 92. By means of the valve pressure can be admitted on either side of the piston and exhausted on the other, to advance or retract the actuator and hold the latter in adjusted position until the valve is shifted. Valve rod 91 passes through a lug 93 on the side of a lever 94 and is provided with adjustable nuts 95 above and below said lug. Beneath the outer or free end of lever 94 are arranged two pistons 96, 97, working in twin cylinders the one connected by pipe 98 to the port controlled by designating perforation 15 and the other similarly connected with the port controlled by designating perforation 16. A spring 99 coupled with lever 94 normally operates to hold valve 90 at one extreme of its stroke, Fig. 19, thereby admitting pressure in front of the motor piston, to advance and hold the actuator in its forward or adjusting position, as during the formation of a line of composition.

It is obvious that the presentation by the pattern of either of the designating signals or perforations 15, 16, in conjunction with a dimensioning perforation 25 or 65, for the purpose of setting pins 3 to adjust the line-measure and space-number registering devices (30, 67) will admit pressure to the corresponding piston 96 or 97; and the latter, acting through lever 94, will shift the valve to the opposite extreme position and thereby reverse the pressure in the motor to retract the actuator 77.

Owing to the fact that in the machine with which the improvements are herein shown associated the pins 3 controlled by dimensioning perforations 25, 65, are set during one cycle of operations and the adjustments so designated are performed during the succeeding cycle, as hereinbefore explained, the immediate shifting of valve 92 upon the presentation of the line-measure or space-number signals (15 or 16+25 or 65) would have the effect of changing the justifications for the line before the last type thereof, which might be a space, was completed hence means are provided whereby the indicated movement of valve 92 will be delayed until after the type indicated during the preceding cycle is completed. This delay mechanism, as illustrated, includes a reciprocating pawl 100 carried by an arm 101 and coupled with a moving member of the machine, such as the pump actuating rock shaft 102, Figs. 2 and 17; a pivoted sector 103 provided with a pawl-engaging shoulder 104 and a projection 105, the latter adapted to engage valve lever 94; and a tripping pin 106 carried by lever 94 in position to engage the tail of pawl 100 when said lever is depressed.

When in normal position, as during the composition of a line, the parts assume the relative positions indicated in Fig. 19 with lever 94 retracted by its spring, tripping pin 106 bearing upon the tail of pawl 100 and holding the point of the latter out of the path of shoulder 104, and sector 103 retracted by its spring with retaining shoulder 105 above and in the path of lever 94, while shoulder 104 is in position to receive the point of pawl 100 should the tripping pin 106 be withdrawn. This is the position just prior to the presentation of a signal, at which time rock shaft 102 is retracted preparatory to operating the pump follow-

ing the presentation of a signal. If the signal presented does not contain one of the designating perforations 15, 16, the pawl makes its stroke without disturbing the relations of the other members, being withheld from engagement with sector 103 by tripping pin 106; but should the signal presented contain either of said designating perforations the movement of its piston 96 or 97 in attempting to elevate lever 94 and shift the valve will be temporarily interrupted by the engagement of lever 94 beneath projection 105 of sector 103, at the same time the movement will be sufficient in extent to withdraw pin 106 and permit pawl 100 to engage shoulder 104, so that at the next forward movement of said pawl accompanying the action of the pump in injecting metal into the mold and while the pressure admitted through perforation 15 or 16 is still on its motor 96 or 97, sector 103 will be advanced to withdraw projection 105, thereby permitting lever 94 to complete its upward movement and thus shift valve 92 so as to reverse pressure in the motor of the actuator. Upon the return motion of pawl 100 accompanied by sector 103, shoulder 104 will pass beneath the end of lever 94 and sustain the latter in elevated position after pressure in motor 96 or 97 has been withdrawn by the passing of the signal containing perforations 15 or 16, thus holding actuator 77 retracted while the adjustment indicated by the associated dimensioning perforations 25, 65, is being performed. Should the next succeeding signal contain a perforation 15 or 16, lever 94 will retain its elevated position, notwithstanding the withdrawal of the projection 104 incident to the movement of pump shaft and pawl 100 accompanying the presentation of said signal, the admission of pressure beneath piston 96 or 97 serving to sustain lever 94; but if the succeeding signal does not contain one of the perforations 15, 16, the withdrawal of projection 104 will permit the return of lever 94 and the shifting of valve 90, to reverse pressure in motor 86[a] and advance the actuator, at the same time lifting pawl 100 from engagement with sector 103 until a designating perforation 15, 16, is again presented.

Summary of operation.—Assume that the operator in composing the pattern or record strip 2 finds that a line containing seven spaces is, say, 155 units short. He closes the pattern for that line with the two signals indicated in Fig. 20, to wit; first, a single-unit designating perforation 15 associated with two dimensioning perforations, that is a perforation 25 registering with the port controlling pin 5—× of the B series (representing five units) and a perforation 65 registering with the port controlling pin 7—× of the C series (representing seven spaces); and, second, the fifteen-unit designating perforation 16 associated with a dimensioning perforation 25 registering with the port controlling pin 10—× of the B series (representing 15×10=150 units). The signal as thus formed represents a 155 (15×10+5) units of line deficiency, and seven spaces among the same is to be distributed. It is immaterial with which of the designating perforations 15, 16, the space number perforation 65 is associated providing it is associated with the one nearest the type signals. The record strip or pattern being delivered to the final composing machine in the reverse order of its composition, the signal containing perforation 16 is presented first. At the time of its presentation to the tracker board or bar, lever 17 has been depressed to hold the matrix brought to position by jaws 6, the latter closing upon the stop bars 5 in the positions designated by the previous type signal. As jaws 6 begin to open and jaws 4 to close, and while lever 17 is down pressure is admitted through perforations 16 and 25, the former coupling lever 13 carrying bar 35 with centering pin lever 17, and admitting pressure to motor 97 to elevate valve lever 94 against stops 105 and couple pawl 100 with segment 103, while perforation 25 operates to elevate pin 10—× of the B series of pins 3. Pressure on pin 3 and motor 96 is continued and lever 17 remains depressed until after pump shaft 102 has rocked to inject metal into the mold, and, incidentally, has advanced sector 103 to clear valve lever 94, whereupon the latter completes its movement and shifts valve 90, to retract actuator 77. As lever 17 rises it tilts lever 13 to elevate and hold bar 35 in the path of jaws 6, and as jaws 4 close upon pin 3 they adjust stop bar 5 to correspond therewith. Perforation 16 also operates to unlock sleeve 47 and project latch 50 into the path of jaws 6 pertaining to the C series of pins 3, and the omission of a perforation 65 pertaining to this series being equivalent to the designating of the fixed pin, the stop bar 5 of this series is, upon the closing of jaws 6, adjusted to correspond with pin 1—× of series C. The next signal containing perforations 15, 25 and 65 is presented during the next cycle of operations wherein jaws 6 close upon the stop bars 5 to shift wedge 45 in accordance with the previous setting of the stop bar 5 of the B series of pins and to shift the interponent 67 to first position with respect to wedges 66. The described operations are again repeated, but this time bar 34 is coupled with lever 17 by perforation 15, and the stop bar is set by pin 5—× of the B series, while pin 7—× of the C series is elevated and stop bar 5 positioned so that during the performance of the next succeeding cycle of operations wedge 44 will

be set to the fifth stage of adjustment and interponent 67 to the seventh stage. The signals representing the line of composition contain neither of the perforations 15 or 16, consequently the first one presented permits valve lever 94 to return to initial position, thereby reversing pressure in motor 86[a] and advancing actuator 77 to register upon abutment 32 the product of the indicated line deficiency by the number of spaces, said actuator being retained in its forward position by pressure exerted by its motor, while interponent 67 is retained in adjusted position by bolt 62 and the wedges 44 and 45 by locking bar 18 until the presentation at the conclusion of the line of a signal containing a perforation registering with ports 23 or 24. The type and space signals do not differ in any material respect from those of the prime patent, hence have been omitted in Fig. 20.

Having thus described our invention, what we claim as new and desire to secure by Letters-Patent is:

1. In a pattern controlled type casting and composing machine such as described provided with an adjustable mold, a plurality of matrices and means controlled by a pattern for selectively presenting individual matrices to the mold and dimensioning the latter, and in combination therewith, an automatic justifying mechanism responsive to line-deficiency and space-number signals of the pattern and coupled with the mold adjusting devices through the space designating signals including the following elements, to wit; a gaging member controlled by the line-deficiency signals to measure the indicated line deficiency; a series of wedges interposed between said gaging member and an abutment; an actuator for said wedges; an interponent movable to engage successive wedges and controlled in such movement by the space-number signals; and means for transmitting the movement of the actuator to the mold adjusting devices.

2. In a pattern controlled type casting and composing machine such as described provided with a type mold, a plurality of matrices, main and supplemental mold adjusting devices and means controlled by the pattern for selectively presenting the matrices to the mold and designating the adjusting devices to be applied thereto, and in combination therewith an automatic justifying mechanism including the following elements, to wit; a gaging or measuring element controlled by line deficiency signals of the pattern; a plurality of wedges extending across the path of movement of said gaging or measuring element; an actuator for said wedges coupled with the supplemental mold adjusting devices; and an interponent controlled by space number signals of the pattern and movable between the actuator and series of wedges to selectively engage those called for by the space number signal.

3. In a pattern controlled composing machine the combination of the following elements, to wit; a measuring or gaging element controlled by the line deficiency signals of the pattern; a plurality of wedges serially disposed in the path of movement of said measuring or gaging element; an actuator; and a movable interponent controlled by the space number signal of the pattern to engage the number of wedges indicated by said signal.

4. In a pattern controlled composing machine the combination of the following elements, to wit; an adjustable mold; a plurality of matrices; positioning or centering mechanism controlled by the pattern and operating to selectively present individual matrices to the mold; mold adjusting means controlled by the pattern; and an automatic justifying mechanism coupled with the mold adjusting means and including a gaging or measuring element controlled by line deficiency signals acting through members of the matrix positioning mechanism, a plurality of wedges, an actuator, and an interponent, the latter controlled by space number signals of the pattern and acting through members of the matrix positioning mechanism to couple the predetermined number of wedges with the actuator.

5. In a pattern controlled composing machine the combination of the following elements, to wit; a pattern or controller containing serially disposed and prearranged signals representing line deficiency, space number, characters and spaces for a line of composition; a mold provided with normal or main and abnormal or supplemental adjusting means; a plurality of matrices; positioning mechanism controlled by the pattern signals to present individual matrices to the mold and set the normal or main mold adjusting devices; means for setting the abnormal or supplemental mold adjusting devices including a gaging member controlled by the positioning mechanism and line deficiency signal, a plurality of wedges, an actuator coupled with said abnormal or supplemental mold adjusting devices, and an interponent controlled by the positioning mechanism and line-number signal to couple one or more of said wedges with the actuator according to the value of the signal; and means controlled by the space signals for coupling the abnormal or supplemental mold adjusting devices with the mold.

6. In a pattern controlled composing machine the combination of the following elements, to wit; a pattern for a line of composition including predetermined line-de-

ficiency and space-number signals preceding the individual type and space signals; a plurality of matrices and positioning mechanism therefor controlled by the type signals to present individual matrices to the mold; an adjustable mold blade; normal and supplemental adjusting devices for said mold blade; means controlled by the space signals for coupling up the supplemental adjusting devices with the mold blade; and means controlled by the space number and line deficiency signals for setting the supplemental mold blade adjusting devices at the beginning of a line of composition the same including a gaging member and adjusting mechanism therefor controlled by the line deficiency signal, an actuator coupled with the supplemental mold blade adjusting devices, a series of wedges interposed between said gaging member and an abutment, and a movable interponent controlled by the space number signal.

7. In a composing machine such as described the combination of the following elements, to wit; a controller or pattern provided, in addition to the type signals for a line of composition, with line-deficiency and space-number signals; a gaging or measuring member and means under the control of the line-deficiency signal for adjusting the same with relation to an opposed abutment or bearing; a plurality of wedges arranged in series intermediate said gaging member and opposed bearing; an actuator for advancing said wedges coupled with the adjusting devices of the mold dimensioning member; an interponent interposed between said actuator and series of wedges and movable transversely of the latter; and means controlled by the space-number signal for shifting said interponent.

8. In a type casting and composing machine such as described provided with a movable die case, pattern controlled positioning mechanism therefor, and an adjustable mold member, and in combination therewith, a space apportioning or distributing mechanism including the following elements, to wit; a gaging or measuring member with means for setting the same to correspond with the ascertained line deficiency; a series of wedges interposed between said gaging member and an opposed bearing; a wedge selecting member with means for setting the same to engage as many wedges as there are justifying spaces in the line; and means coupled with the adjustable mold member and said wedge selecting member for measuring the degree of motion of the wedges required to occupy the space between the gaging member and opposed bearing.

9. In a type casting and composing machine such as described provided with a mold, a movable die case, pattern controlled positioning mechanism and adjusting devices for the mold, and in combination therewith, an automatic space apportioning or distributing mechanism including the following elements, to wit; an automatic line deficiency measuring or gaging mechanism controlled by line deficiency signals of the pattern; a series of wedges so disposed that the permissible motion of one or more of said wedges will be determined by the line deficiency measuring or gaging mechanism; an automatic space-number designating mechanism controlled by space number signals of the pattern and operating to designate as many wedges as there are spaces indicated in the signal; means for advancing the designated wedge or wedges; and means coupled with the mold adjusting devices for measuring the advance of the designated wedge or wedges.

10. In a pattern controlled composing machine provided with signal controlled positioning means and mold adjusting devices, and in combination therewith, a space apportioning and distributing mechanism including the following elements, to wit; a line deficiency gaging or measuring member with means for detachably coupling the same with said signal controlled positioning means; a plurality of wedges interposed in lateral series between said gaging member and a bearing; a space-number designating member with means for detachably coupling the same with said signal controlled positioning means and operating to engage the predetermined number of said wedges designated by the space-number signal; and actuating devices coupled with the mold adjusting devices and operating to advance the designated wedges to an extent determined by said gaging member.

11. In a pattern controlled composing machine provided with positioning mechanism and mold adjusting devices and in combination therewith a space apportioning and distributing mechanism including the following elements, to wit; a gaging member; means for coupling said gaging member with the positioning mechanism at predetermined intervals to adjust the former; a plurality of wedges arranged in lateral series in the interval between said gaging member and an opposed bearing; a wedge selecting mechanism; means for coupling said wedge selecting mechanism with the positioning mechanism at predetermined intervals; and means coupled with the mold adjusting devices for advancing the selected wedges.

12. In a type casting machine the combination of the following elements, to wit; mold adjusting devices; opposed bearings with means for varying the interval between said bearings; a plurality of wedges disposed in lateral series between said bearings; and means for advancing a predeter-

mined number of said wedges to occupy or fill the interval between said bearings, said advancing means being coupled with said mold adjusting devices and operating to vary the action of the latter in dimensioning the mold.

13. In a pattern controlled composing machine provided with mold adjusting means and two positioning mechanisms, and in combination therewith, the following elements, to wit; a movable gaging member and opposing abutment; a plurality of wedges arranged in lateral series between said gaging member and abutment; means for selecting and advancing a predetermined number of said wedges, said means being coupled with the mold adjusting devices; means for adjusting said gaging member, including adjusting devices and means for coupling the latter with one of said positioning mechanisms; and means for adjusting said wedge selecting devices including means for coupling the latter with the other of said positioning mechanisms.

14. In a space apportioning and distributing attachment for composing machines, the latter provided with mold adjusting and pattern controlled positioning mechanisms, the combination of the following elements, to wit; a movable line deficiency gaging member and adjusting devices therefor adapted to be coupled with the positioning mechanism; a plurality of wedges arranged in lateral series between said gaging member and a relatively fixed abutment; a wedge selecting member and actuating devices therefor adapted to be coupled with the positioning mechanism; and means coupled with the mold adjusting mechanism for setting the latter to correspond with the advance of the selected wedge or wedges.

15. In a space apportioning and distributing attachment for composing machines provided with mold adjusting devices and pattern controlled positioning mechanism, the combination of the following elements, to wit; a gaging member provided with adjusting devices and means for coupling the latter with the positioning mechanism to set said gaging member relatively to a fixed bearing; a plurality of wedges arranged in lateral series between said gaging member and opposing abutment; a wedge selecting member provided with adjusting devices and means for coupling the latter with the positioning mechanism; and an actuator for the selected wedges provided with means for coupling it with the mold adjusting devices to set or vary the position of the latter to correspond with the movement imparted to the selected wedge or wedges.

16. In a composing machine provided with pattern controlled die-case positioning mechanism, mold adjusting means and a pattern controlled designating member and in combination therewith, a space apportioning and distributing mechanism including the following elements, to wit; a gaging member; adjusting devices for said gaging member including means acted upon by said designating member for coupling said adjusting devices with the positioning mechanism; a plurality of wedges arranged in lateral series with said gaging member and an abutment; an interponent adapted to engage successive wedges; adjusting devices for said interponent including means acted upon by the designating member for coupling said interponent with the positioning mechanism; and means coupled with the mold adjusting devices and acting to advance the selected wedges.

17. In a composing machine equipped with multiple pattern-controlled positioning mechanisms, mold adjusting devices and a plurality of pattern controlled designating members, and in combination therewith, a space apportioning and distributing attachment including the following elements, to wit; a gaging member provided with a plurality of adjusting means of relatively different capacities, each connected to one of said designating members, to bring it within the control of one of the positioning mechanisms; a plurality of wedges arranged in lateral series and movable longitudinally in the interval between said gaging member and a relatively fixed bearing; an actuator; an interponent movable laterally of the wedges to engage successive members of the series; and adjusting devices for said interponent including means coupled with the designating members and operating to bring said adjusting devices within the control of the positioning mechanism complemental to the one acting upon the gaging member.

18. In a space apportioning and distributing attachment for a composing machine provided with pattern controlled positioning mechanism and mold adjusting devices, and in combination therewith, the following elements, to wit; a gaging member receiving its setting or adjustment from the positioning mechanism; a plurality of wedges in lateral series between said gaging member and an opposed bearing; an actuator coupled with the mold adjusting devices; an interponent movable transversely of the wedges intermediate the latter and the actuator; adjusting devices for said interponent adapted to be coupled up with said positioning mechanism; and means for retaining said actuator in adjusted position after the gaging member and interponent have been disconnected from the positioning mechanism.

19. In a composing machine provided with a plurality of mold adjusting members and pattern controlled positioning mechanism

and designating member and in combination therewith the following elements, to wit; a line gaging member; a space counting member; adjusting devices for said gaging and counting members controlled by said designating member and acted upon by said positioning mechanism; a plurality of wedges with intermediate spacers arranged in lateral series between said gaging member and an opposing bearing in position to be engaged by said space counting member; an actuator coupled with one of the mold adjusting devices and operating to displace the space counting member and to advance the wedges covered thereby; and pattern controlled means for coupling up the mold adjusting devices connected with the actuator and the adjustable member of the mold.

20. In a mold adjusting mechanism for composing machines provided with a gaging member and opposed bearing and in combination therewith the following elements, to wit; adjusting means for said gaging member; a plurality of wedges arranged in lateral series and held in contact by a spring actuated slide, said wedges and slide interposed in series between said gaging member and opposed bearing; and means for advancing one or more of said wedges.

21. In a mold adjusting mechanism for composing machines the combination of the following elements, to wit; a plurality of wedges arranged in lateral series between a gaging member and opposed bearing; an actuator movable longitudinally of said wedges; an interponent supported to reciprocate upon said actuator in a direction transverse of the wedges for engagement with the latter; and mold adjusting devices coupled with said actuator through adjustable means for varying the relation of said actuator and the mold adjusting devices.

22. In a mold adjusting mechanism for composing machines the combination of the following elements, to wit; a gaging member; a plurality of wedges interposed in lateral series between said gaging member and an opposed bearing; an actuator movable longitudinally of said wedges and provided with means for retracting said wedges; an interponent engaged by said actuator and movable longitudinally of the series of wedges to engage successive members thereof; and transmitting devices adjustably connected with said actuator.

23. In a mold adjusting mechanism for composing machines the combination of the following elements, to wit; a gaging member and opposed bearing; a plurality of wedges arranged in lateral series between said gaging member or bearing and each provided with an operating shoulder or projection; an actuator for said wedges provided with an alining bar or surface and a guide or way in parallel therewith; an interponent movable upon said guide or way; and a slide coupled with said interponent in a manner to compel movement of the latter in a direction transverse of the wedges while permitting independent movement longitudinally of said wedges.

24. In a mold adjusting mechanism for composing machines provided with a gaging member, an opposed bearing and a plurality of wedges interposed in lateral series between said gaging member and bearing and in combination therewith, the following elements, to wit; a pattern controlled positioning mechanism; a slide and means for coupling the latter with said positioning mechanism for adjustment; an actuator for said wedges provided with an alining bar or surface and a guide, or way in parallel therewith; an interponent mounted upon said guide or way and adapted to engage said wedges; and means for coupling said slide and interponent for transmitting the motion of the former to the latter in a direction transversely of the wedges and permitting independent movement of the interponent in a direction longitudinally of said wedges.

25. In a composing machine the combination of the following elements, to wit; pattern controlled positioning and designating devices; mold adjusting devices; a space apportioning and distributing mechanism provided with an actuating motor and coupled with the mold adjusting devices; and means controlled by the designating devices and in turn controlling said actuating motor.

26. In a composing machine, the combination of the following elements, to wit; a pattern controlled positioning mechanism; a pattern controlled designating device; mold adjusting devices; a space apportioning and distributing mechanism provided with line gaging, space number registering and proportional dividing devices controlled from said positioning mechanism; and an actuating motor for said proportional dividing devices controlled by said designating devices.

27. In a composing machine provided with pattern controlled die case positioning mechanism, pattern controlled designating devices, and mold adjusting devices, the combination therewith of the following elements, to wit; a space apportioning and distributing mechanism including a line gaging member and adjusting devices therefor under the control of said designating devices and positioning mechanism; a space number member also under the control of said designating devices and positioning mechanism; dividing or apportioning devices and an actuator coupled with the mold adjusting devices; a motor for said actuator; and controlling devices for said motor coupled with the designating devices.

28. A control mechanism for the space ap-

portioning and distributing mechanism of a composing machine including the following elements, in combination, to wit; a motor provided with reversing means, the latter coupled with a reciprocatory member: an actuator for said reciprocatory member adapted to advance the latter in one direction; a movable stop lying normally in the path of said reciprocatory member; and means for withdrawing said stop.

29. A control mechanism for the space apportioning and distributing mechanism of a composing machine, the same including the following elements, in combination, to wit; a reciprocatory member coupled with a motor reversing device or mechanism; a stop normally projected into the path of said reciprocatory member; means for advancing said reciprocatory member until arrested by said stop; and means for retracting said stop to permit said reciprocatory member to complete its stroke.

30. A control mechanism for the actuating motor of a space apportioning and distributing mechanism for composing machines including, in combination, the following elements, to wit; a motor control valve coupled with a reciprocatory member or pivoted arm and provided with an actuating motor or piston; a sector or lever provided with an engaging shoulder normally in the path of said reciprocatory member; a pawl adapted to engage said sector or lever; and a bearing, coupled with said first named reciprocating member, in position to disengage said pawl when in retracted position.

31. A control mechanism for the motor of a mold adjusting mechanism for composing machines, including, in combination, the following elements, to wit; a motor control device; an actuating lever coupled with said motor control device and provided with a pin or engaging shoulder; a sector provided with a stop normally projecting in the path of said actuating lever; a reciprocating pawl adapted to engage said sector, to withdraw its stop and provided with a retracting member adjacent the pin or shoulder of said actuating lever; and means for advancing said actuating lever into engagement with the stop, thereby releasing the pawl and permitting the latter to engage the sector and withdraw the stop so that the actuating lever may complete its movement.

32. In a type casting and composing machine such as described provided with a space apportioning and distributing mechanism including line gaging and space number members, adjusting devices coupled with pattern controlled positioning and designating or selecting mechanisms, and a motor actuated dividing mechanism coupled with the mold adjusting devices and in combination therewith a control mechanism for said motor including the following elements, to wit; a motor control device or valve; a pivoted arm coupled with said motor control device and provided with a tripping member or pin; a pivoted sector provided with a stop or shoulder normally in the path of said pivoted arm; a reciprocating pawl adapted to engage said sector and having its tail in position to be engaged by said tripping member or pin when said pivoted arm is in retracted position; and two motor devices in position to engage and advance said pivoted arm, each coupled with one of the pattern controlled designating or selecting mechanisms.

33. In a composing machine provided with pattern controlled positioning and designating mechanisms the controlling members whereof are set or adjusted during one cycle of operations and the indicated operations performed during the succeeding cycle, and in combination therewith, a space apportioning and distributing mechanism including line deficiency and space number registering members coupled with and controlled by said positioning and designating members; dividing or apportioning devices coupled with the mold adjusting devices and an actuating motor; and a control mechanism for said motor coupled with the designating mechanism and provided with timing devices connected with a moving part of the machine for delaying the shifting of the motor control device or devices.

34. In a type casting machine, the combination of the following elements, to wit: mold adjusting means; opposed bearings with means for varying the interval between said bearings and for sustaining the latter in fixed relation to each other; a plurality of wedges disposed in series between said bearings; means for advancing a predetermined number of the wedges after the opposed bearings have been set or adjusted to occupy or fill the interval between said bearings; and transmitting means intermediate said advancing means and the mold adjusting means for varying the action of the latter, proportionally to the movement of said wedge advancing means.

JOHN SELLERS BANCROFT.
MAURITZ C. INDAHL.

Witnesses:
W. ARTHUR SELLMAN,
CHARLES BARDSTEY.