No. 765,775. PATENTED JULY 26, 1904.

G. A. GOODSON.

TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED MAY 23, 1904.

NO MODEL. 6 SHEETS—SHEET 1.

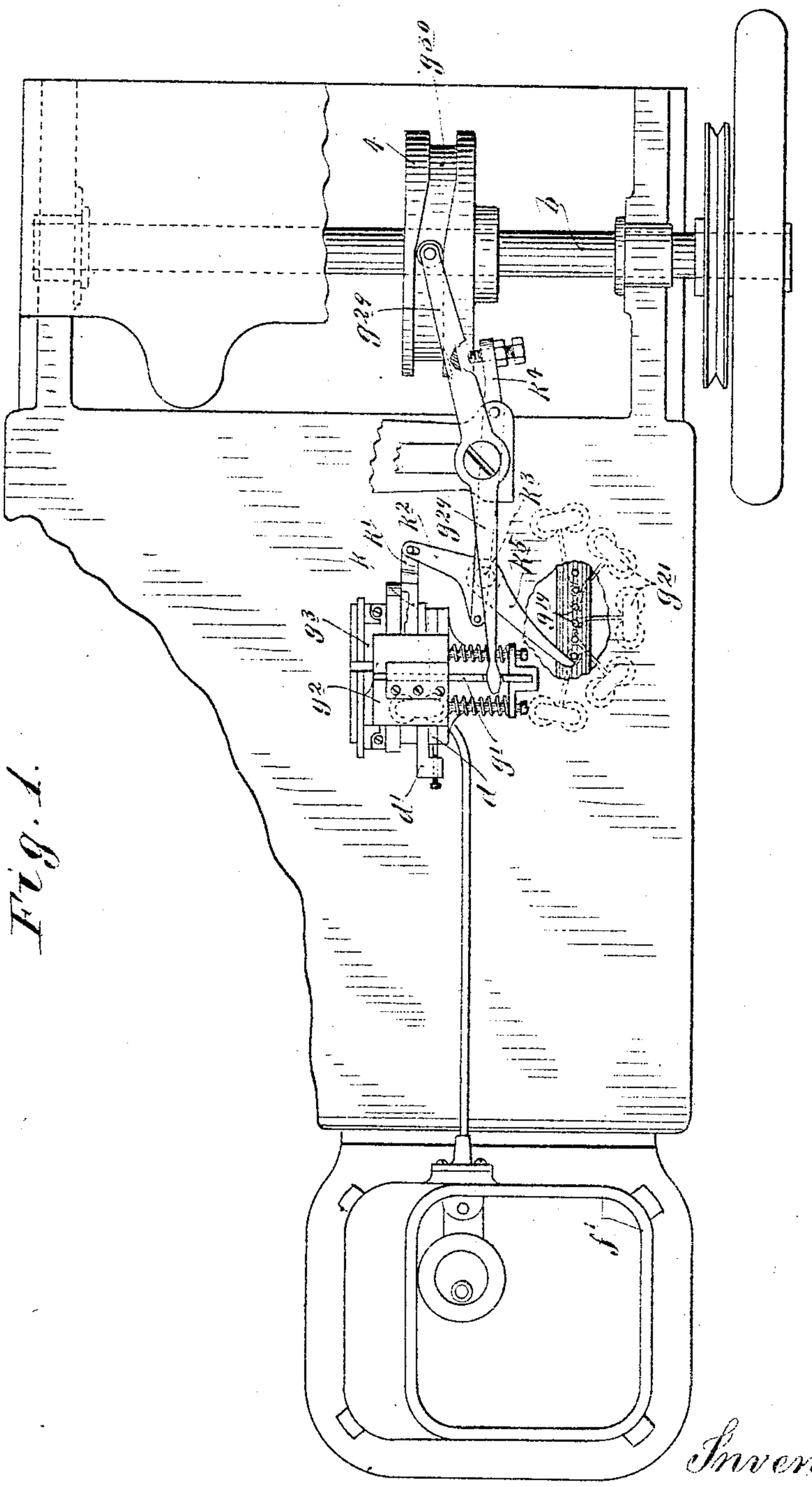

Fig. 1.

Witnesses.
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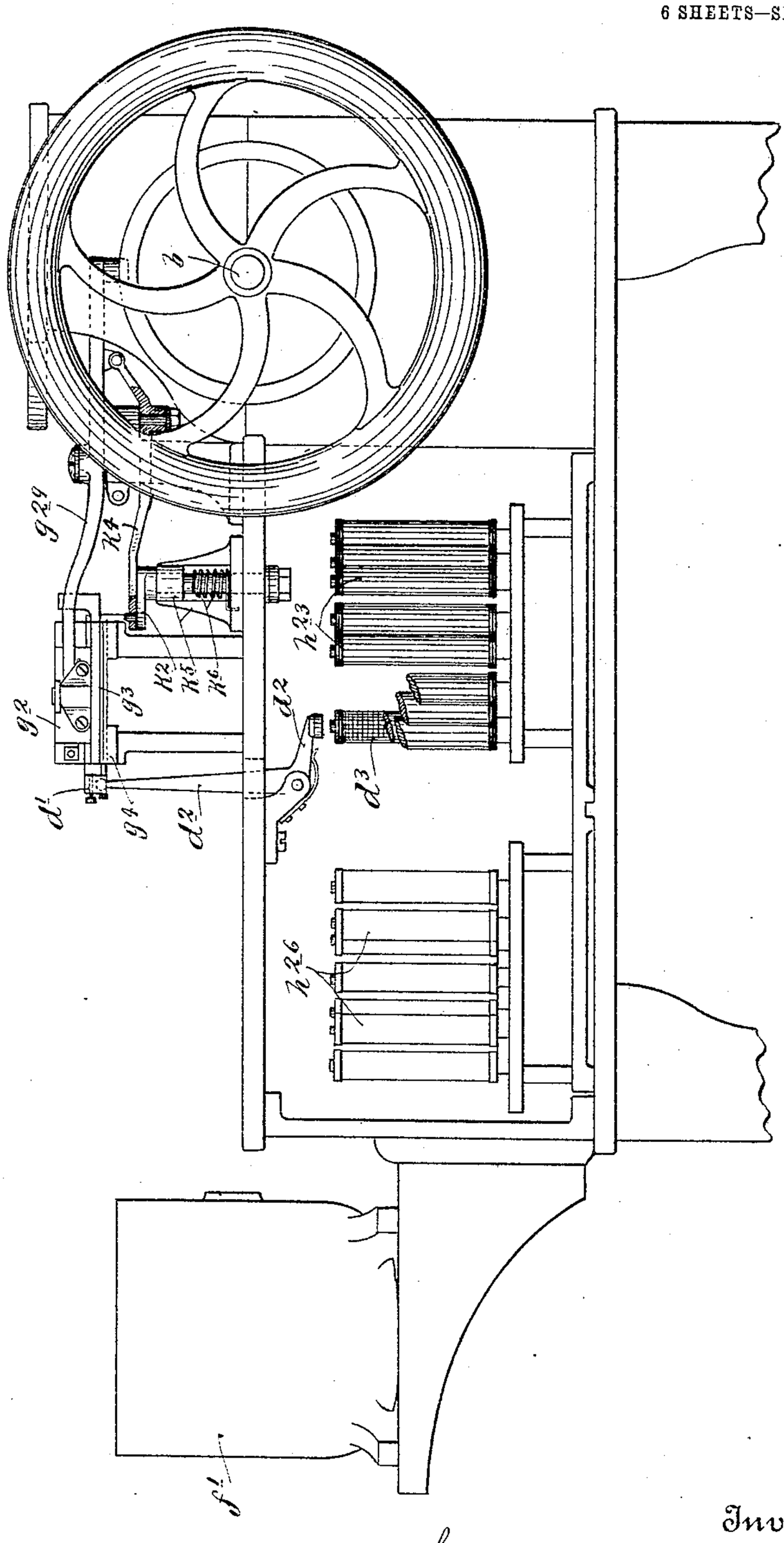
NO MODEL. 6 SHEETS—SHEET 2.

Fig. 2.



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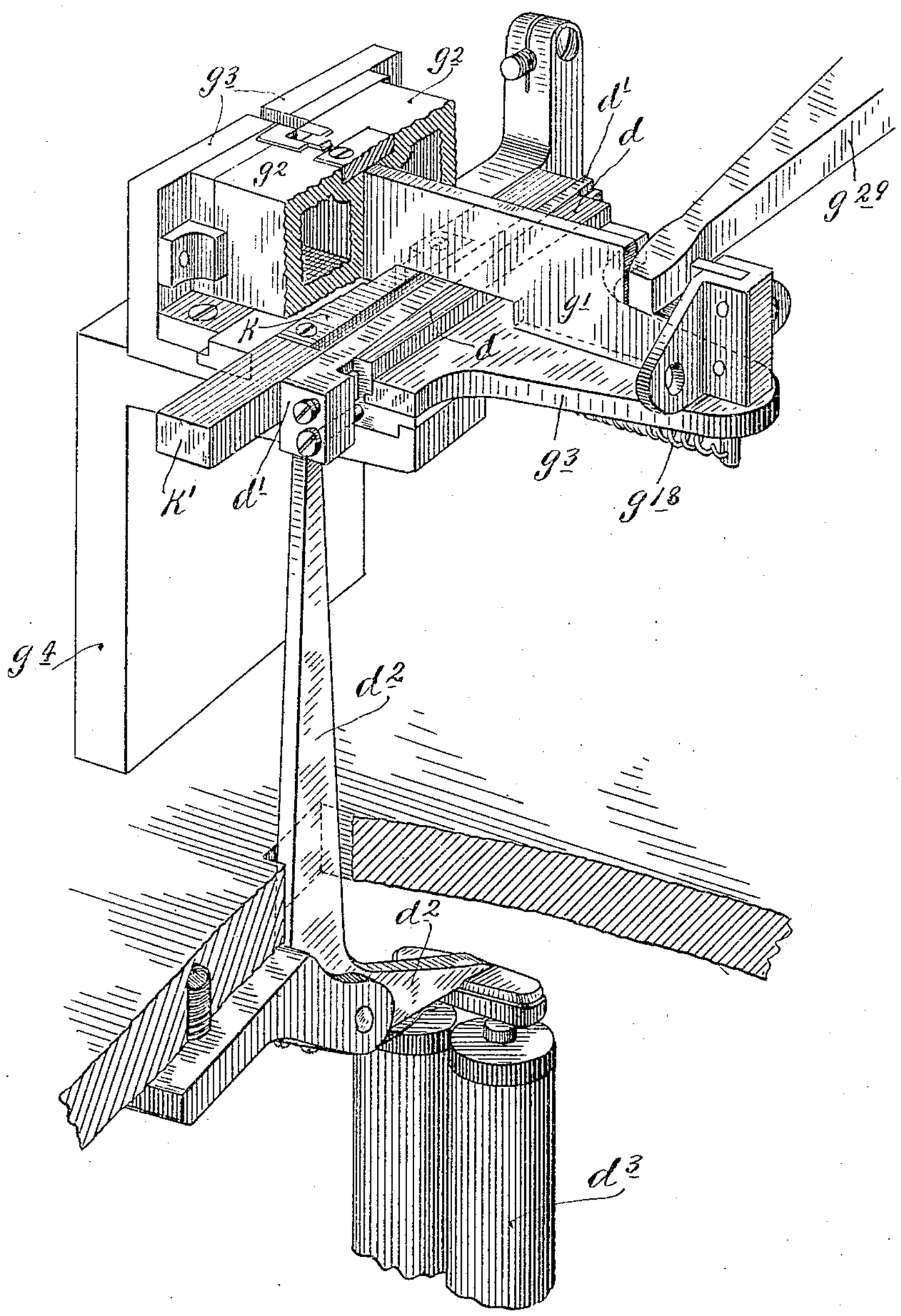
NO MODEL. 6 SHEETS—SHEET 3.

Fig. 3.



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NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.

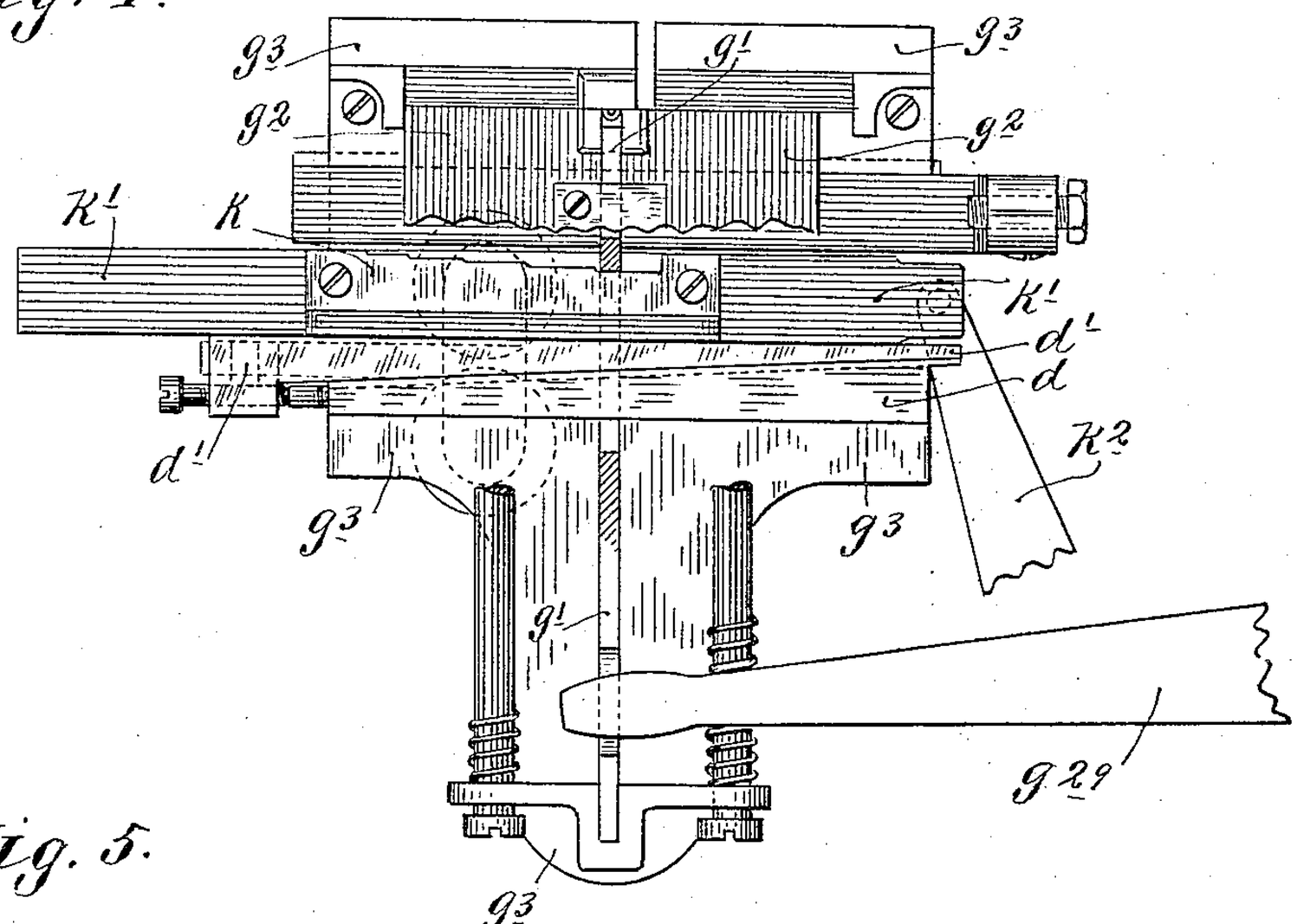


Fig. 5.

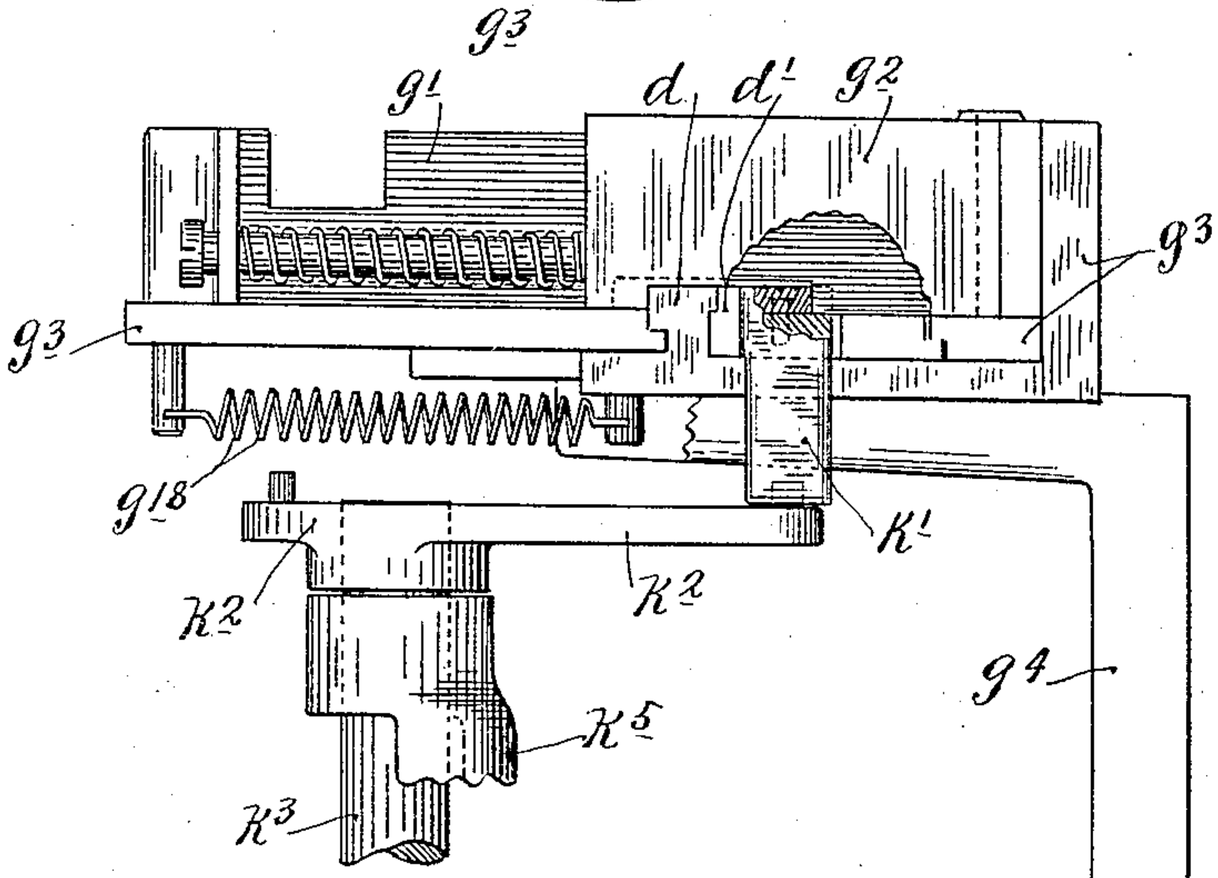
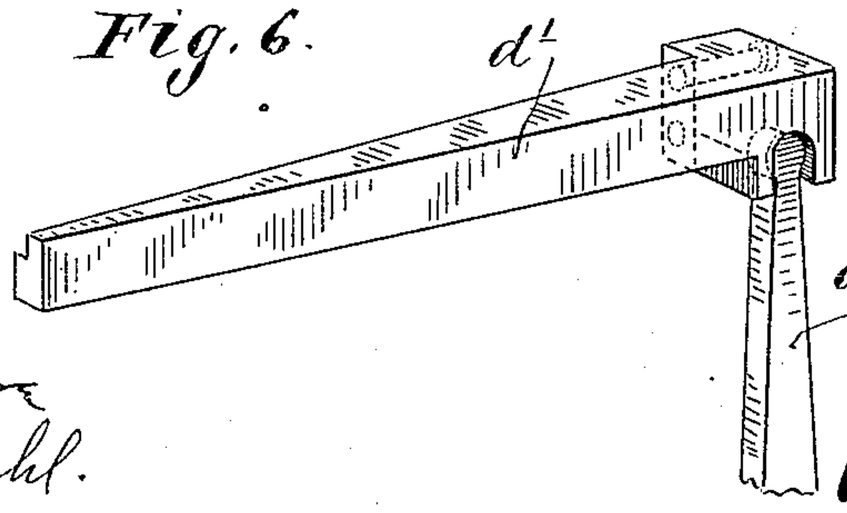


Fig. 6.



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TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED MAY 23, 1904.

NO MODEL. 6 SHEETS—SHEET 5.

Fig. 7.

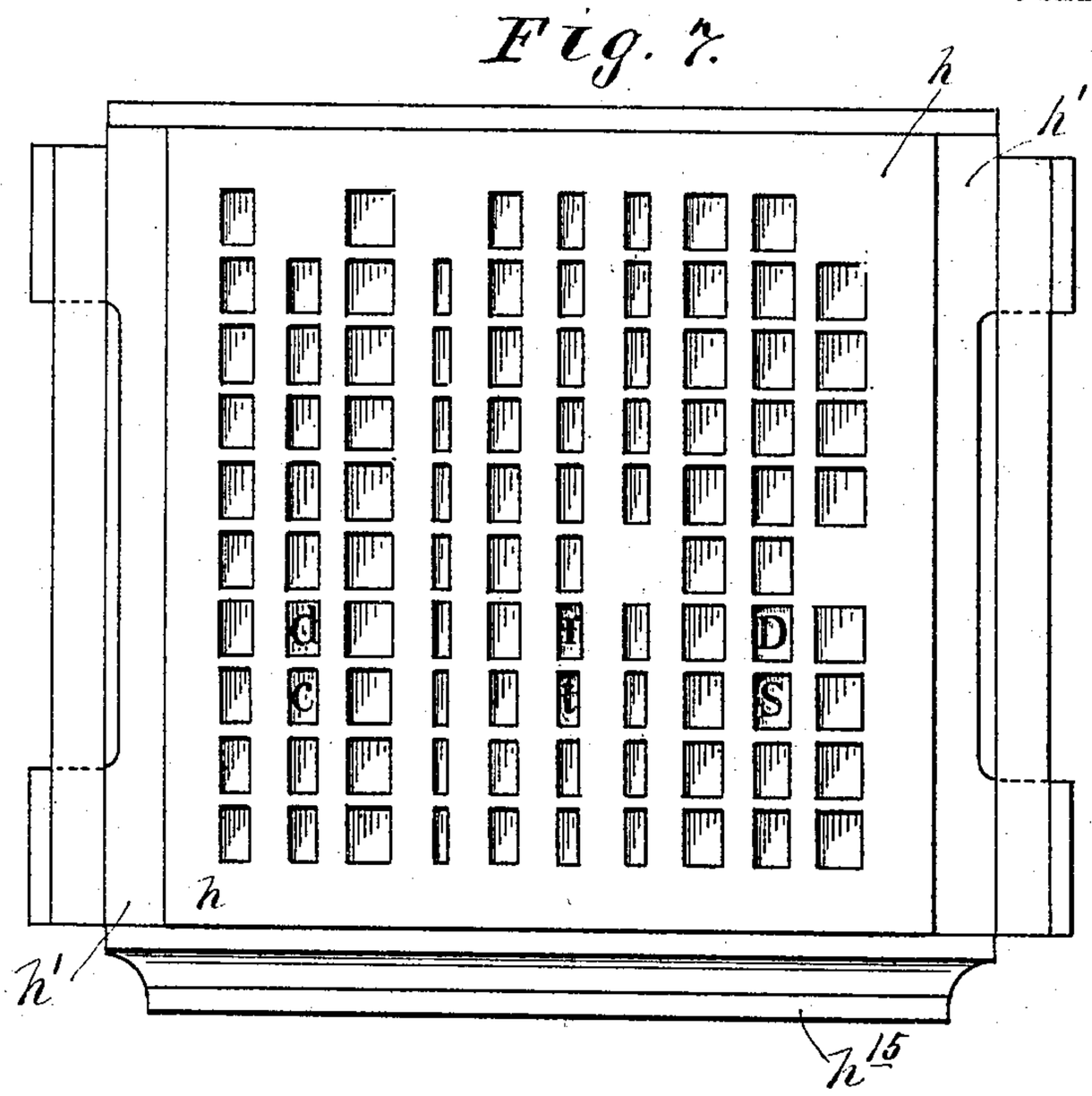

Fig. 8.

4		6		4	3	3	5	5	
4	4	6	2	4	3	3	5	5	6
4	4	6	2	4	3	3	5	5	6
4	4	6	2	4	3	3	5	5	6
4	4	6	2	4	3	3	5	5	6
4	4	6	2	4	3		5	5	
4	4	6	2	4	3	3	5	5	6
3½	3½	5½	1½	3½	2½	2½	4½	4½	5½
3½	3½	5½	1½	3½	2½	2½	4½	4½	5½
3½	3½	5½	1½	3½	2½	2½	4½	4½	5½

Witnesses.
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E. W. Jeppesen.

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No. 765,775. PATENTED JULY 26, 1904.

G. A. GOODSON.

TYPE CASTING AND SETTING MACHINE.

APPLICATION FILED MAY 23, 1904.

NO MODEL. 6 SHEETS—SHEET 6.

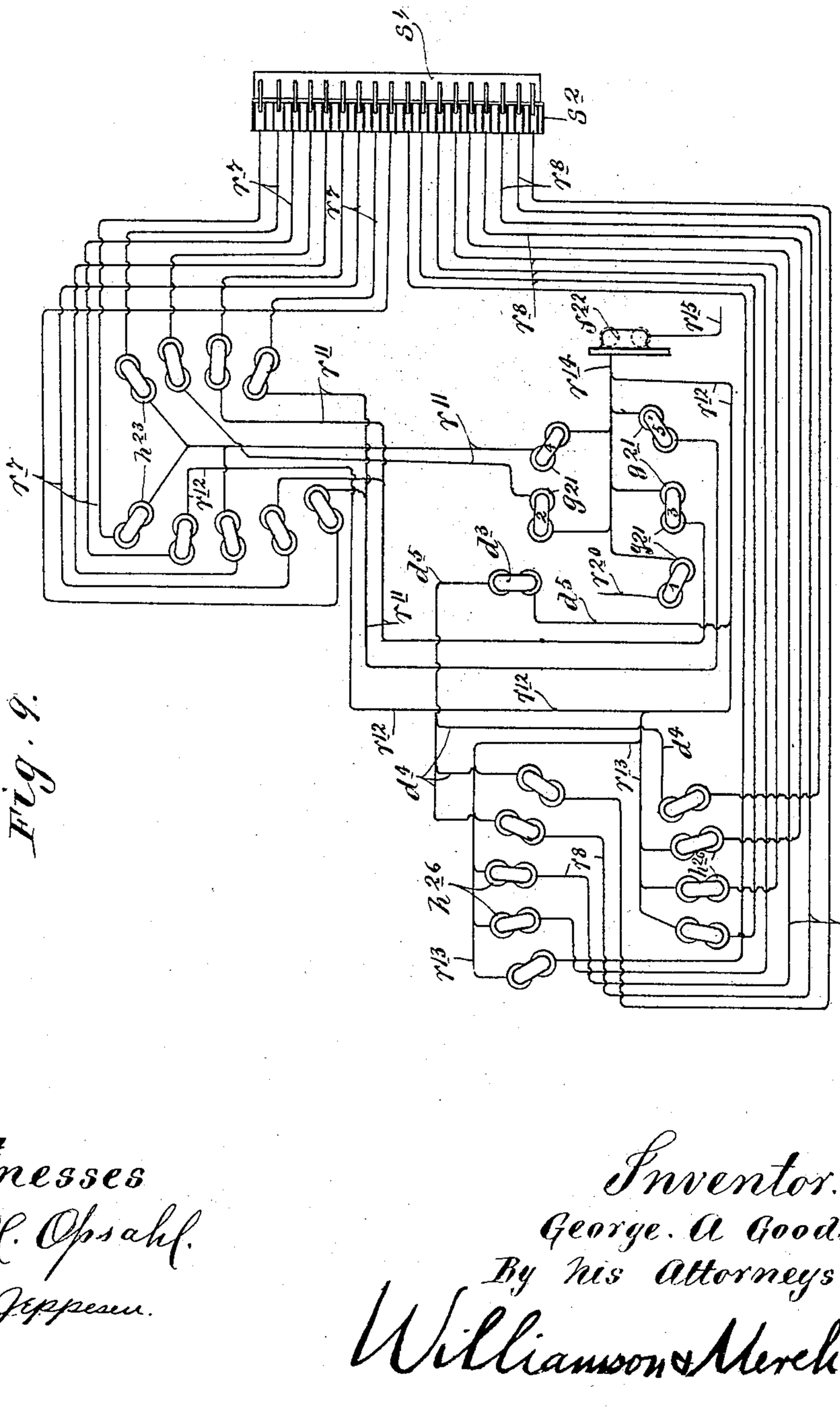

Fig. 9.

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No. 765,775. Patented July 26, 1904.

UNITED STATES PATENT OFFICE.

GEORGE A. GOODSON, OF PROVIDENCE, RHODE ISLAND.

TYPE CASTING AND SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 765,775, dated July 26, 1904.

Application filed May 23, 1904. Serial No. 209,161. (No model.)

To all whom it may concern:

Be it known that I, GEORGE A. GOODSON, a citizen of the Dominion of Canada, residing at Providence, in the county of Providence and State of Rhode Island, have invented certain new and useful Improvements in Type Casting and Setting Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to type casting and setting machines, and is especially designed to effect certain improvements in the Goodson system for casting and setting type, which system is disclosed most nearly in its commercial form in my prior United States patents, No. 606,007, of date June 21, 1898, and No. 609,098, of date August 16, 1898. Said Patent No. 606,007 discloses what I call my "composing-machine," under the action of which a pattern or dummy in the form of a punctured representative strip is produced, which subsequently is made to control the type casting and setting machine disclosed in my said Patent No. 609,098. Otherwise stated, the Goodson type casting and setting machine is entirely automatic in its action, as it operates under the control of said pattern or representative strip. In said type casting and setting machine the matrices which cooperate with the type-body mold and the other elements of the machine to cast and set individual type are carried by a two-way movable matrix-carriage, and this carriage is variably intercepted by two coöperating banks or sets of stops for selecting and centering the selected die in casting position. Otherwise stated, the matrices are arranged in rows in two different directions, and one set or bank of said stops serve to properly intercept the matrix-carriage in one direction of its movement for selecting the row in which the desired matrix is contained, and the other set or bank of said stops serve to intercept the matrix-carriage in the other direction of its movement in the proper position to select and center the desired matrix of the row. Hence in my prior patents one set or bank of said stops because of their said function are called the "row-selecting" stops, and the other set or bank thereof are called the "individual" stops.

In the Goodson machine the matrices are formed in the face of a solid block. Otherwise stated, I employ what I call an "integral-font" matrix-block produced by the process disclosed in my foundation United States Patent No. 530,481, of date December 4, 1894.

The back of the matrix-block contained centering-holes for coöperation with a vertically-movable centering-pin finally and exactly to center the selected matrix in casting position, and said centering-holes on the back of the block were uniformly spaced apart in two different directions, so that the block had uniform steps of movement in both directions of its travel. Said matrix-block was of rectangular form and had ten rows of ten matrices each, if completely filled out, thereby making provisions for ten by ten or one hundred possible stopping positions. Provision was made for five different running widths of type-face and one thin or hair spacing quad. The matrices were grouped or classified according to running width of face, or, otherwise stated, each row from side to side of the matrix-block, or lengthwise of the machine when the block was in working position, contained matrices of the same running width of face; but as only five widths of face were provided for character-type several rows on the block were devoted to matrices of the same size. An adjustable type-body mold coöperated with said two-way movable matrix-block. The plunger member of said mold was adapted to be variably set, according to the running width of the face of the selected matrix or of the type-body to be cast. For this purpose said mold-plunger was under spring tension to assume its outermost or most widely open position and was variably intercepted by a stepped lever or unit-gage and a coöperating series of stops, so as to locate said plunger in proper position for the running width of the type-body to be cast.

The type produced and set by the machine were of the kind known as "self-spacing"

type, involving the unit principle for measuring the running width of the type face and body and the point principle for measuring the type-body transversely of the face. Otherwise stated, all the type, including quads as type, were in running width of face multiples of a common unit, and the same unit also measured the predetermined column-line to be justified.

The different fonts of type distinguished in respect to size—such, for example, as brevier, nonpareil, small pica, pica, long primer, &c.—each had its own unit. For example, the unit for pica was six to a pica-em, the unit for brevier was ten to a pica-em, the unit for small pica was eight to a pica-em, and the unit for nonpareil was twelve to a pica-em.

As already noted, only six units of possible variation in running width of face were provided in the matrices on the block. The single-unit size was used only to produce a thin quad for hair-spacing in justifying the line. This left only five sizes of face, ranging from two to six units, among which all the characters, including upper and lower case letters, punctuation-points, &c., had to be assigned in each font of type. There being thus six sizes of face and running width of type-body in each font, six stops were employed for cooperation with the stepped lever or unit-gage variably to intercept the mold-plunger in six different positions. As the rows on the matrix-block were grouped or classified according to the running width of face and all the movable members of the stops for intercepting the matrix-block and for intercepting the mold-plunger were subject to electromagnets, the classification above noted made it possible to connect up the row-selecting stop-magnets for the matrix-block with the proper corresponding mold-plunger stop-magnets in series, so that when the matrix-block was positioned to select any given row in respect to face size of the matrix the circuit was also closed through the mold-plunger stop-magnet of corresponding unit size for the body required.

The foregoing statements outline the general organization of my type casting and setting machine and the special relations of the matrix-block and the type-body mold as disclosed in my prior patent. The result was satisfactory for many purposes; but a material limitation existed in respect to the possible diversity in the styles of dresses of type which could be produced on the machine. It is a well-known fact that authors and publishers demand a great variety in the styles or dresses of type. One may demand "Old Style," another "French Old Style," another "Roman," another "Ronaldson," another "Franklin," &c. Type founders producing type to be set by hand in the old way readily met this demand for diversity of styles or dresses, for the reason that they could cut their matrices to secure the desired artistic effect in the face, regardless of whether the type-faces should differ in multiples of any standard unit or not. Self-spacing type did not permit of this freedom for diversity in running width of face. On my machine as above outlined it will be seen, for example, that there never could be a difference in running width of face or type-body of less than one standard unit. This was a serious limitation in respect to the best artistic effect for some styles or dresses of face. For example, for some styles the lower-case letter "t" is too wide for a two-unit body and too narrow for a three-unit body, the lower-case letters "c" or "e" are too wide for a three-unit body and too narrow for a four-unit body, the upper-case or capital "S" is too wide for a four-unit body and too narrow for a five-unit body, and the lower-case letter "w" is too wide for a five-unit body and too narrow for a six-unit body.

Now my present invention has for its object to meet the precise problem above stated by overcoming the limitation as to the diversity in the styles and dresses of face capable of being produced on my machine. In other words, by my invention I make my machine capable of duplicating or approximately duplicating any style of type-founders type. I accomplish this result, moreover, in an extremely simple way. I leave the general organization of my machine substantially the same as before. I then provide a matrix-block having matrices some of which are multiples of a fraction of said standard unit, with said matrices so classified on the block that the whole-unit sizes and the half-unit sizes occupy the same row or rows in one direction, with all the half-sizes occupying certain predetermined rows in the opposite direction. I then provide a type-body mold which is adjustable either in multiples of the entire standard unit or in multiples of the fractional unit, as the case may require, or, otherwise stated, I add a wedge-shaped supplemental or fractional-unit gage for coöperation with my old full-unit gage and its coöperating stops hitherto employed to intercept the mold-plunger. The new or fractional-unit gage is under the control of a special magnet, which for distinction I call the "fractional-unit" magnet, and certain of the return-leads from the individual stop-magnets for the matrix-block are connected to a common return-wire which passes through said fractional-unit magnet before tapping the return-wire, extending from the mold-magnets to the pump-magnet, thus causing the fractional-unit gage to be brought into action whenever a fractional size is required. By these slight additions and changes in the general organization of my machine I multiply or greatly increase the diversity of unit divisions, and hence am able to produce the desired diversity in the styles and dresses of type.

The foregoing general statements probably

make my present invention so distinct that only a brief detailed description is needed.

The accompanying drawings illustrate my improvements and such parts of the old machine as are deemed necessary to show the application of the improvements. All the old parts required for the complete organization may be assumed to be absolutely identical with the parts disclosed in my said prior patent, No. 609,098, of date August 16, 1898, and all the old parts shown are marked by the same reference notations as in the same prior patent. The new parts are marked with the reference-letters d and k and powers thereof.

In the accompanying drawings, wherein like notations refer to like parts throughout the several views, Figure 1 is a plan view of a portion of my type casting and setting machine with my improved mold in working position, many parts of the machine being removed and some portions broken away. Fig. 2 is a side elevation of the parts shown in Fig. 1. Fig. 3 is a perspective view showing the improved mold with some parts broken away. Fig. 4 is a plan view of the mold with some parts broken away and others shown in section. Fig. 5 is a right-side elevation of the parts shown in Fig. 4. Fig. 6 is a detail in perspective, showing the fractional or supplemental gage detached. Fig. 7 is a view in underneath plan, showing the face of the matrix-block, on an enlarged scale, the same being exactly double the full size of the matrix-block. Fig. 8 is a unit diagram illustrating the face sizes of the matrices and the grouping thereof on the block; and Fig. 9 is a diagram illustrating the electrical connections for the matrix-block, stop-magnets, the mold-magnets, and the pump-magnet, these being sufficient to illustrate the modifications in the wiring required to incorporate my present improvements as compared with the electric connections or wiring illustrated in the diagram view Fig. 37 of my said prior patent, No. 609,098.

The type-body mold (best shown in Figs. 3 to 6, inclusive) includes the members g', g^2, and g^3, constructed and related to each other, with the members g' and g^2 mounted on and movable crosswise of the angular member g^3 exactly as in my prior patent. The angular member g^3, and hence the entire mold, is also carried by the vertically-movable angular bracket g^4, as in the prior patent. The plunger member g' is under tension from spring g^{18} to move to its outermost position until intercepted by unit-gage k, which in its number of steps and in the functions performed corresponds to the stepped lever g^{22} of my said prior patent; but in this instance the unit-gage k is mounted on a slide k', seated on the mold member g^3 with freedom for transverse sliding movement thereon. Said slide k', carrying said unit-gage k, has pin-and-slot engagement with the longer arm of a bell-crank lever k^2, fixed to a vertical rock-shaft k^3, as best shown in Figs. 1, 2, and 5, and the shorter arm of said lever k^2 is connected to the inner end of a pivoted lever k^4, which is subject to the mold-plunger-ejecting lever g^{29}, the rear or roller end of which works in the peripheral cam-channel g^{30} of cam-wheel No. 4 on the constantly-running shaft b. The vertical rock-shaft k^3 is also provided with a crank-arm k^5 and a spring k^6, working in opposition to the lever k^4 and the lever g^{29}, and permitting said shaft-arm to be yieldingly intercepted. The said crank-arm k^5 is adapted to be intercepted by any selected member of the six mold-plunger stops g^{19}, so as to set the unit-gage k in the proper position to intercept the mold-plunger g' in proper position for the type-body selected. The mold-plunger g' is cut away where it straddles the unit-gage to permit the proper relative movements of the said plunger and gage, and the inner end of the ejecting-lever g^{29} works in an enlarged notch of the mold-plunger, just as in my prior patent.

To the angular member g^3 of the mold is fixed a wedge-shaped banking-block d, and between the same and the back of the unit-gage k is mounted the wedge-shaped supplemental or fractional-unit gage d' with freedom for a sliding motion on the bed or angular member g^3. The said fractional gage d' is pivotally connected to the upper end of the long arm of a bell-crank spring-pressed armature-lever d^2, the lower or armature member of which is subject to the magnet d^3, which because of its function I call the "fractional-unit" magnet.

Under the tension from the spring the lever d^2 tends to hold the fractional gage d' in its outermost or idle position; but when the magnet d^3 is energized the gage d' will be moved inward far enough to make a half-unit of difference in the setting of the mold-plunger g' under the coöperation of the unit-gage k and the fractional gage d'.

The improved matrix-block h, suitably seated in its small or transverse carriage h', is illustrated in Fig. 7, and the classification of the matrices thereof in respect to size is shown in the unit diagram Fig. 8. It may be noted that only a few of the matrices are shown on the block h, (illustrated in Fig. 7,) but that the seats for all appear thereon, and that when in position on the machine the downturned lip or flange h^{15} of its small or transverse carriage h' faces the individual stops controlled by the magnets h^{26}. When the block h is in position on its two-way carriage of the machine, the size-rows run from right to left, or lengthwise of the machine, so they can be selected by steps of the forward motion of the block under the action of the row-selecting stops controlled by the row-selecting magnets h^{23}, (best shown in diagram view Fig. 9,) and hence it follows from the grouping of the matrices on the new block, as shown in the diagram Fig. 8, that the half-sizes occupy the three rows at the left of the block when the

block is in working position, and hence that the half-sizes can be selected by the individual stops controlled by the right-hand first three members of the individual stop-magnets h^{26}. (Best shown in Fig. 9.) To accomplish this result, the return-leads d^4 from the said first three individual stop-magnets h^{26} tap a common wire d^5, which leads through the fractional-unit gage-magnet d^3 and thence taps the six-unit return-wire r^{12} from the row-selecting magnets h^{23}, which in turn taps the common return-wire r^{14}, leading from the mold stop-magnets g^{21} to the pump-magnet f^{22}.

The return-wires r^{12} from the row-selecting stop-magnets h^{23} are properly grouped so as to connect the proper members thereof in series with the mold-magnets stops g^{21} of the unit size corresponding to the standard unit size of the row selected. Otherwise than in the respects just hereinbefore noted the wiring is exactly the same as illustrated in the diagram view Fig. 37 of my said prior patent No. 609,098, and such of the old leads as are shown are marked with the same identical reference-letters. Current reaches the set contacts of the two-way movable switch s' s^2 through the connections controlled by the punctured representative strip exactly as in my prior patent.

The molten metal is supplied from the pump-equipped melting-pot f' to the mouth of the mold-cell through the tube f^3, which is intended to be electrically heated just as in the prior patent.

From the forgoing detailed description it must be obvious that the electric connections will control the proper stops for intercepting the two-way movable matrix-block h to select any desired matrix and the proper mold-plunger stops variably to intercept and set the mold-plunger g' for coöperation with the centered matrix of the block to produce the selected type. If the selected matrix be one formed in multiples of the standard unit, then the fractional gage will not be called into action; but if the selected matrix be one formed in multiples of the half-unit then the magnet d^3 will be energized and the wedge-shaped fractional gage d' will be called into action, so as to coöperate with the unit-gage k to set the mold-plunger g' as required for the selected type. It will be understood, of course, that a greater or less number of the matrices may be multiples of the full unit or multiples of the factional unit, as may be found most desirable for any particular style or dress of type, the proper number of the return-leads from the individual stop-magnets h^{26} being passed through the fractional-unit gage-magnet d^3. It will also be understood that the fraction, instead of being a half-unit might be any other subdivision of the standard unit. The half-unit subdivision, however, affords differences which are fine enough to afford a sufficient range in the dresses or styles of type for all practical commercial purposes.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. In a type casting and setting machine, the combination of a two-way movable bank of dies arranged in rows in two directions, with the rows in one direction containing dies appropriated, some to type-bodies formed runningwise in multiples of the standard unit of the font, and others appropriated to type-bodies formed runningwise in multiples of a fraction of said unit, and an adjustable type-body mold adjustable in multiples of the entire unit or in multiples of the fractional unit, as the case may require, substantially as described.

2. In a type casting and setting machine, the combination with a matrix-block having matrices, some of which are multiples of the standard unit of the font, and others of which are multiples of a fraction of said unit, with said matrices arranged in rows in two directions, and classified in respect to size of face, with the full-unit sizes and the half-unit sizes occupying the same rows in one direction, but all the half-unit sizes occupying certain predetermined rows in the opposite direction, two corresponding banks or sets of stops for intercepting said block to select the desired matrix, and a type-body mold, the plunger member of which is subject to a full-unit gage and a coöperating series of stops, whenever a full-unit type-body is selected, and also to a fractional-unit gage, whenever a fractional-unit matrix is selected, substantially as described.

3. The combination with the two-way movable matrix-block, having its matrices formed, some in multiples of the entire unit, and others in multiples of a fractional unit, arranged in rows in two directions, and classified in respect to size of face, as described, of the two corresponding sets of stop-magnets, operating as described, to intercept said matrix-block, the type-body mold with plunger subject to the full-unit gage alone or to the same and the fractional-unit gage, as required, the mold-plunger stop-magnets connected in series with the row-selecting stop-magnets of the block, and the fractional-unit gage-magnet in the common return-lead from such of the individual stop-magnets of the block, as select the fractional sizes, all for coöperation, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE A. GOODSON.

Witnesses:

JAS. F. WILLIAMSON,

F. D. MERCHANT.