No. 690,720. Patented Jan. 7, 1902.

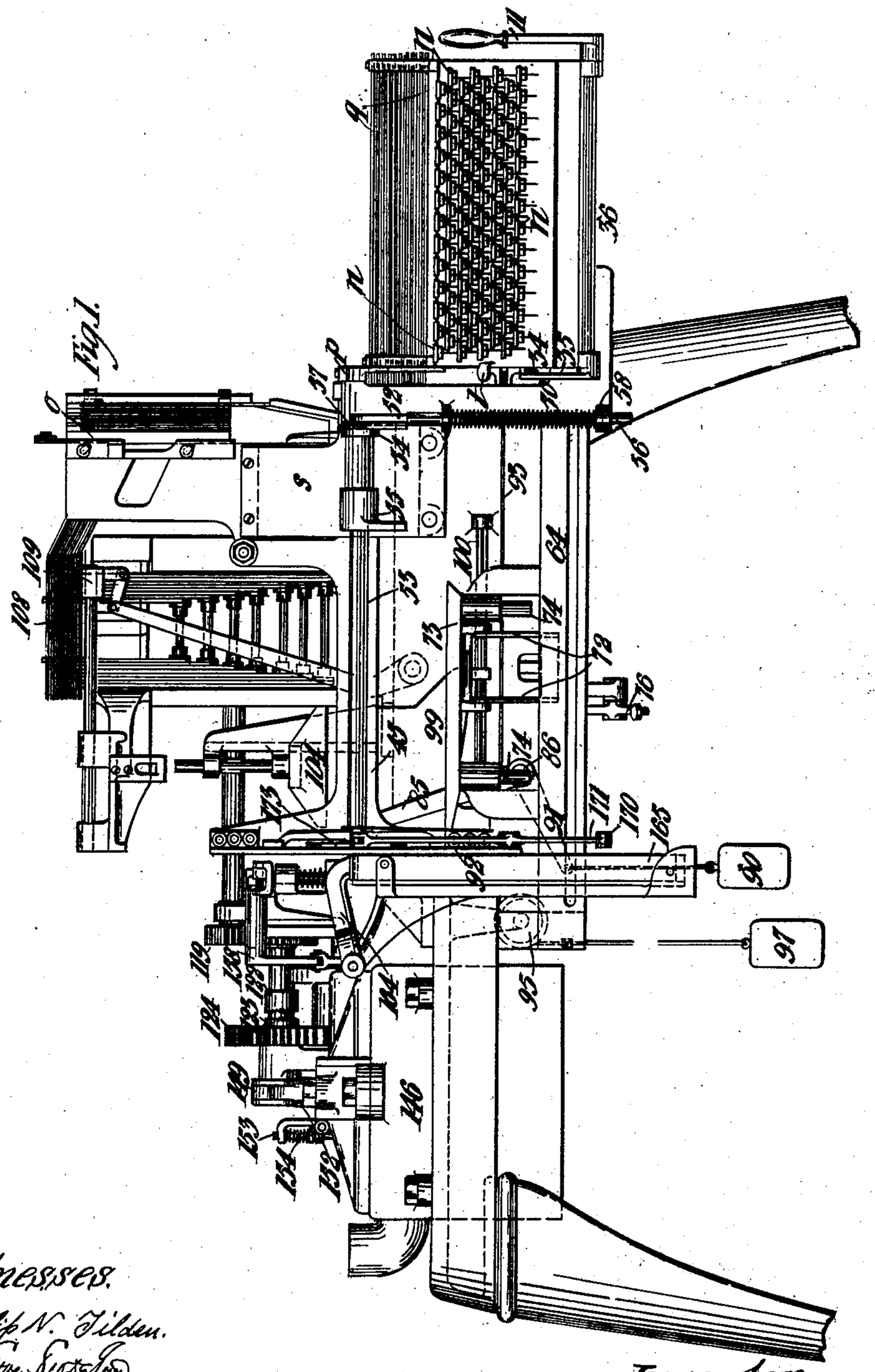
H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.

(No Model.) 12 Sheets—Sheet 1.

Fig. 1.



Witnesses.
Philip N. Tilden.
Henry Lee Stanley

Inventor,
Henry J. S. Gilbert-Stringer.
By James L. Norris Atty.

No. 690,720. Patented Jan. 7, 1902.

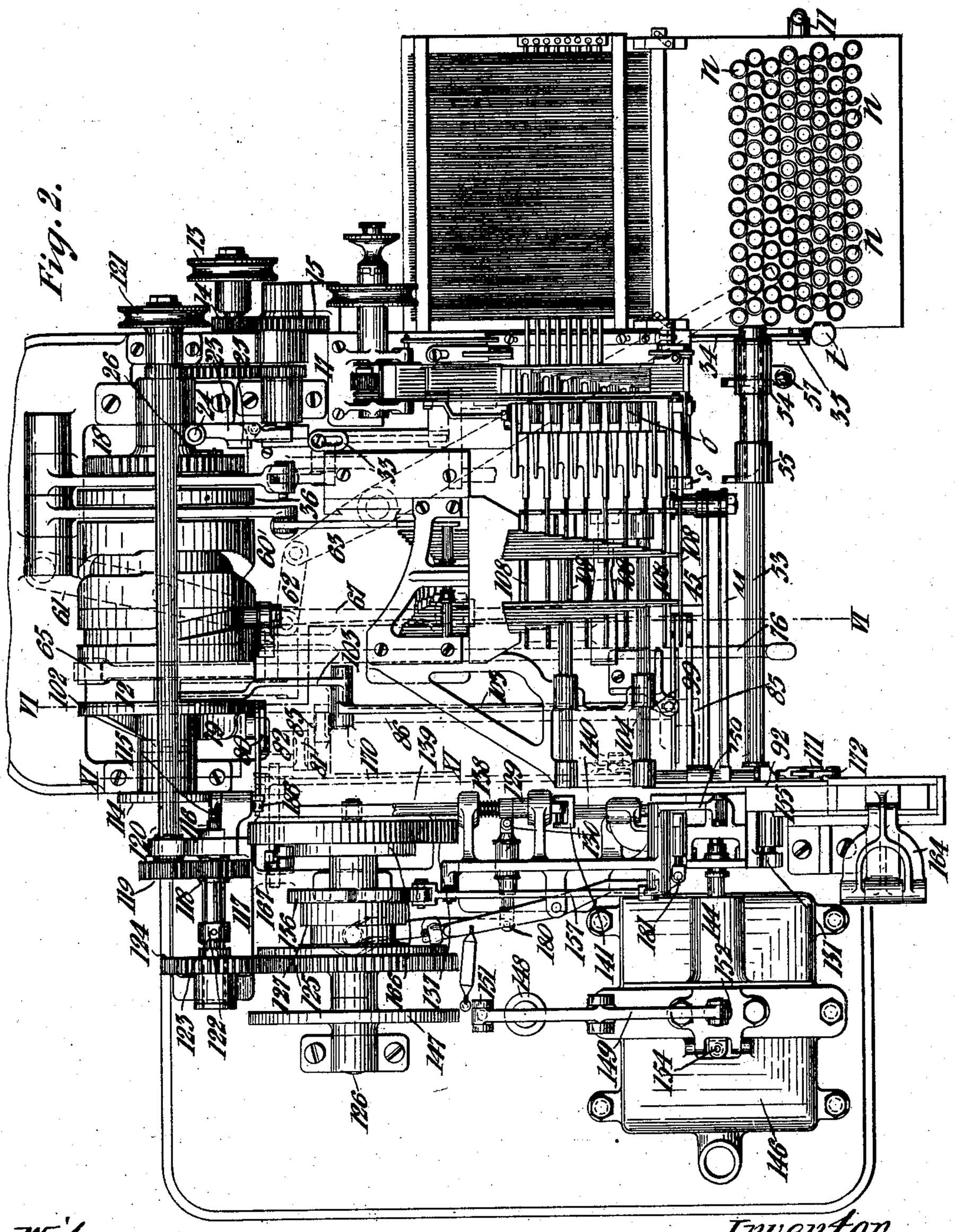
H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 2.

Fig. 2.



Witnesses.
Philip N. Tilden.
Allen Stoneham

Inventor.
Henry J. S. Gilbert-Stringer.
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No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 3.

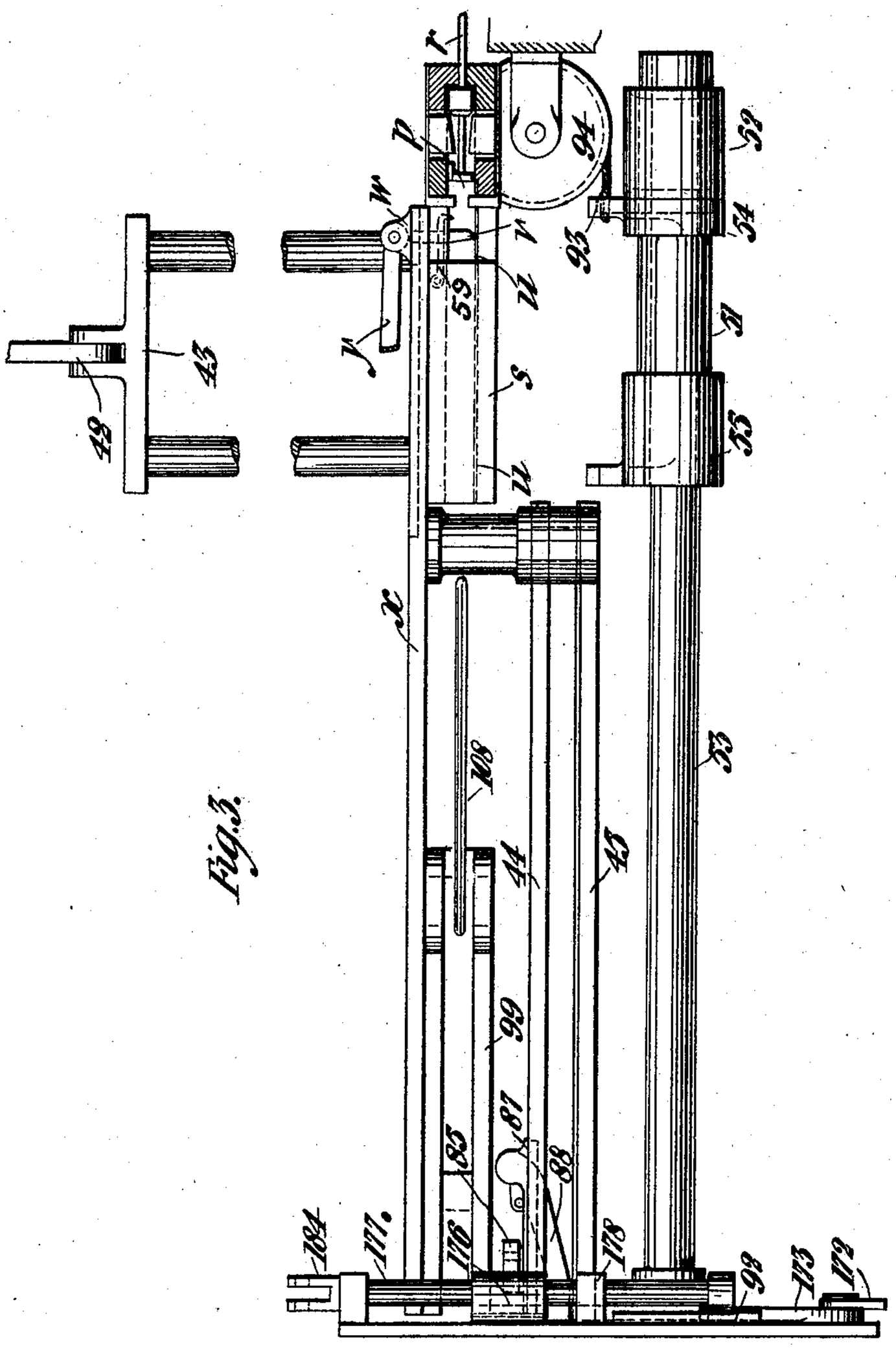

Fig. 3.

Witnesses.
Philip N. Tilden.
Wm. Lowe Lee

Inventor.
Henry J. S. Gilbert-Stringer.
By James L. Norris.
Atty.

No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 4.

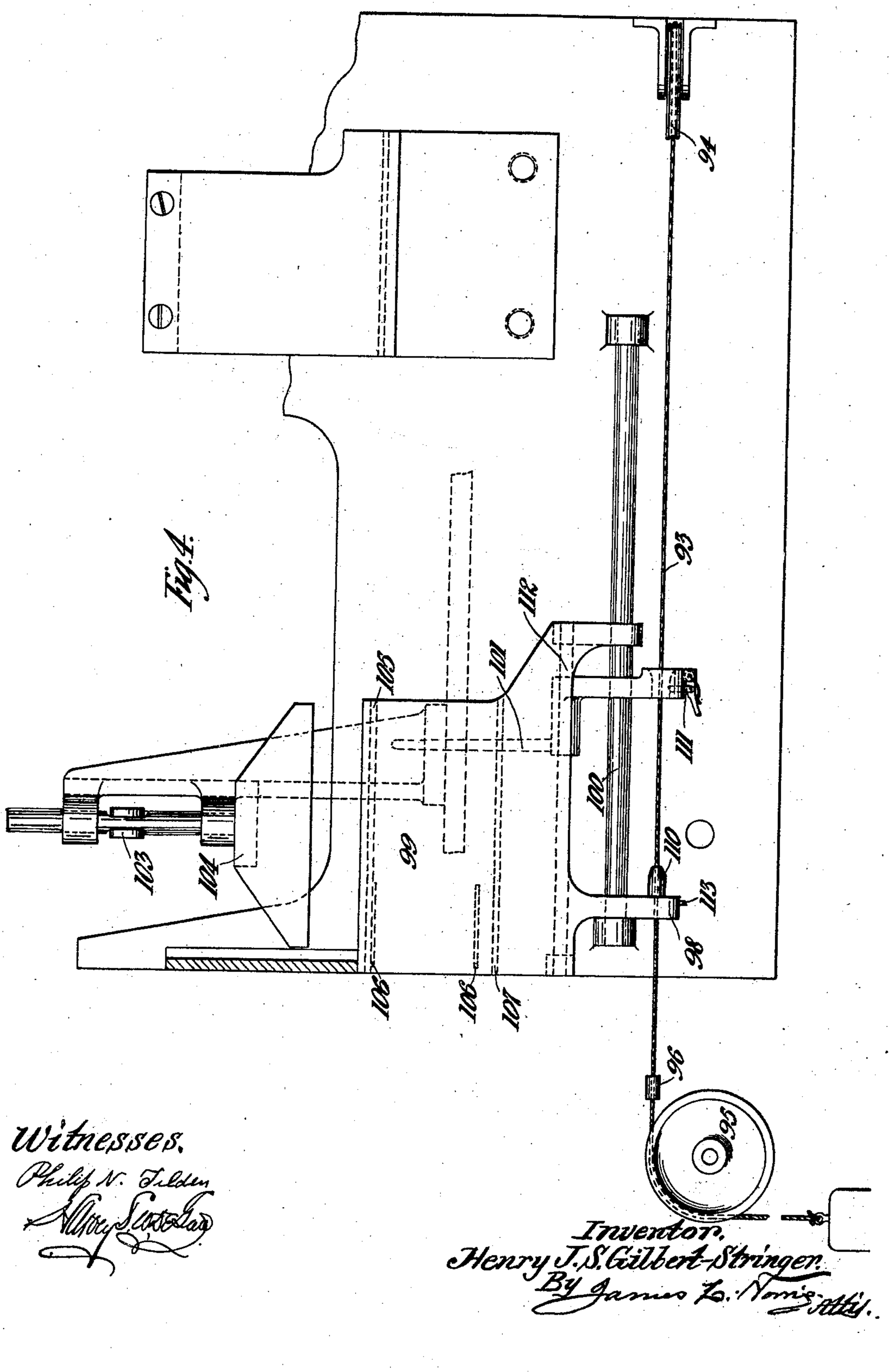

Fig. 4.

Witnesses.
Philip N. Tilden
Wm. Scott Lay

Inventor.
Henry J. S. Gilbert-Stringer.
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No. 690,720. Patented Jan. 7, 1902.

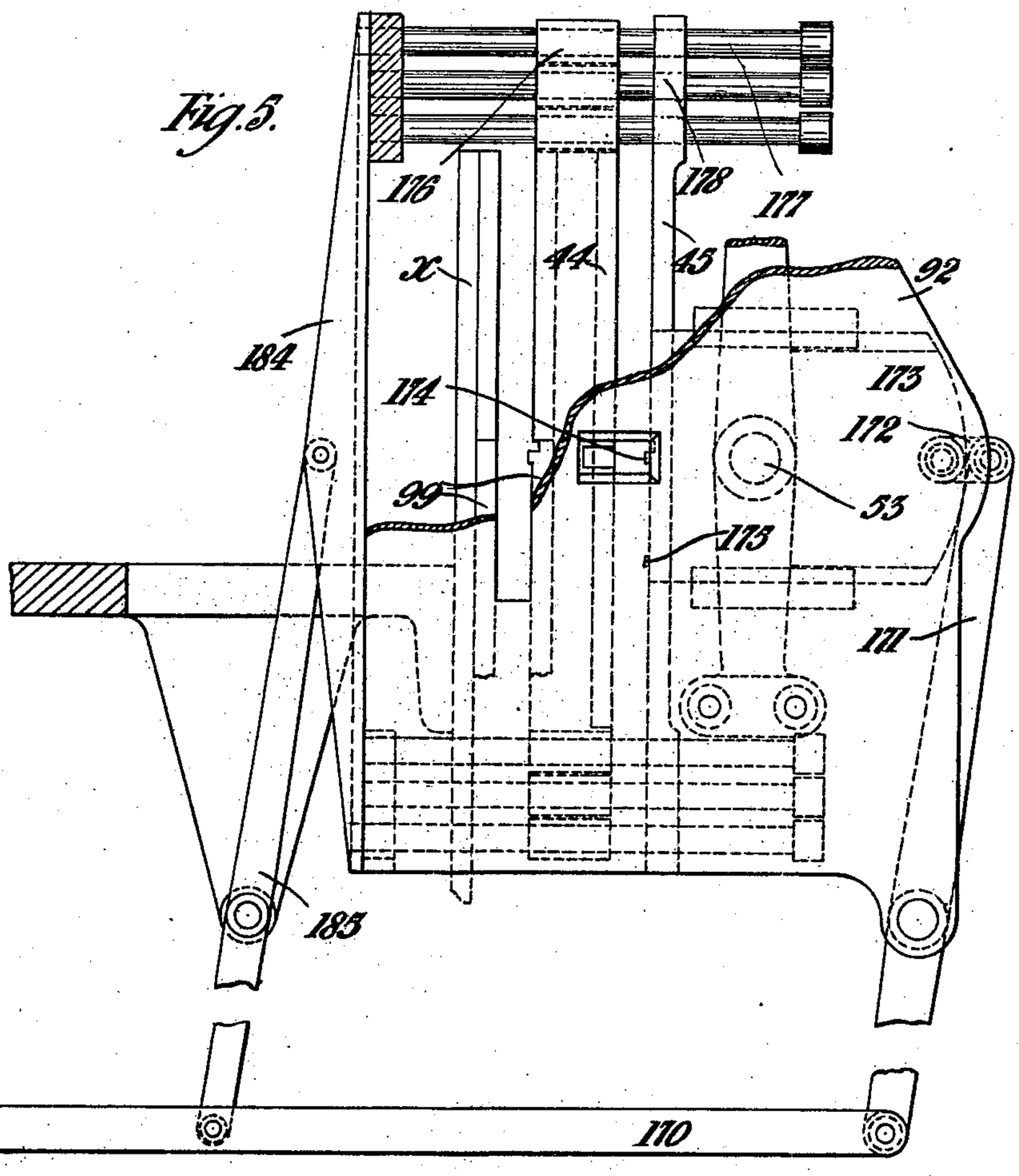
H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 5.

Fig. 5.



Witnesses.
Philip N. Tilden.
Henry S. Sutherland.

Inventor.
Henry J. S. Gilbert-Stringer.
By James L. Norris.
Atty.

No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 6.

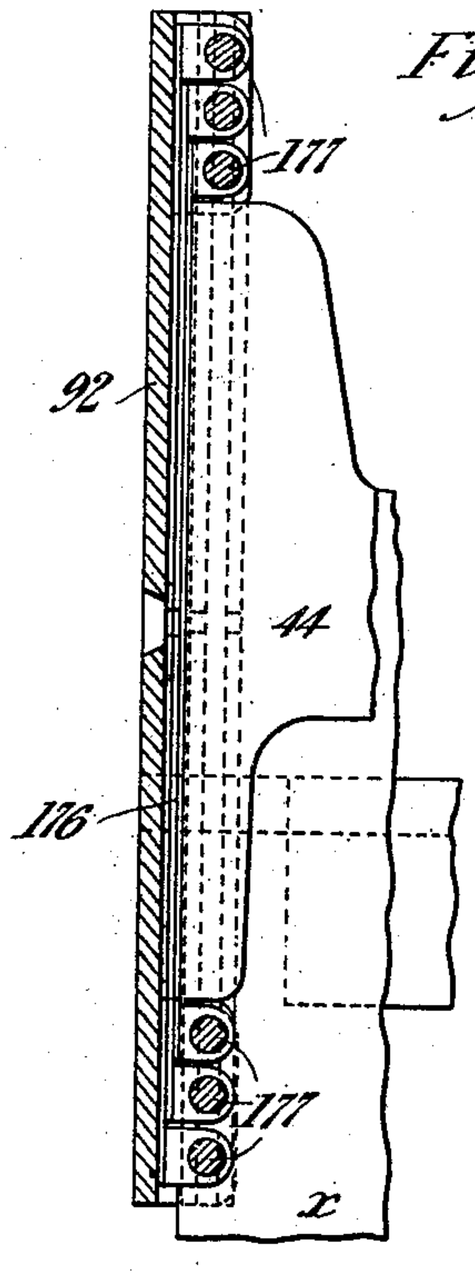


Fig. 5a.

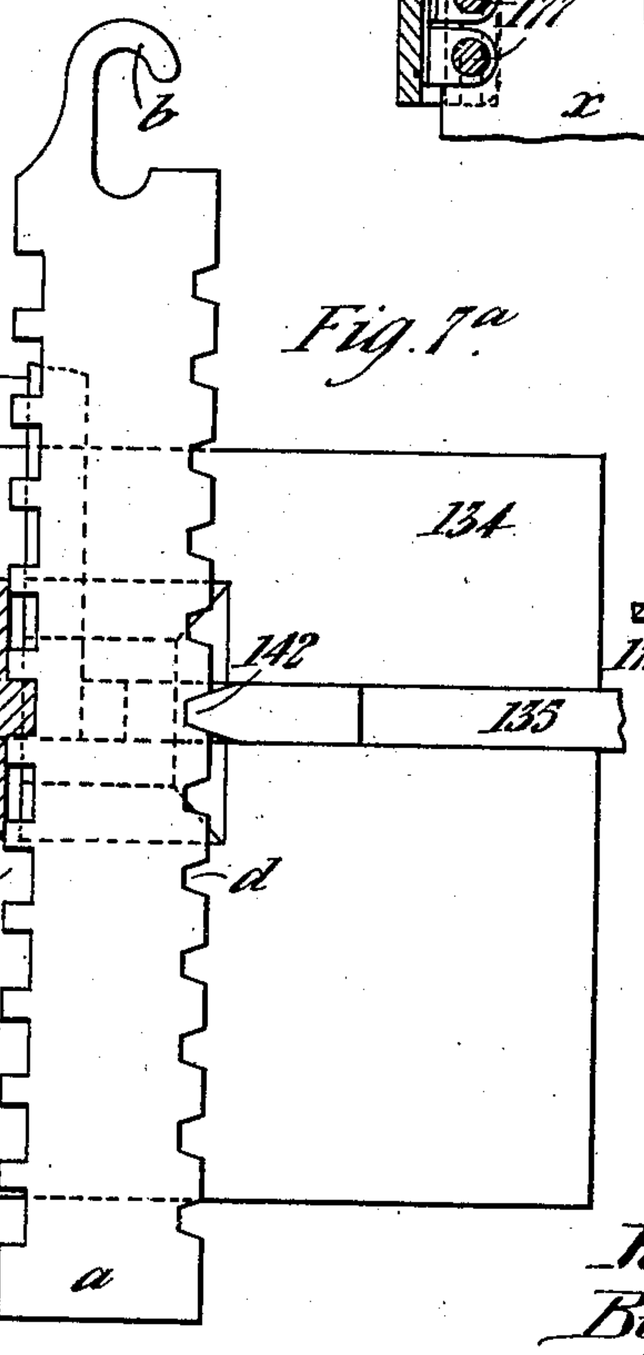


Fig. 7a.

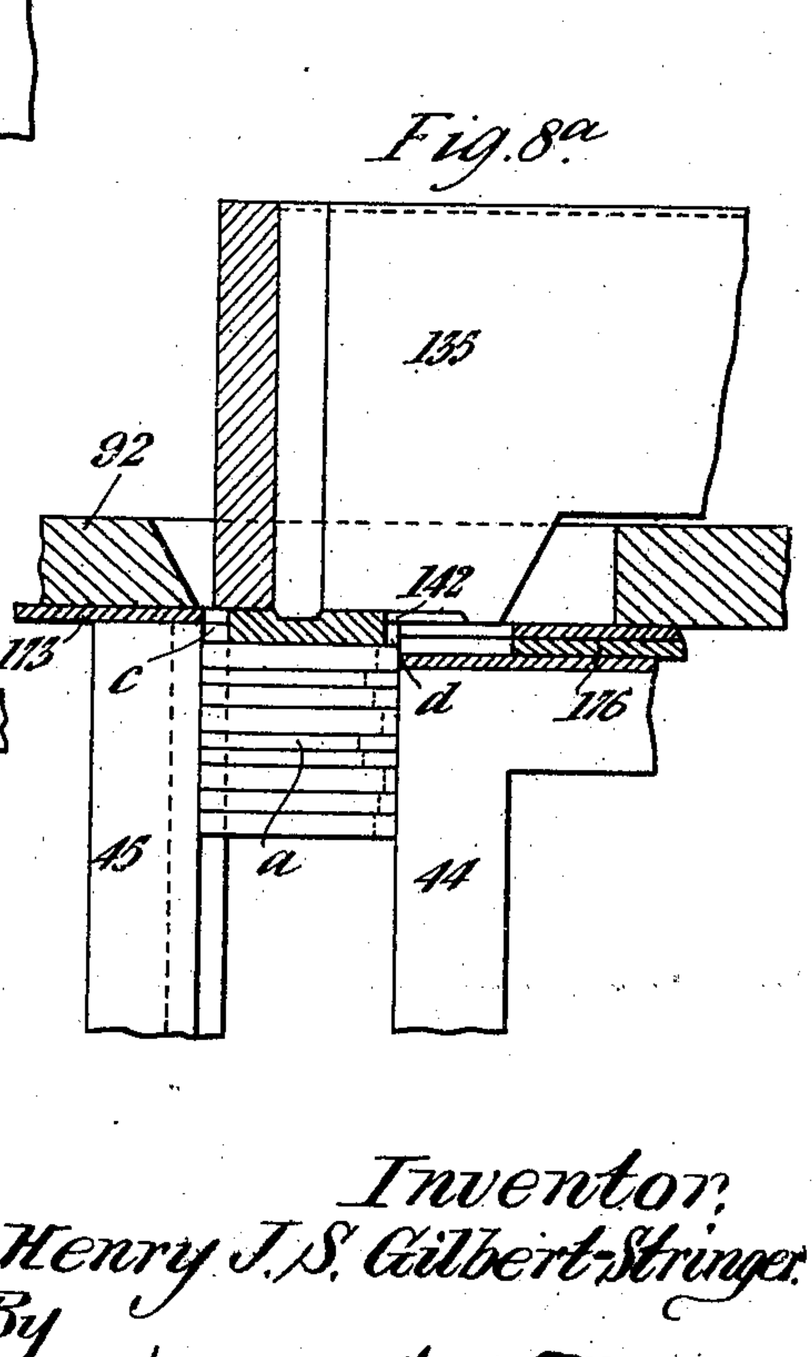


Fig. 8a.

Witnesses.
Howard Dunne.
Robert Sewell.

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No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 7.

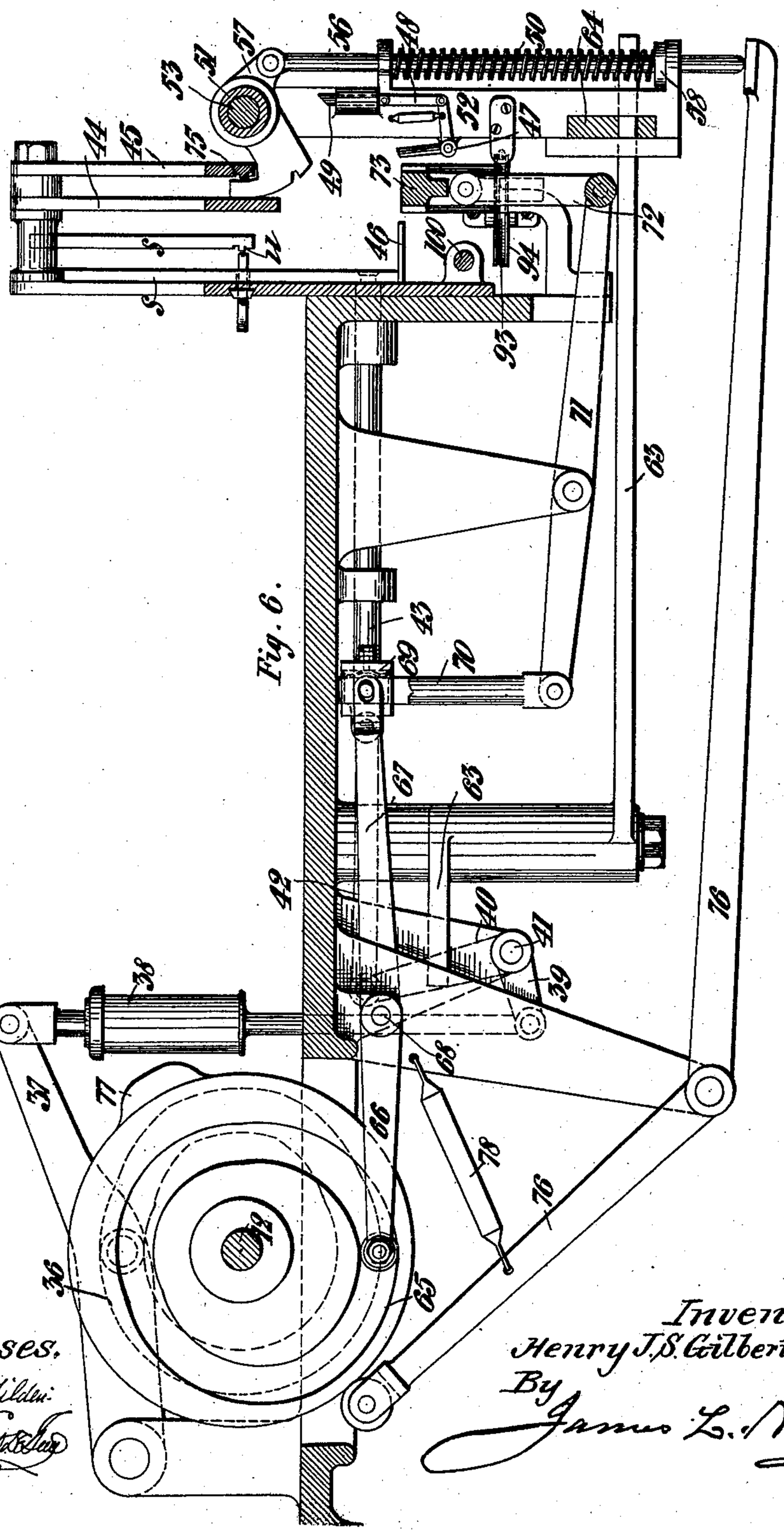

Fig. 6.

Witnesses.
Philip N. Dilden.
Henry J. S. Gilbert-Stringer.

Inventor
By James L. Norris.
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No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 8.

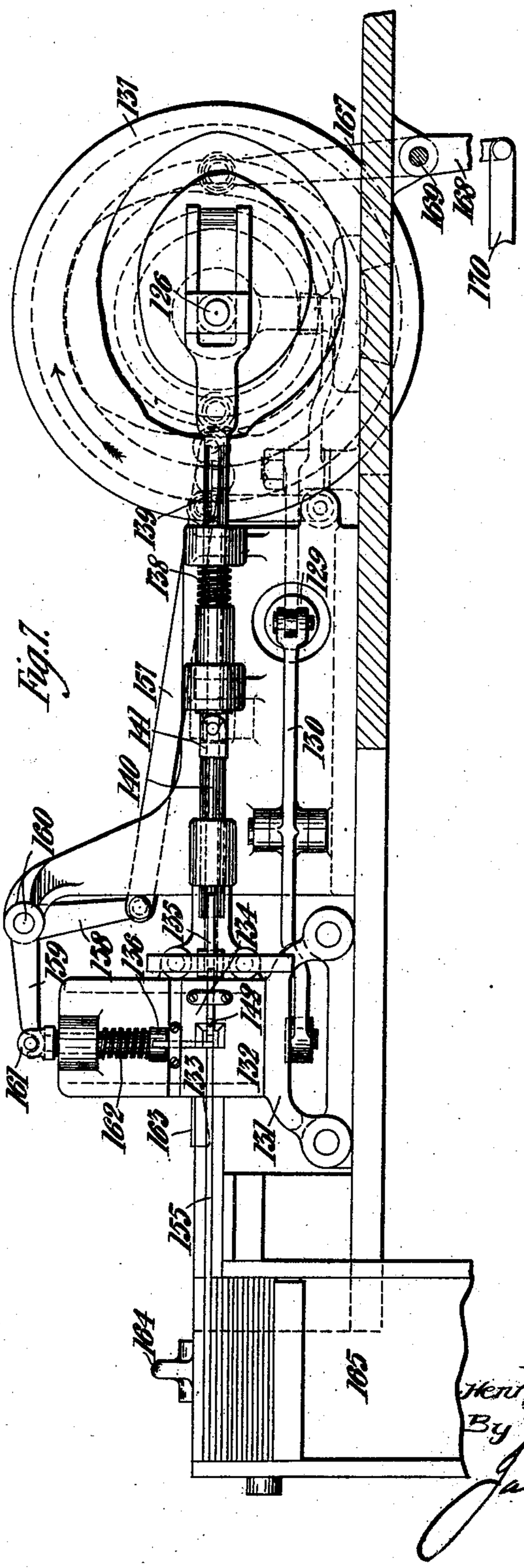

Fig. 1.

Witnesses:
Philip N. Tilden.
Alfred E. Wallace

Inventor
Henry J. S. Gilbert-Stringer
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No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 9.

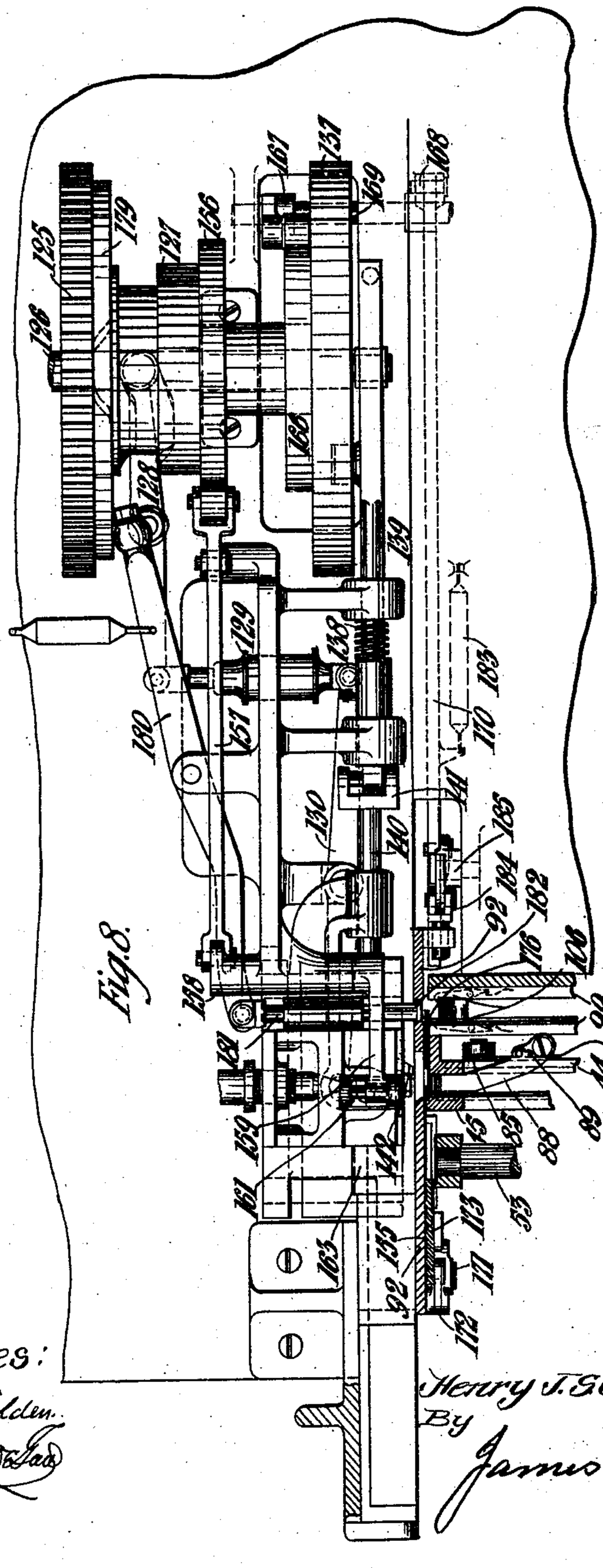

Fig. 8.

Witnesses:
Philip N. Tilden.
Walter Swaslad

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APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet 10.

Fig. 9.

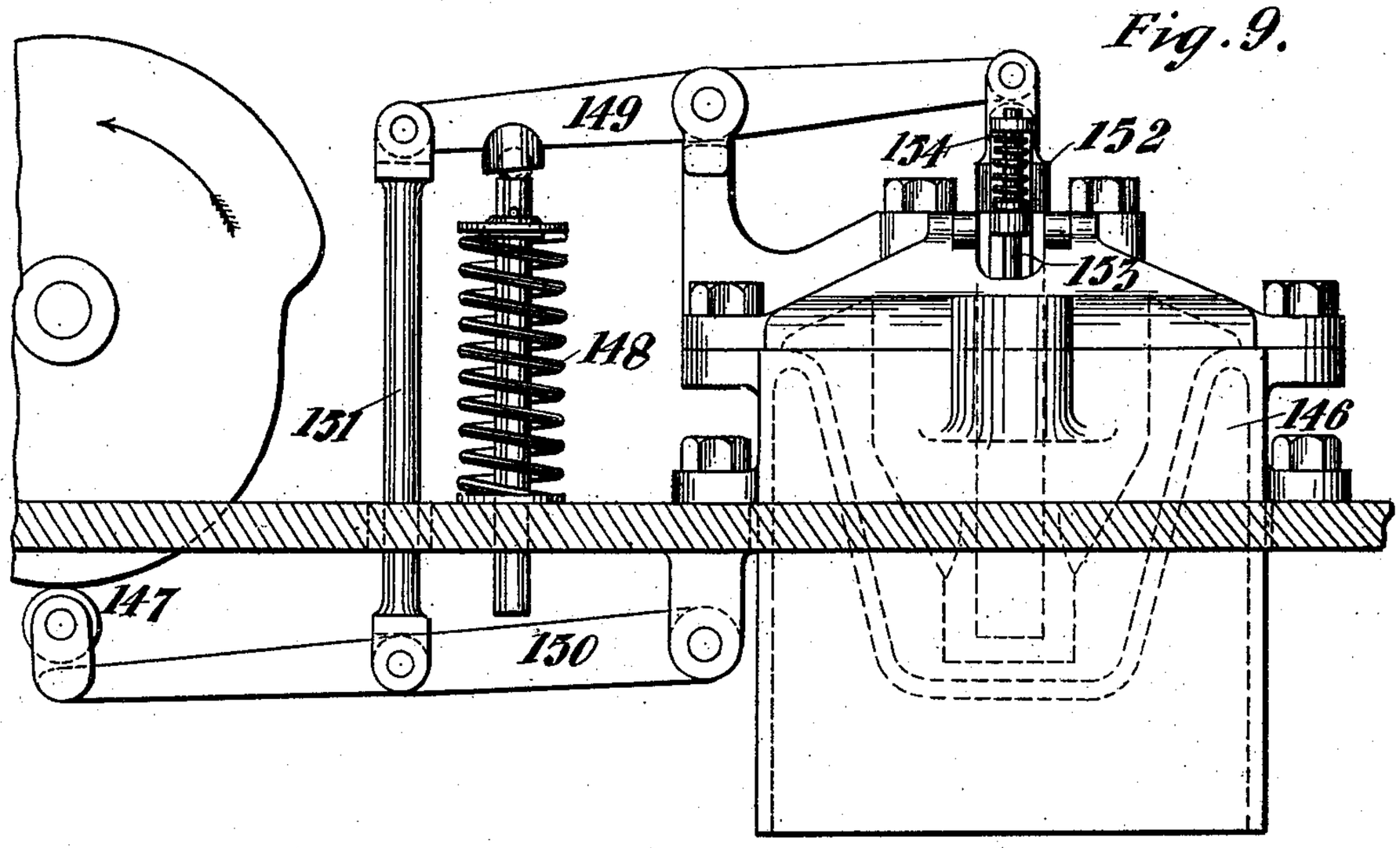
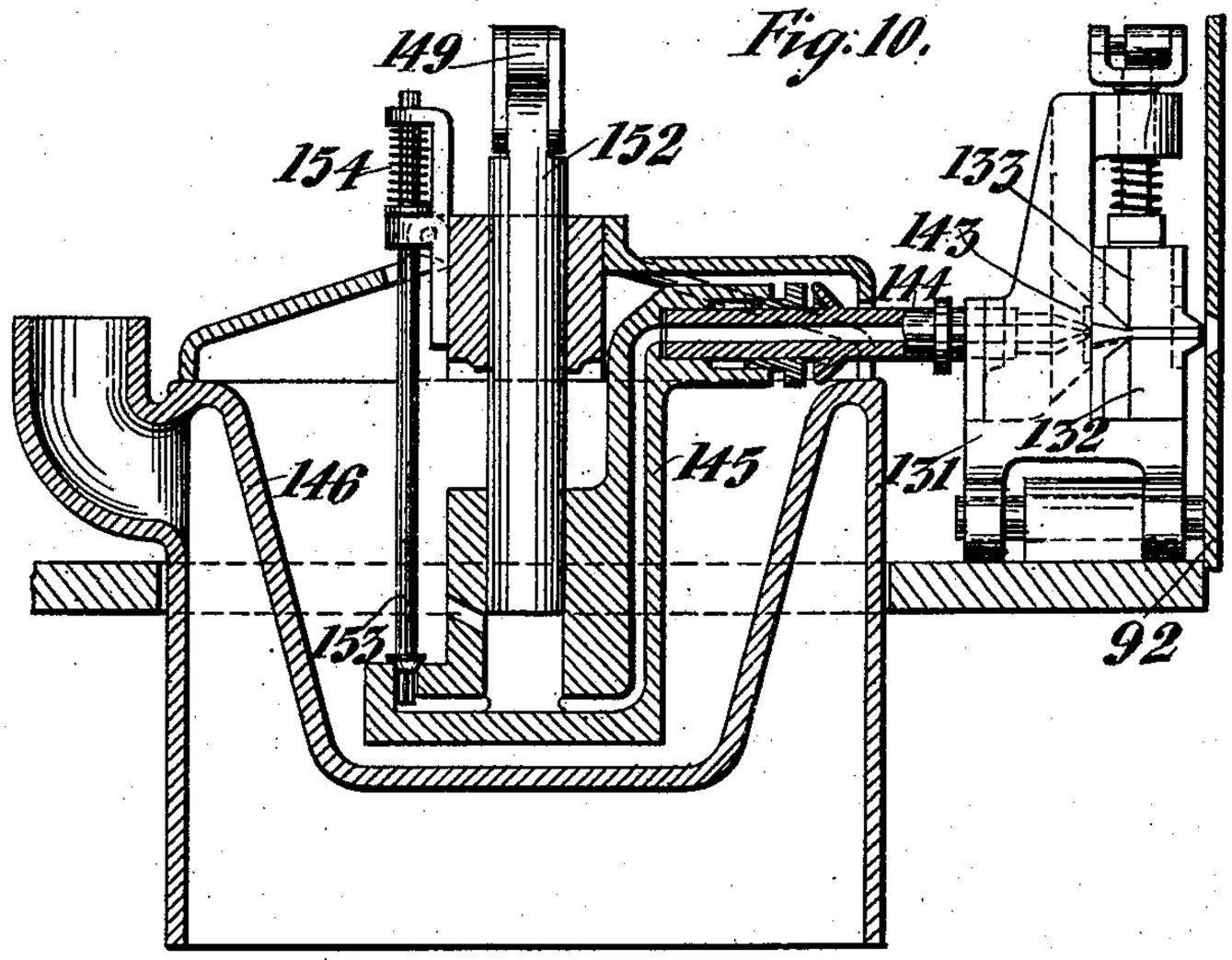


Fig. 10.



Witnesses:
Philip V. Tilden.
Albert S. Goodale

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Atty.

No. 690,720. Patented Jan. 7, 1902.

H. J. S. GILBERT-STRINGER.

APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

(No Model.) 12 Sheets—Sheet II.

Fig. II.

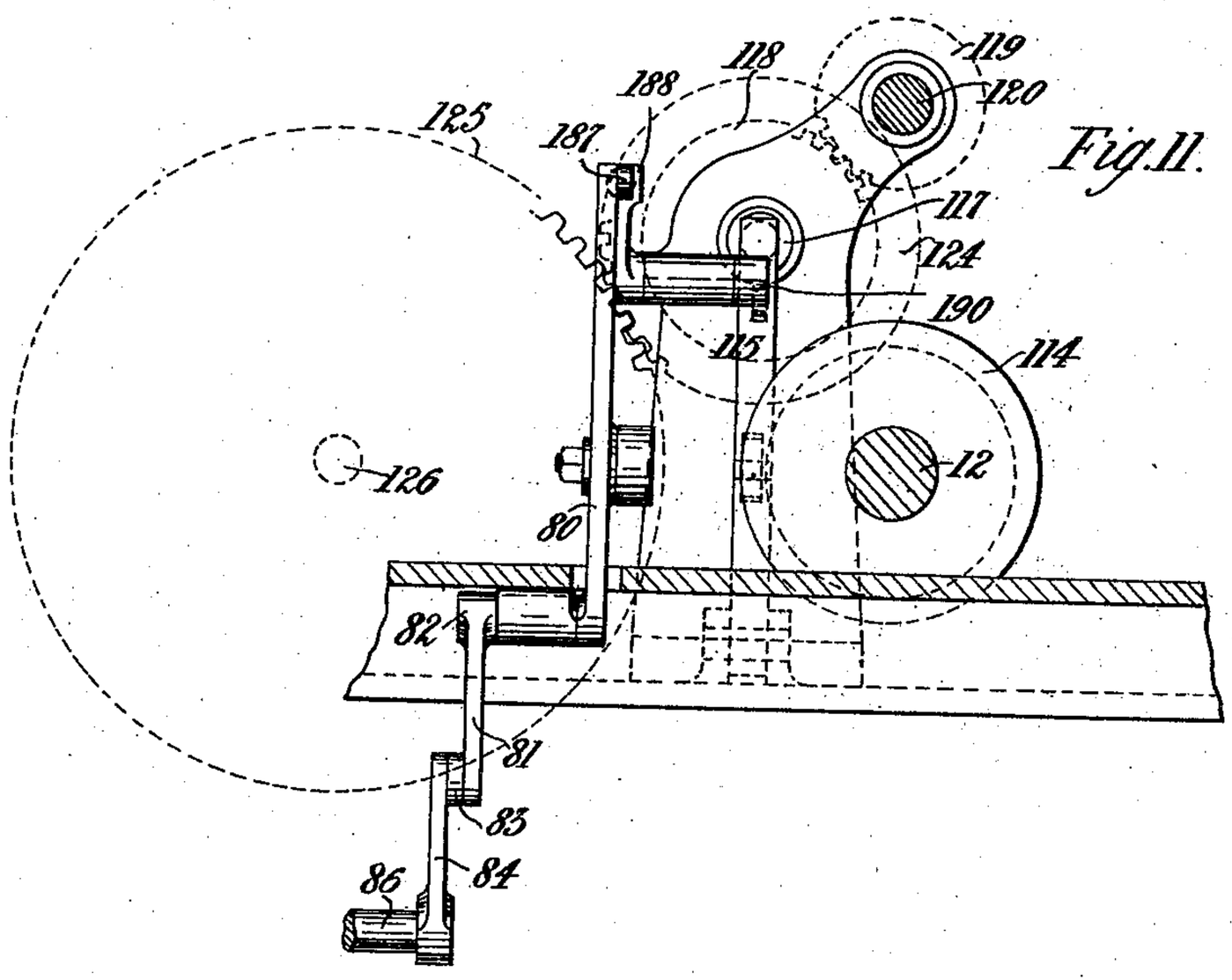
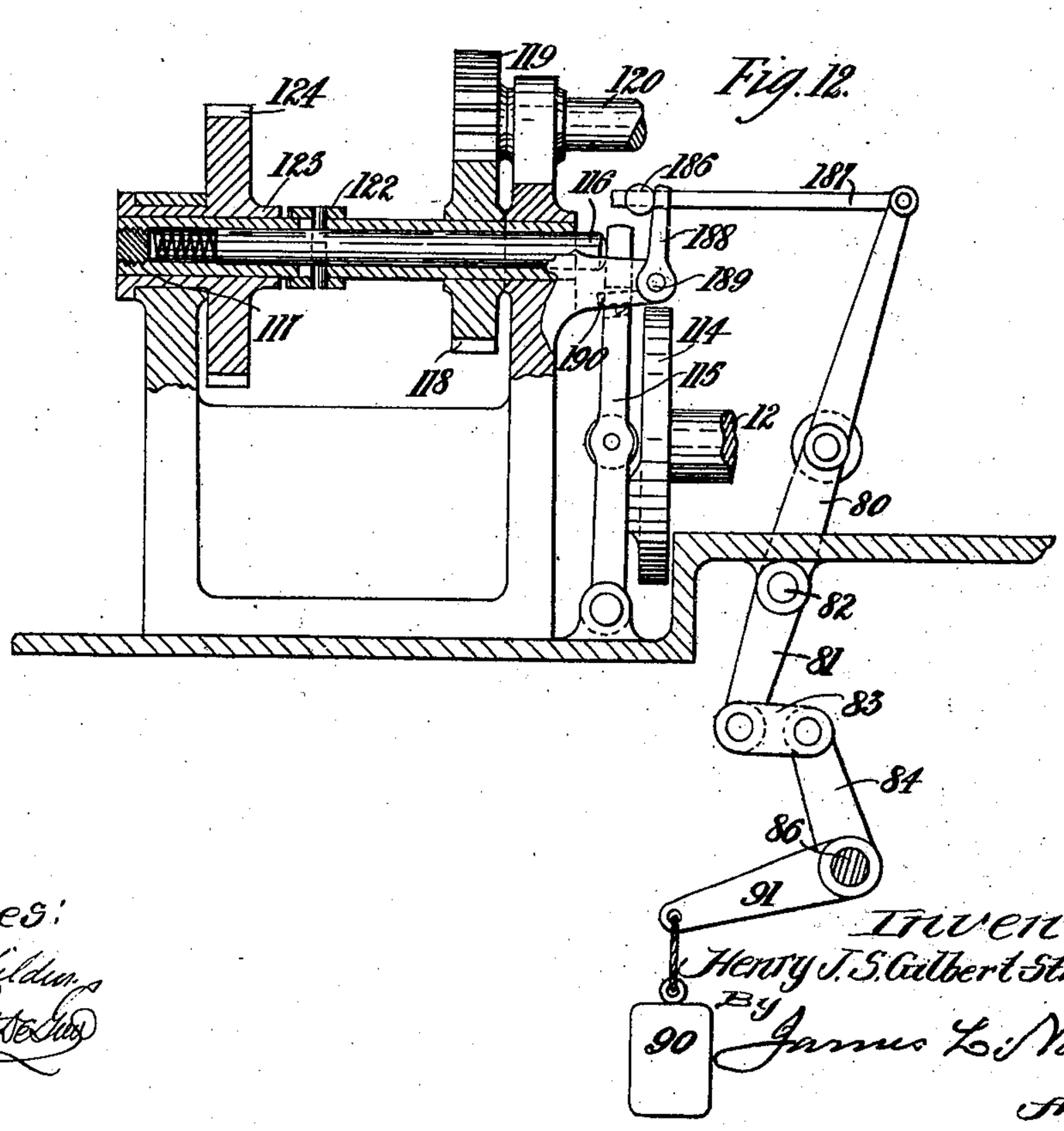


Fig. 12.



Witnesses:
Philip N. Dildine
Henry J. S. Gilbert-Stringer

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By James L. Norris
Atty

No. 690,720. Patented Jan. 7, 1902.

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APPARATUS FOR CASTING AND COMPOSING TYPES.

(Application filed May 27, 1901.)

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Fig. 13.

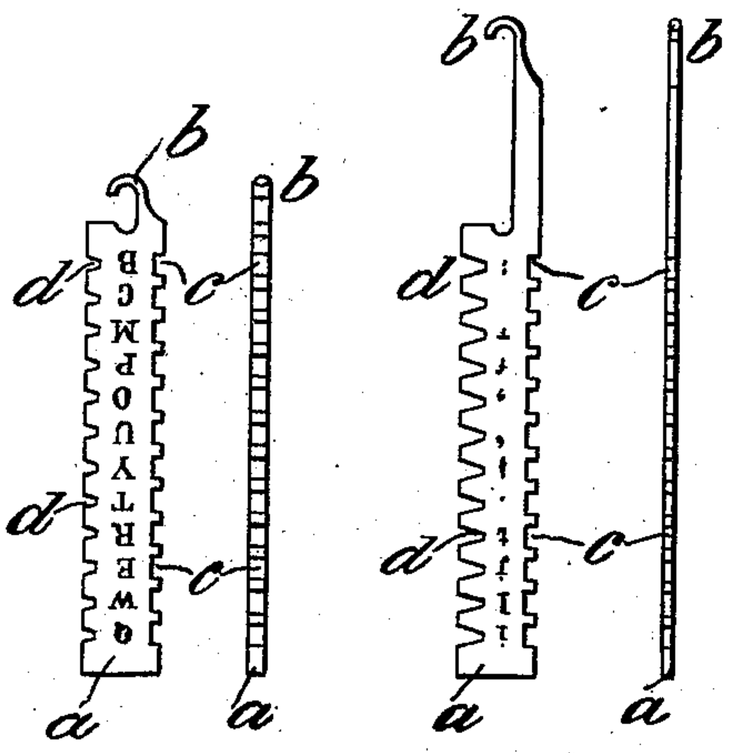


Fig. 14.

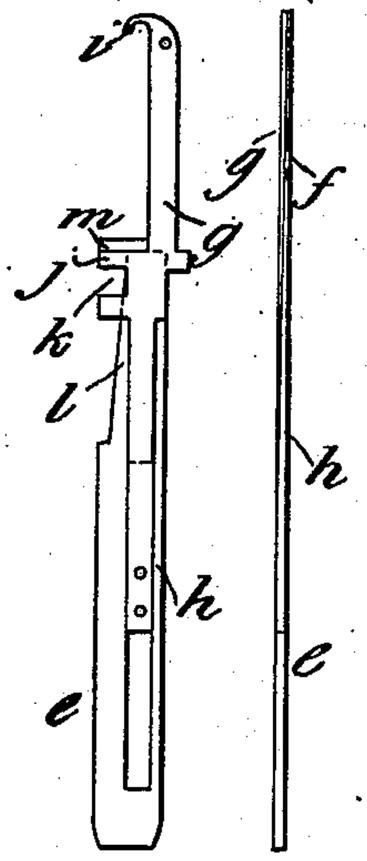
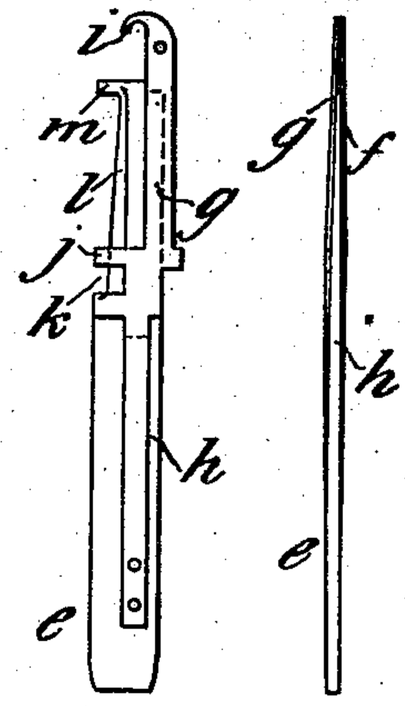


Fig. 15.



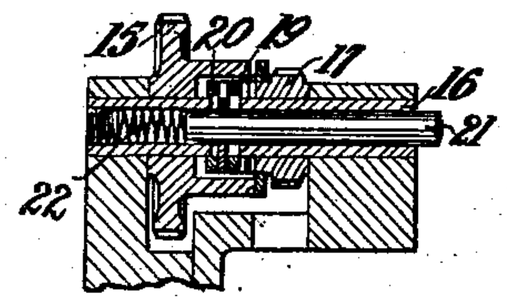


Fig. 16.

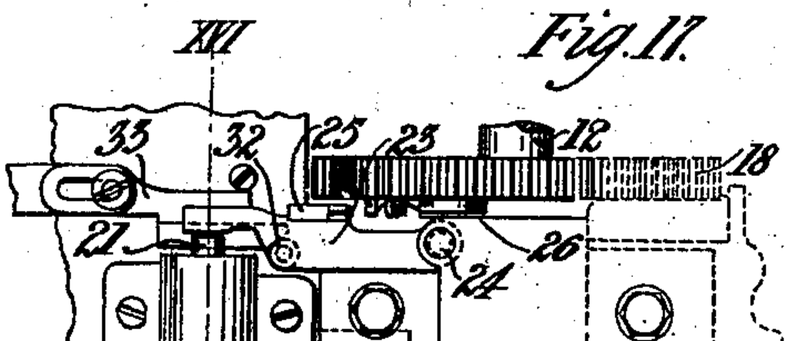


Fig. 17.

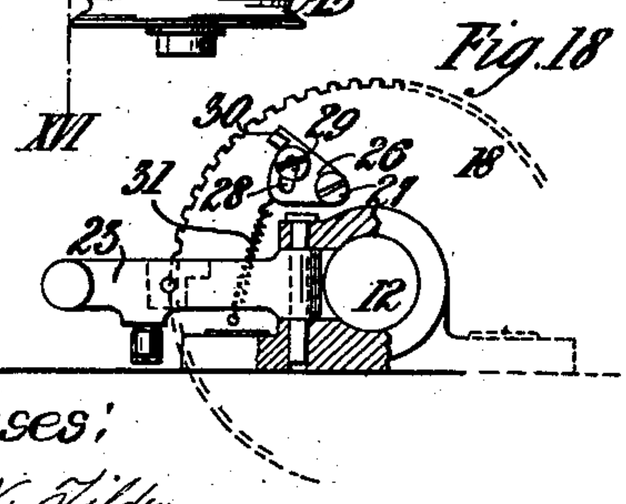


Fig. 18

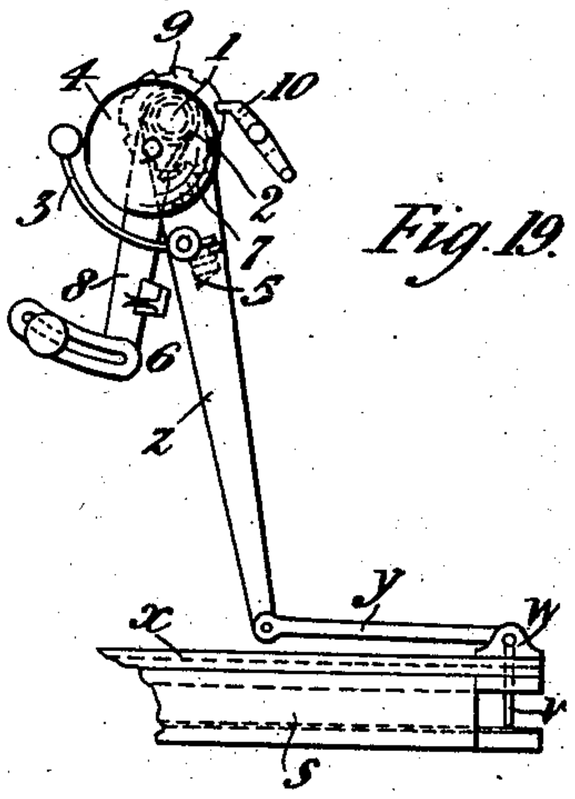


Fig. 19.

Witnesses:
Philip N. Tilden.
Walter Schmidt

Inventor
Henry J. S. Gilbert-Stringer
By James L. Norris
Atty.

UNITED STATES PATENT OFFICE.

HENRY J. S. GILBERT-STRINGER, OF WESTBOURNE PARK, LONDON, ENGLAND.

APPARATUS FOR CASTING AND COMPOSING TYPES.

SPECIFICATION forming part of Letters Patent No. 690,720, dated January 7, 1902.

Application filed May 27, 1901. Serial No. 62,118. (No model.)

To all whom it may concern:

Be it known that I, HENRY JAMES SYDNEY GILBERT-STRINGER, a citizen of England, residing at 37 Tavistock Crescent, Westbourne Park, in the county of London, England, have invented a certain new and useful Improvement in Apparatus for Casting and Composing Types, (for which I have applied for a patent in Great Britain, dated May 13, 1901, No. 9,907,) of which the following is a specification.

In my applications for United States Patent Serial Nos. 675,827 and 675,829 I have described means of producing equably-justified lines of individual character and space types by the use of matrices each carrying a single character. My present invention relates to means of effecting the same object by the use of matrix-bars each carrying a group of different intaglio characters. The matrix-bars having been previously stored in magazines are by the operation of finger-keys released thereform and assembled in a line in proper order, wedge-space matrices being inserted between the word groups. Justification is then effected by the expansion of such space-matrices, and all the matrices are presented singly to a casting apparatus and a single type or space is cast from each of them, all the spaces between word groups being equal in size and the line when complete being of a predetermined length. The matrices are then returned to the magazine-chambers from which they were taken and the types are assembled in the order in which they are cast line upon line in a galley.

I am aware that matrix-bars, space-matrices, and controlling mechanism possessing characteristics similar to some of those embodied in this invention have been used for the purpose of producing linotypes or type-bars and will be found fully described in the patents granted to W. Scudder, Nos. 494,899 and 605,141; but in neither of these systems could such apparatus be employed to produce lines of single types and spaces.

Having thus set forth generally the character of my invention, I shall now describe the apparatus I employ for this purpose, referring to the accompanying drawings.

Figure 1 is a front elevation of the machine. Fig. 2 is a plan. Fig. 3 is a plan of that part of the machine used to transfer the line of matrices from its assemblage-point to the casting mechanism. Fig. 4 is a front elevation of Fig. 3 with parts removed to show the reassembly-box. Fig. 5 is an elevation, partly sectional, of the separating mechanism looking to the right hand. Fig. 5ª is a section on the line V V of Fig. 5, drawn to an enlarged scale, showing the leaves attached to the sliding spindles. Fig. 6 is a transverse section on the line VI VI of Fig. 2, showing the mechanism for dealing with the line of matrices. Fig. 7 is an elevation of the mold and its controlling mechanism. Fig. 7ª is an elevation, drawn to an enlarged scale, showing a matrix-bar in front of a mold. Fig. 8 is a plan of the same with the separating mechanism in front shown in section. Fig. 8ª is a similar view drawn to an enlarged scale. Fig. 9 is an end elevation of the pump and driving-gear looking to the right hand. Fig. 10 is a front elevation, partly in section, of the mold and pump. Fig. 11 is a part section on the line XI XI of Fig. 2, showing the mechanism for starting and stopping the letter-shaft. Fig. 12 is a front elevation, partly in section, of the same parts. Fig. 13 shows front and edge views of two of the matrix-bars. Fig. 14 shows front and edge views of a space-matrix before justification, and Fig. 15 shows similar views after justification. Fig. 16 is a section on the line XVI XVI of Fig. 17, which is a plan of the mechanism for starting the line-shaft. Fig. 18 is a detail sectional elevation showing the clutch-operating lever and spring dog or pawl on the drive-wheel of the main or line shaft for automatically stopping the machine. Fig. 19 is a detail plan of the alarm mechanism.

The machine for the purposes of illustration is, as in the case of the monoline machine, supposed to be adapted for ninety-six characters; but I do not intend thus to limit the number of groups of characters. By adoption of the unit principle, whereby every character in a font of types is in set width a multiple of a common unit, the characters can be so grouped that all those on one bar are identical in set thickness. Thus by dividing the ninety-six characters into eight

groups, each of twelve, there are eight species of matrix-bars, each bearing twelve different characters. Each of these matrix-bars (two of which, *a*, are shown in Fig. 13) consists of a flat plate of metal bearing on its face twelve intaglio characters. It has a hook *b* at its upper end, the stem of which hook is of a different length for each group, and thus furnishes a means whereby the distributing mechanism distinguishes between the different groups. There are on one edge alining notches *c*, corresponding in number and position to the characters, and on the other edge set notches *d*, which by their respective depths control the width of the mold-opening when the cast is being made. The matrices of one group also differ from those of another in their thickness, this corresponding with the set width of the types which are to be produced therefrom. Such matrix-bars as are too thin to receive a good impression from the type-punch have their thickness increased by a certain definite amount, which is allowed for when justifying, as described in my patent application Serial No. 17,150. In the apparatus herein described none of the matrix-bars are supposed to be thickened, and therefore no provision is made for allowing for increased thickness. In cases where the matrices have to be thickened the adjustment of the justifying mechanism to suit the additions to the thickness can be effected as described in my said application Serial No. 17,150.

Each space-matrix *e* (shown in front and edge views in each of Figs. 14 and 15) consists of two plates *f* and *g*, pinned together at the top and the bottom, the central portions of which are tapered in thickness to correspond with a tapered blade *h*, which is free to move up between them, increasing their joint thickness. This space-matrix carries a distribution-hook *i*, like those on the matrix-bars *a*, and a lug *j*, and it also has a notch *k* in its upper portion. The blade *h* besides being tapered in thickness is inclined at *l* on its left edge, the angle of this inclination being such that when the space-matrix is presented to the mold this portion of the blade by its increased width, corresponding to the increased thickness of the space-matrix, determines the position of the adjustable part of the mold, so as to cast a space-type corresponding in set to the then joint thickness of *f*, *g*, and *h*. By pressure on a projection *m* the blade is driven down to its normal position after a cast has been made from it.

The apparatus for handling the matrix-bars and space-matrices includes the following mechanisms employed in the monoline-machine and fully described and illustrated in United States Patents Nos. 494,899 and 605,141 above referred to—viz., the magazine and matrix-bar delivery mechanism, the oscillator, the space-bar lever and feeder, the assembly-box and ejector devices, and the distributer. Consequently no detailed descriptions of those parts are here given. The operator by depressing the keys *n* releases from the magazines *o* the matrix-bars *a* bearing the desired characters, and these fall into an assembly-box *p*, where they are arrested at the proper height to aline the characters required by the stop-bars *q*, and afterward transferred by the ejector *r* into a line-receiver *s*. Space-matrices are inserted between the word groups by depression of a key *t*. The matrix-bars are retained in their alined position on entering the line-receiver *s* by a ledge *u*, Fig. 6, which enters the alinement-notches *c*, and are prevented from falling back into the assembly-box *p* by two retaining-latches 59. In the case of the space-matrices the lug *j* rests on the ledge *u*. When the first matrix-bar of a line enters the line-receiver, it encounters and moves forward a line-abutment pin *v*, carried by a sliding block *w*, which can move in a channel in a fixed wall *x*. Connected to the sliding block *w* by a link *y* is a horizontally-vibrating lever *z*, mounted at its rear end on a stud 1, rising from the bed-plate and having coiled around it a spring 2, which engages with the lever in such a manner as to urge it toward the right. The lever *z* carries the pivoted hammer 3 of a bell or gong 4, and on the tailpiece of the hammer is a trip-pawl 5, so pivoted that when the line of matrices is nearly of the proper length this trip-pawl strikes a lug 6, moving the hammer away from the bell, and when the lever *z* moves farther the pawl 5 passes the lug 6, releasing the hammer, which being urged by a helical spring 7 strikes the bell and indicates to the operator that the line is approximately of the right length. The lug 6 is shown mounted upon an adjustable arm 8, pivoted on the same axis as the lever *z*, and can consequently be adjusted relatively to the trip-pawl 5 to suit different lengths of line. The tension of the coil-spring 2 can be varied by means of notched disk 9 and a locking-pawl 10. When the operator receives indication that the line of matrices is nearly complete, he, as in the case of the monoline-machine, pushes a lever 11 to the rear and then pulls it forward, thus starting the justifying and other parts of the mechanism.

The rotation of a line-shaft 12 is effected by a driven pulley 13, Figs. 1 and 17, the shaft of which is provided with a pinion 14, gearing with a wheel 15, attached to a tubular shaft 16, Fig. 16. The tubular shaft also carries a freely-mounted pinion 17, connected by toothed gearing to a toothed driving-wheel 18 on the shaft 12. The pinion 17 has a nave which enters the annular nave of the wheel 15 and carries a clutch-piece 19. Another clutch-piece is formed by a loosely-mounted toothed collar 20, placed within the annular nave of the wheel 15 and secured to a clutch-shaft 21, arranged within the tubular shaft, but pressed outward by a spring 22, which acts against its inner end. This inner end has a rounded extremity bearing directly

against the front end of a clutch-operated lever 23, which is pivoted at its rear end 24 and is provided at its left-hand side with a lateral abutment or stud 25 to coöperate with a stop-dog or pawl 26 on the wheel 18. The dog or pawl is pivoted to the right-hand face of the wheel, as shown at 27, Fig. 18, and its outer end has a segmental slot 28, through which a pin 29 passes into the wheel. The pawl 26 is further provided with a projecting finger 30 and is connected to one end of a spring 31, attached to the wheel. The movement rearward of the hand-lever 11 has the effect of pushing the operating-lever 23 to the right and forces the clutch-shaft 21 inward by means of an incline 32 on the end of a slide-bar 33, which is connected to the hand-lever 11 by a rod 34 and lever and rocking shaft 35. When the hand-lever 11 is moved forward again, the clutch-operating lever 23 is released and urged by the spring 22, the clutch-shaft is thrown forward, the clutch-pieces are engaged, and motion is transmitted to the shaft 12. This shaft makes only one complete revolution and is automatically stopped by the pawl 26, which has its finger 30 beveled on its under side to set against the abutment or stud 25 on the clutch-operating lever 23, thus forcing the clutch-pieces apart. When the shaft 12 is at rest, the pawl 26 is in engagement with the abutment 25 and is disengaged to permit the starting of the shaft by the operating-lever 23, being forced rearward by the first movement of the hand-lever 11 a sufficient distance so that the finger 30 can, owing to the slot 28 of the dog or pawl and the action of the spring 31, snap past the abutment and offer no obstruction to the immediate movement of the shaft 12. When this shaft rotates, a cam 36, fixed on it, acting through a lever 37, a spring-box 38, two arms 39 and 40 of a rocking shaft 41, and a link 42, advances a guide-frame 43, on which is mounted the line-receiver *s*, until the receiver is in line with a raceway which is formed by two walls 44 and 45 and corresponds in character to the line-receiver. This forward movement also causes a projection 46 on the line-receiver to move a bell-crank lever 47, which by a link 48 withdraws a latch 49 from engagement with one of a pair of jaws of a justifying-vise and permits a spring 50 to impel these jaws into the line-receiver and embrace the composed line of matrices. This justifying-vise consists of a sleeve 51, mounted on the upper end of a carriage 52 and riding on a fixed spindle 53. It has one jaw 54, which cannot move laterally, and another jaw 55, adjustable to permit lines of different length to be dealt with, this jaw being adjusted to correspond with the desired length of line before composition is commenced. The spring 50 is mounted on a rod 56, suitably guided in the carriage 52, and this rod is linked to a lever 57, formed by an extension of the jaw 54, and carries a fixed collar 58. Thus the withdrawal of the latch 49 out of the notch in the jaw 54 causes partial rotation of the vise. A barrel-cam 60 on the shaft 12 then working through a lever 61, a link 62, and a lever 63, which passes through a suitable slot in the lower portion of the carriage 52, moves this carriage to the left along a fixed guide 64, carrying the justifying-vise, with the composed line of matrices loosely held between its jaws, out of the line-receiver *s* into the raceway formed by 44 and 45, after which the line-receiver is returned by its cam to its original position, enabling the operator to resume composition. When the justifying-vise in its left-hand travel reaches a position over a justifying-frame 73, it pauses while a cam 65, which works through two arms 66 and 67 of a rocking shaft 68, a friction-block 69, mounted on a rod 70, a lever 71, and two links 72, elevates the justifying-frame 73, which is guided on suitable rods 74 and drives up all the blades *h* of the space-matrices *e*, expanding them all equally and swelling out the line to its proper length. The lugs *j* on the upper parts of the space-matrices are held in a grooved channel 75, and thus prevent the whole of the matrices from being moved upward when the frame 73 ascends. The cam 65 is sufficient to raise the blades *h* to their maximum height; but as this is seldom or ever required the slipping of the friction-block 69 when the line is justified obviates any undue strain. The justifying-frame 73 is maintained in the position to which it has been raised until after the whole line is dealt with by the casting mechanism and is lowered when the line-receiver is advanced. The left-hand movement of the carriage 52 is now resumed, and on reaching a position which brings the rod 56 directly over the front end of the lever 76 a cam 77, against which the other end of such lever bears, causes it to elevate the rod 56, compressing the spring 50, partially rotating the justifying-vise and withdrawing it from the raceway, thus leaving the matrices free therein and allowing the latch 49 to lock and retain the vise in that position. The cam 77 then permits the lever 76 to return to its original position, urged by a spring 78. Coinciding with the second advance of the carriage 52, described above, a cam 79, acting through two arms 80 and 81 of a rocking shaft 82, a link 83, and two arms 84 and 85 of another rocking shaft 86, moves a carriage 87, which is mounted to slide in the wall 44, to the right hand. This carriage has on it a pivoted finger 88, controlled by a spring 89 in such a manner that it projects through the wall 44 into the raceway; but when it encounters the advancing line of matrices it is pushed aside, reëntering the raceway after passing the right-hand jaw of the vise. When the justifying-vise is withdrawn, as described, the cam 79 permits a weight 90, attached to an arm 91, fixed on the rocking shaft 86, to advance the carriage 87 to the left, whereupon the finger 88 snaps behind the rearmost of the matrices and ad-

vances the line until the first is brought against the wall 92.

Attached to the carriage 52 is a cord 93, running over two pulleys 94 and 95, carrying two collars 96 and 110, and having at its free end a weight 97. When the carriage 52 moves to the left, the collar 96 travels toward a projection 98 on the foot of a reassembly-box 99. This box can slide upon a rod 100 and receives the matrices one by one after they have been cast from, and it consequently at this time holds the matrices used in producing the preceding line of types. It is, however, in order to simplify explanation, shown in Fig. 4 without such matrices; but a yielding resistant 101, which prevents the matrices from becoming disarranged when they are delivered into the box, as will hereinafter be described, is shown in the position to which it has been advanced from the left end of the box by the introduced matrices. The space-matrices which had been cast from before they can be again employed in composition require that their blades *h* should be returned to their lowest position. For this purpose after the complete line of matrices has been delivered into the box 99 a rim-cam 102, acting through a spring-governed lever 103, moves a depressor 104, and this acting on the projections *m* of the blades *h* drives them down, while the sides of the space-matrices are held stationary by their lugs *j*, resting on a ledge 105, projecting from the wall of the box. The matrix-bars *a* on their delivery into the box pass four latches 106 and fall until their feet are checked and rest upon a ledge 107. When the collar 96 on the cord 93 encounters the projection 98 on the reassembly-box 99, it in its further travel moves this to the right and in this manner places all the hooks of the matrix-bars and space-matrices upon distributer-rods 108, previously lowered into their path, and these rods are then raised, carrying suspended on them the matrices, which are swept off the rods by a sweeper 109 into their respective chambers in the magazine, these operations being identical in character and performed by the same mechanisms as are detailed in the United States patents above referred to. The justifying-vise now returns to the right hand, and this permits the weight 97 to move the cord 93 back until the second collar 110 enters a hole in the foot of the resistant 101 and encountering a spring-latch 111 moves the resistant along a rod 112, on which it is mounted, until it reaches a pin 113, which, striking the latch 111, releases it and permits the collar 110 to pass through the hole of the resistant 101 to meet the projection 98 and to return the reassembly-block to its original position ready to receive a fresh line of matrices. These movements accomplished, a cam 114, Figs. 2, 11, and 12, acts on a lever 115, the end of which bears against a spring-controlled spindle 116, mounted in a tubular shaft 117. This shaft is designed to receive its motion through two geared wheels 118 and 119 from a shaft 120, carrying a driven pulley 121, and carries a clutch-piece 122, connected through slots in the sleeve to the spindle 116. Consequently when the lever 115 is moved as described it causes this clutch-piece 122 to engage another clutch-piece 123, formed on the boss of a gear-wheel 124, loosely mounted on the shaft 117, and thus to transmit its motion by means of a spur-wheel 125 to a letter-shaft 126, on which this spur-wheel is fixed. Having completed its revolution, the shaft 12 is stopped, as described above, in a position in which the cam 114 is clear away from the roller on the lever 115. As already mentioned, the line of matrices now occupies a position in which the foremost is pressed against the wall 92 and is held firmly by the weight 90, acting on the finger 88. With the revolution of the letter-shaft 126 a cam 127, fixed thereon, Figs. 7 and 8, acting through a lever 128, a spring-box 129, and a lever 130, advances a bracket 131, Figs. 7 and 10, on which is mounted a type-mold, until the face of the mold has entered an opening in the wall 92 and made contact with the foremost matrix-bar. The type-mold has a bottom piece 132, two top pieces 133 and 134, affixed to the bracket 131, a body-plunger 135, of the body thickness of the type to be produced, which moves between the top and bottom pieces, and thus determines the set and ejects the cast types from the mold, and a vertically-moving plunger 136 to form the left-hand wall of the type-mold. The body-plunger and top and bottom pieces have their rear parts so shaped as to cast a type having its jet of such form that on breaking off the jet the fracture occurs at a point within the foot of the type, thus rendering dressing unnecessary. Details of the construction of such a mold are described in my pending application Serial No. 39,379. When the mold has been advanced, the cam-groove 137 permits a spring 138 to urge forward a plunger 139, to which is yoked a second plunger 140 by a yoke-piece 141, so made as to allow for the movement of the mold. The plunger 140 is attached to the body-plunger 135. As the body-plunger is shaped to carry on it a wedge projection 142, when this projection enters the set-notch *d* of a matrix-bar *a* it is checked according to the depth of the notch, and the end of the body-plunger remains distant from the left-hand wall of the mold a distance corresponding to the thickness of the character to be cast, so that the type is cast of such set thickness. In the case of a space-matrix the projection 142 enters the notch *k* until it is checked by the inclined edge *l* on the blade *h*, and the end of the plunger is then at a distance from the wall 136 equal to the thickness of the expanded space-matrix. The rear of the mold has attached to it a nozzle-plate 143 and pump-nozzle 144, and the other end of the nozzle works through a stuffing-box in the upper part of a pump-body 145, and can thus move with the mold.

The pump-body is suspended in a bath of molten metal contained in a pot or reservoir 146, heated in any suitable manner, (not shown,) and the type-mold having been formed as described a cam 147 allows a lever 150 and connecting-rod 151 to be raised by a spring 148, which rocks a lever 149 and depresses a pump-plunger 152, thus injecting a jet of metal into the mold to form type. The jet thrown by the pump is of constant volume, and any surplus metal beyond that required for the type escapes into the melting-pot through a valve 153, controlled by an adjustable spring 154. The type-mold is then retracted until it is in line with a channel 155, when a cam 156, acting through a connecting-rod 157, two arms 158 and 159 of a rocking shaft 160, a yoke-piece 161, and a spring-controlled plunger 162, lifts the side wall 136, and the body-plunger 135 advances under cam control and ejects the cast type into the channel 155. The body-plunger 135 then retreats to its extreme right-hand position and the side wall 136 descends preparatory to casting another type. Each succeeding type as it is ejected from the mold advances those cast before it along the channel 155, in which advance they pass under an inclined blade 163, which breaks off the jet-pieces and leaves the types in a finished condition. As the distance between the point at which the types are delivered by the body-plunger and the left-hand wall of the receiving-galley is a multiple of the length of line required in the composition, it is only necessary when a complete line has entered the galley for the operator to depress a bar 164, which puts the line into a galley 165, the operation being repeated for each succeeding line. When a matrix has been cast from, it is transferred from the raceway into the reassembly-box in the following manner: When the mold retreats, a cam 166 on the shaft 126, acting through two arms 167 and 168 of a rocking shaft 169, a connecting-rod 170, a lever 171, and a link 172, advances a separating-plunger 173. This plunger is of rectangular section, its front portion being of the same thickness as that of the thinnest matrix-bar. It is guided on the face of the wall 92 and works between it and the end of the raceway-wall 45. It carries a projection 174, Fig. 5, corresponding to the ledge on the inner face of the race-wall 45, and when the plunger is at rest forming a continuation thereof, and it is notched to admit the lugs *j* on the space-matrices. On 173, at a lower point, is another projection 175, Fig. 5, designed to rest against the blades *h* of the space-matrices and to maintain them in an upright position during the casting and transferring operations. The separating-plunger 173 as it advances carries with it the foremost matrix, which is supported by it, moving it to the right-hand, Figs. 8 and 8[a], between the end of the race-wall 44 and the face of the wall 92. In order that only one matrix may be removed at a time whatever be its thickness, and also in order to support it during this transference, a number of thin leaves of metal 176 fill up the space through which the matrices have to be pushed sidewise, this space being necessarily wide enough to pass the thickest matrix. Each of these leaves (see Fig. 5[a]) is fixed to a spindle 177, which moves through its bearing 178 with friction determined by a setting-screw. The matrix-bar or space-matrix, supported as described, is carried forward until it is opposite the mouth of the reassembly-box 99, where a cam 179, acting through a spring-controlled lever 180, moves forward a frame 181, the front face of which, 182, passes through an opening in the wall 92 and removes the matrix-bar or space-matrix from between the separating-plunger and such of the leaves 176 as have been displaced, driving the matrix into the reassembly-box past the latches 106. Controlled by the spring 183 the separating-plunger then returns to the left, (right in Fig. 5,) permitting the next matrix in the line to bear against the wall 92. A yoke-piece 184, attached to the first of the leaves acted on by a lever 185, which is connected to the rod 170, returns the leaves to normal position. Thus with every revolution of the line-shaft a type is cast and delivered into line, the used matrix is passed to a collecting-point, and another matrix is advanced ready to be cast from. When the last matrix in the line has been delivered into the reassembly-box 99, the return of the separating-plunger 173 permits the finger 88, which has been following up the matrices, to pass through the wall 92, and the lever 80, Fig. 12, is rocked a sufficient distance to cause a stop-piece 186 on a connecting-rod 187 to move a lever 188, which in turn rocks a shaft 189, throwing the spring-controlled pawl 190 out of engagement with the lever 115 and permitting the spring-controlled spindle 116 to disengage the clutch-pieces 122 and 123 and stop the mechanism.

It is to be distinctly understood that I make no separate claim for the magazines for the matrix releasing and selecting devices or for the distributing mechanisms, these being old and used in the monoline-machine and described in the Patents Nos. 494,899 and 605,141, above referred to.

Having thus described the nature of this invention and the best means I know of carrying the same into practical effect, I claim—

1. In an apparatus for producing lines of single types and spaces, means of selecting matrix-bars, means of assembling the selected bars with their proper characters in a line, means of justifying the line by insertion and expansion of space-matrices between the word groups, means for presenting the matrices singly to a type-mold and casting the type or space from it, means for returning the matrices to the magazine in which they were previously stored, and means of deliv-

ering the cast types and spaces in the order of casting line upon line on a galley, substantially as described.

2. In an apparatus for producing lines of single types and spaces, a set of matrix-bars constituting a font and each of which carries a number of intaglio characters on its face and has one edge provided with alining notches and the other edge with notches of depths suited to the set widths of the characters a hook corresponding in height to the group to which the bar belongs, for distribution purposes, each bar having thickness of the types to be cast from it or thickened by a definite amount, substantially as described.

3. In an apparatus for producing lines of single types and spaces, a space-matrix composed of two united tapered side pieces having between them a tapered blade-piece capable of being moved upward to expand the thickness of the space-matrix and being also inclined on one edge at such an angle that when raised, its edge presented in a notch of the side pieces is so related to the thickness to which the space-matrix is expanded, that when the matrix is brought to the mold, the width of the mold is determined by the part of the inclined edge so presented, the said space-matrix having also a projection for holding its sides up while its middle piece is pushed down by pressure on a projection from it, and these side parts having a hook for distributing purposes, substantially as described.

4. Means for transferring the matrices successively from their casting position to the reassembling-box, comprising the separating-plunger 173, the thin leaves 176, the yoke-piece 184 and its connections to the separating-plunger, substantially as described.

5. In a type-casting apparatus, the combination with a metal-pump provided with a discharge-tube, a pump-nozzle sliding in the latter, a mold, and a matrix, of means for moving the mold to and from the matrix along with the pump-nozzle.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

H. J. S. GILBERT-STRINGER.

Witnesses:

WALTER J. SKERTEN,

GERALD L. SMITH.