(No Model.) 7 Sheets—Sheet 1.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

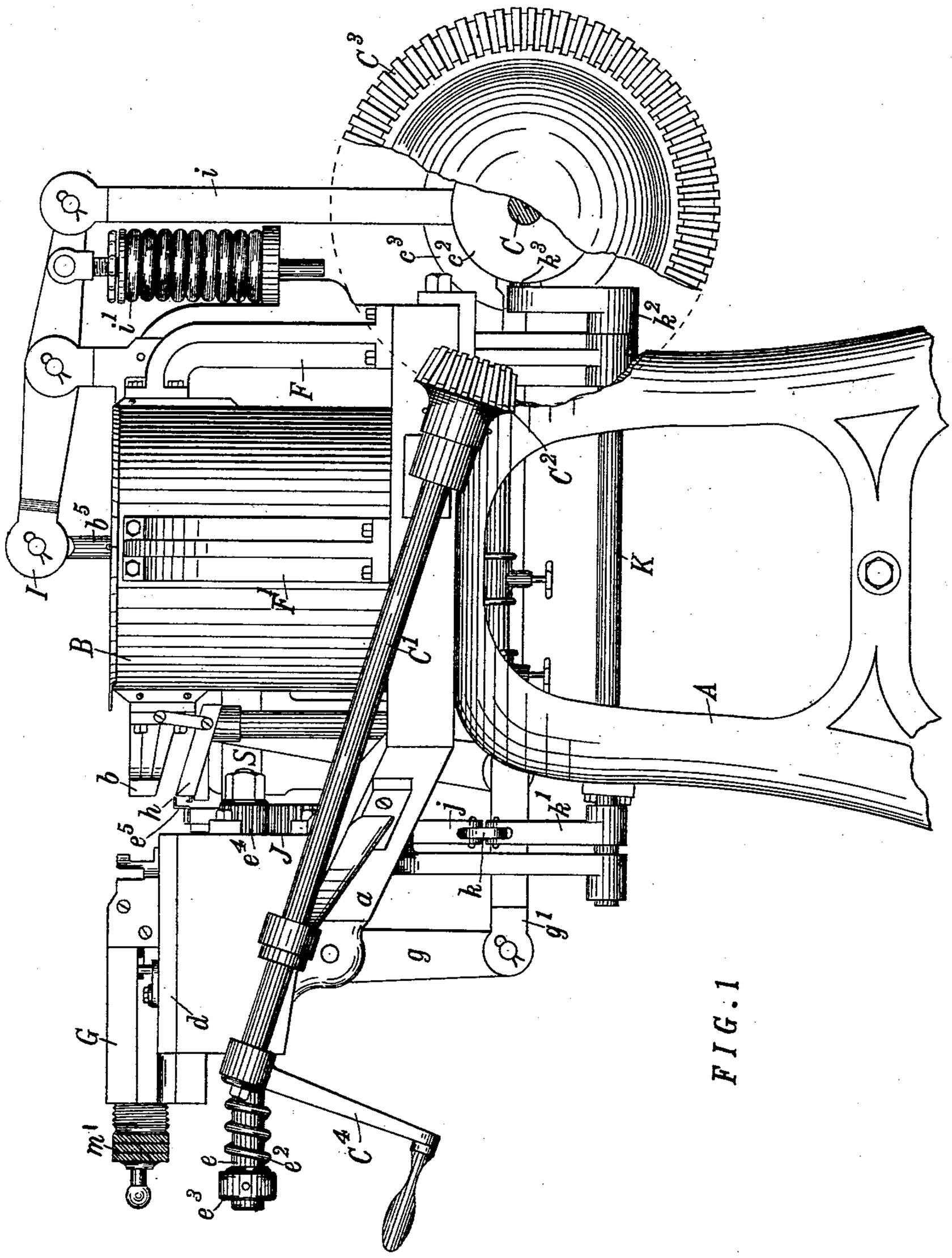

FIG. 1

WITNESSES.

H. Griswold.

Belle S. Lowrie.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.) 7 Sheets—Sheet 2.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

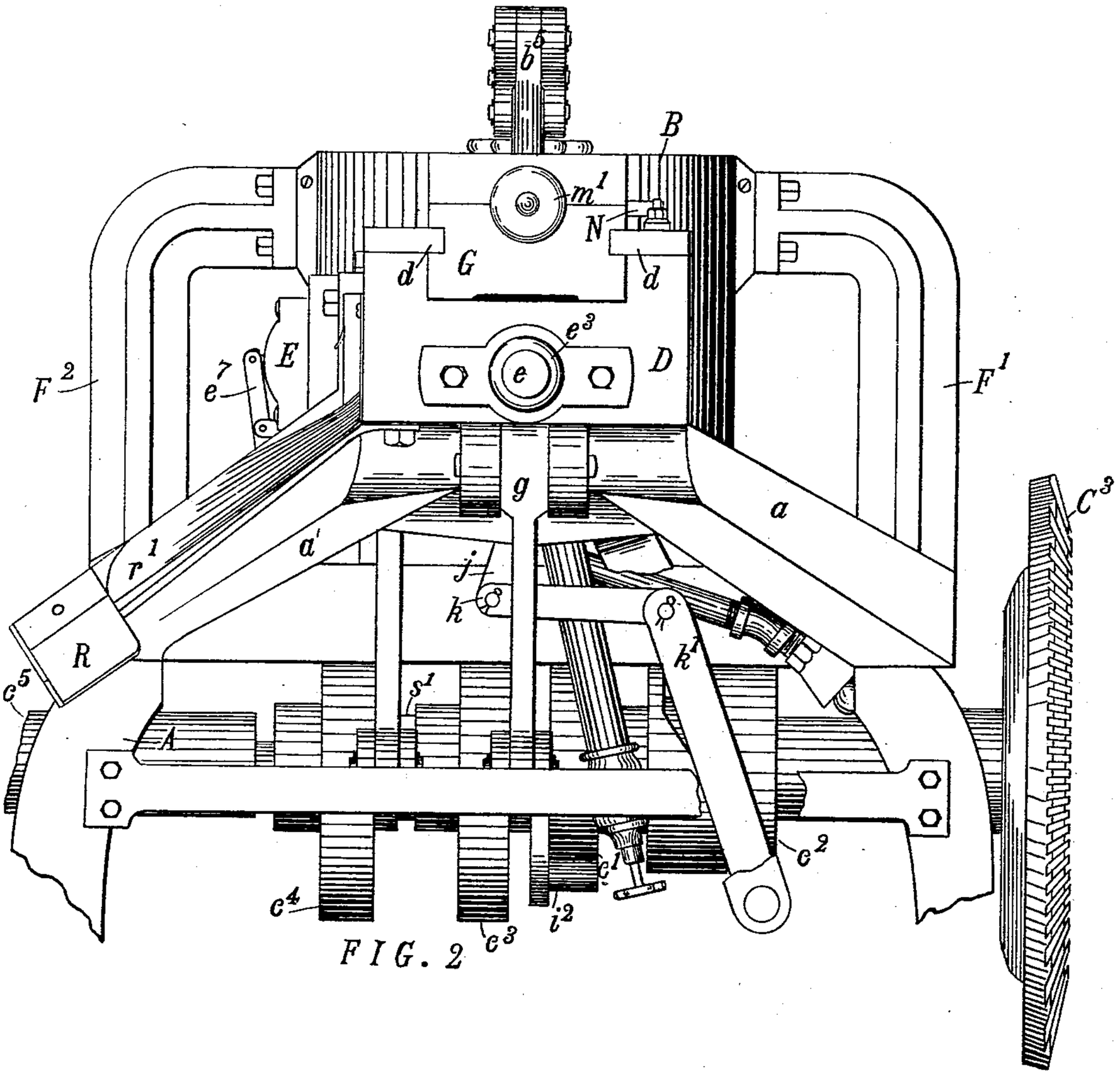

FIG. 2

WITNESSES.

L. Griswold.

Belle S. Lowrie.

INVENTOR.

Charles Forth

By Uhig & Thurston

his attys.

(No Model.) 7 Sheets—Sheet 3.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

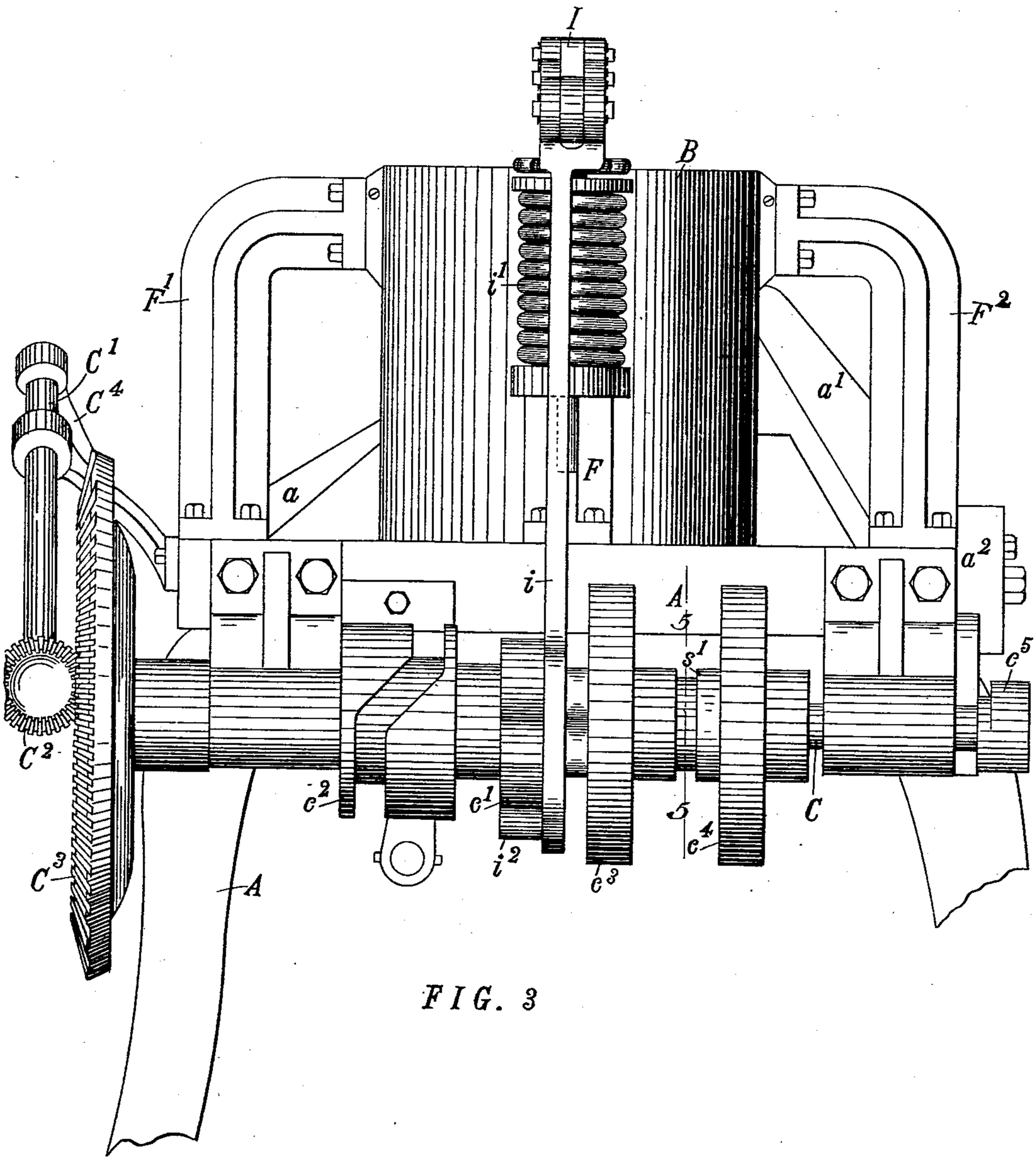

FIG. 3

WITNESSES.

F. Griswold.

Bell & Lowrie.

INVENTOR.

Charles Forth

By Wieg & Thurston

his attys.

(No Model.) 7 Sheets—Sheet 4.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

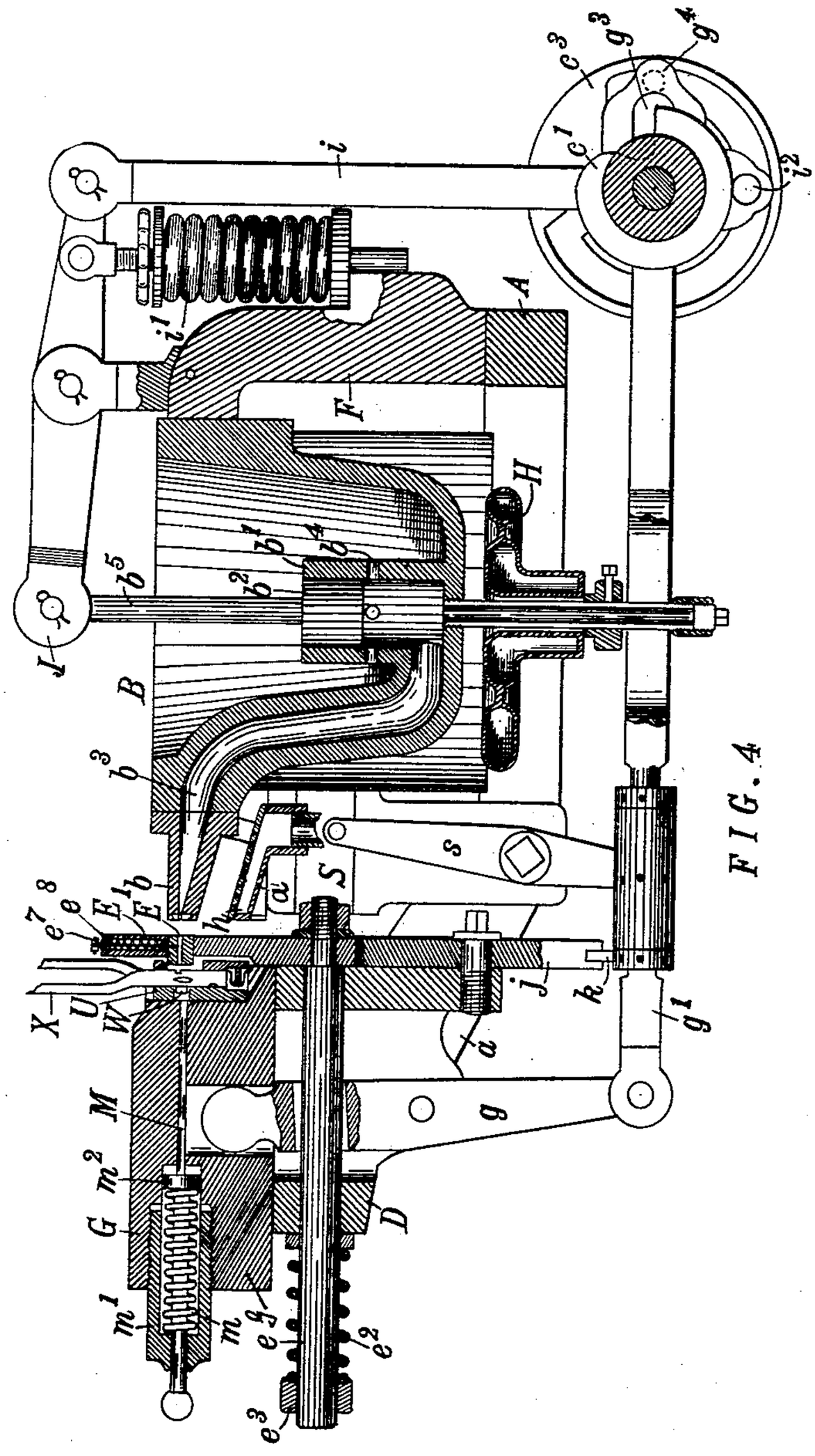

FIG. 4

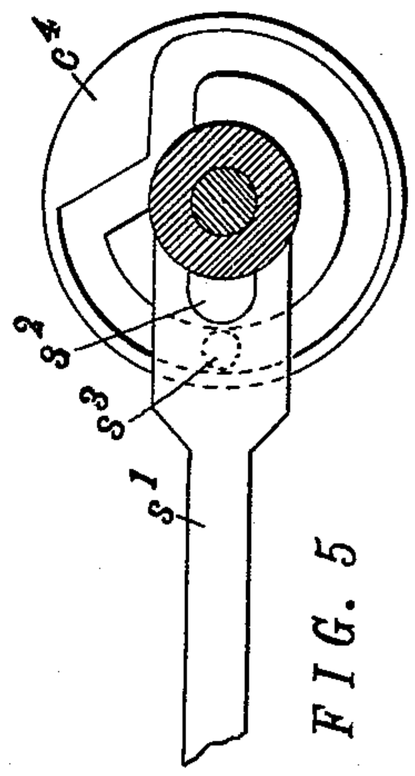

FIG. 5

WITNESSES.

J. Griswold

Bella S. Lowell.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.)

7 Sheets—Sheet 5.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

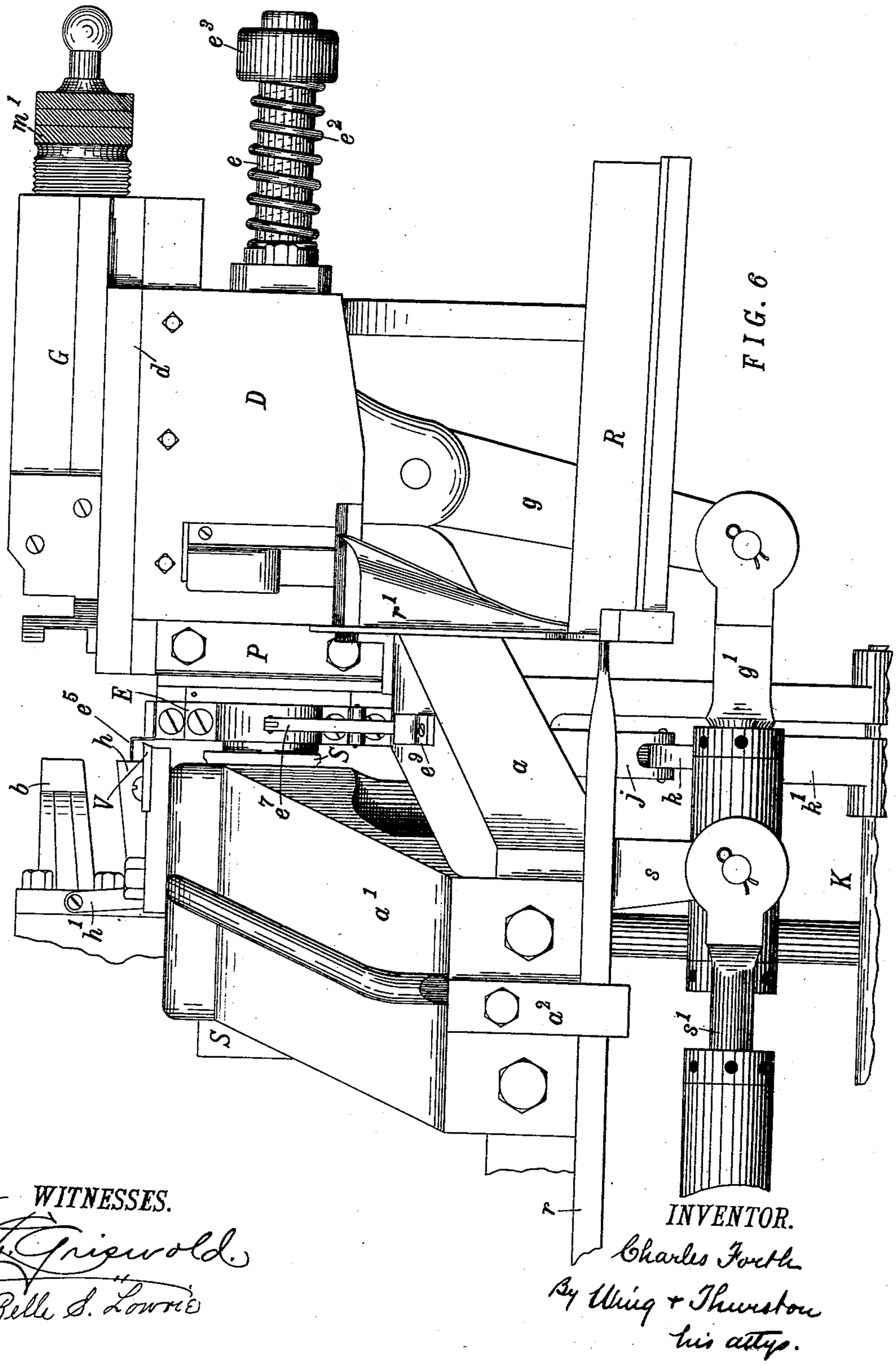

FIG. 6

WITNESSES.

L. L. Griswold.

Belle S. Lowrie

INVENTOR.

Charles Forth

By Uhlig & Thurston

his attys.

(No Model.) 7 Sheets—Sheet 6.

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

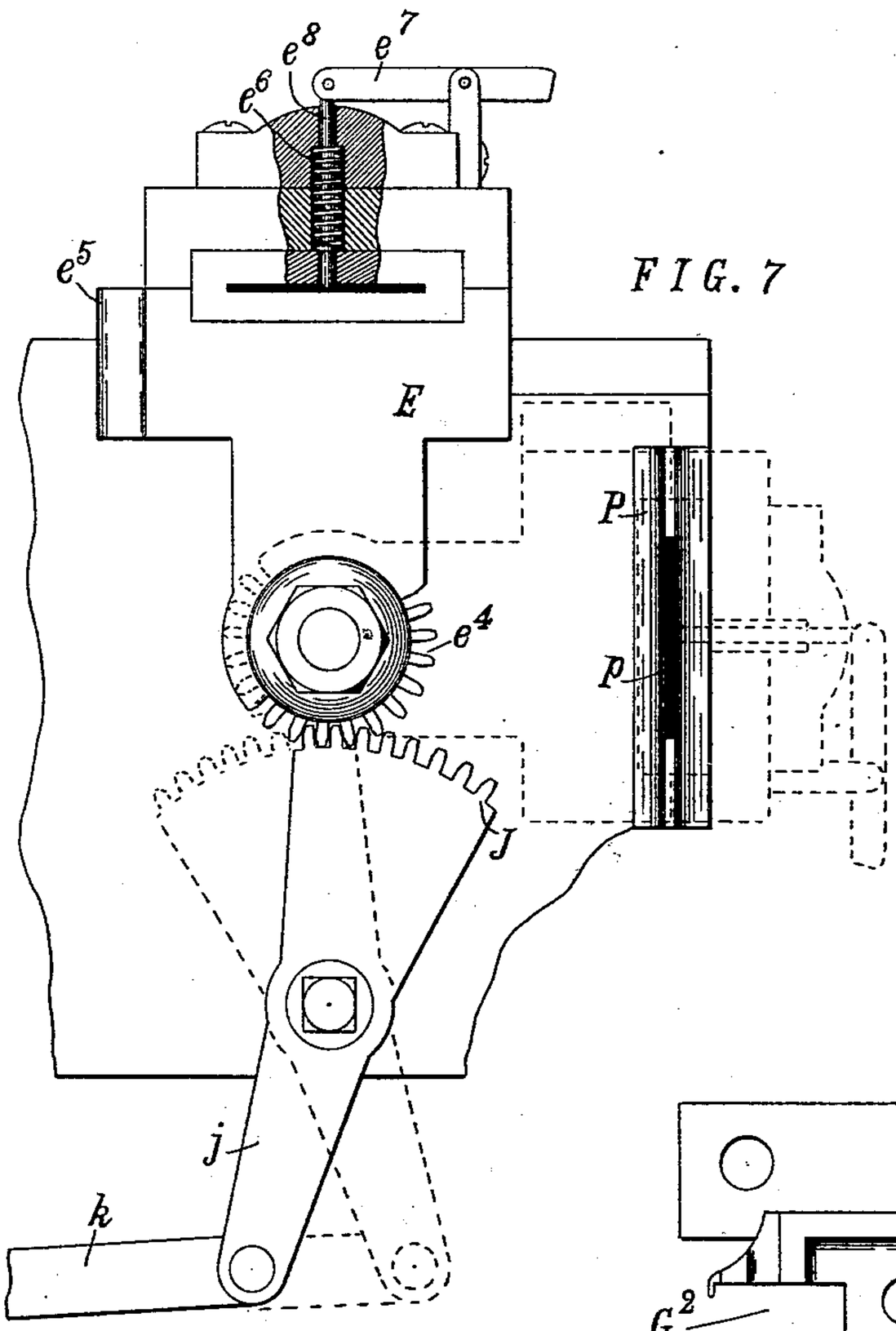

FIG. 7

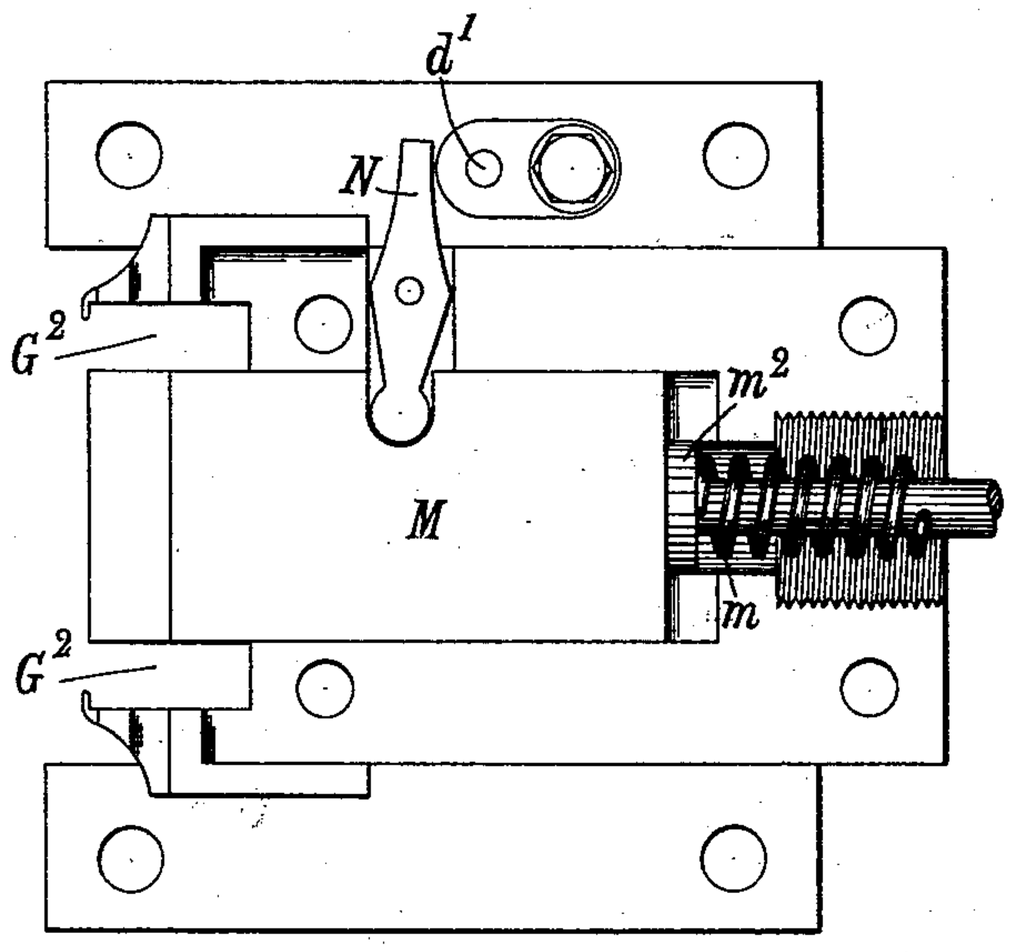

FIG. 8

WITNESSES.

F. Griswold.

Nellie M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys.

(No Model.) 7 Sheets—Sheet 7

C. FORTH.

LINOTYPE CASTING MACHINE.

No. 562,955. Patented June 30, 1896.

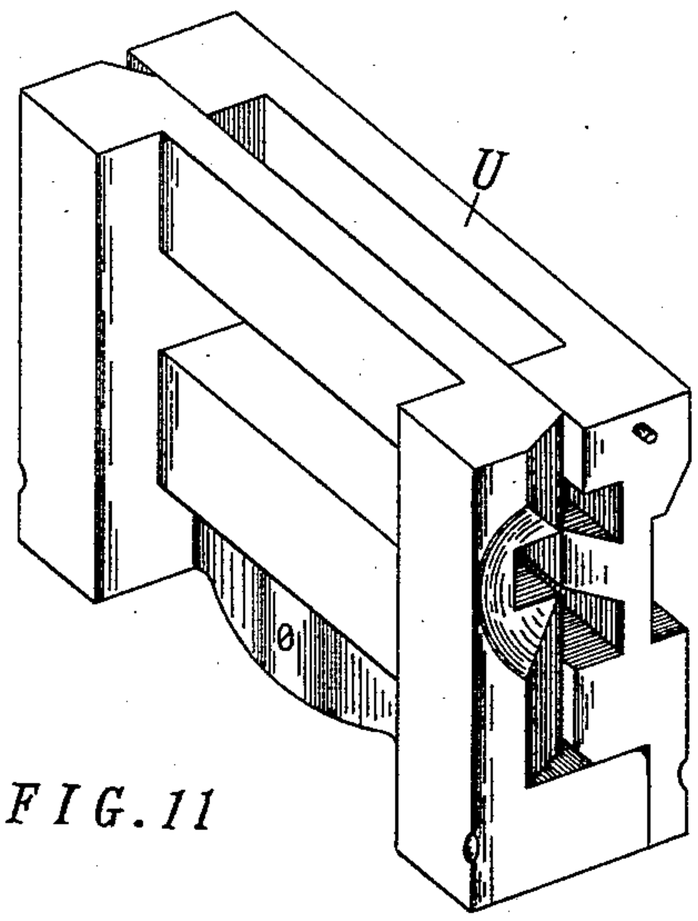

FIG. 11

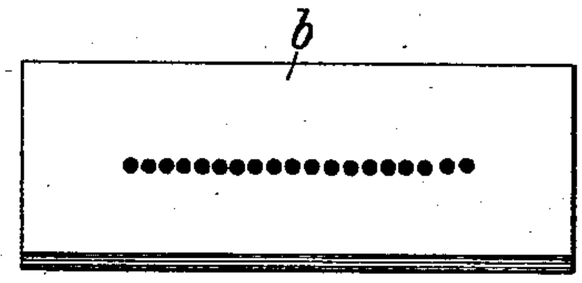

FIG. 9

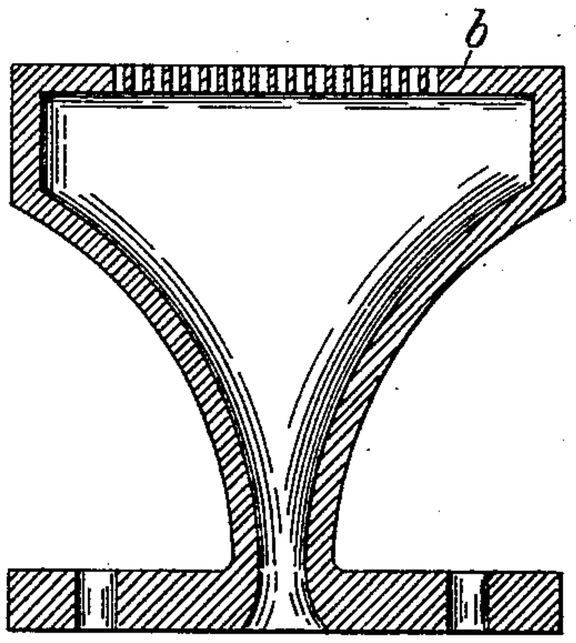

FIG. 10

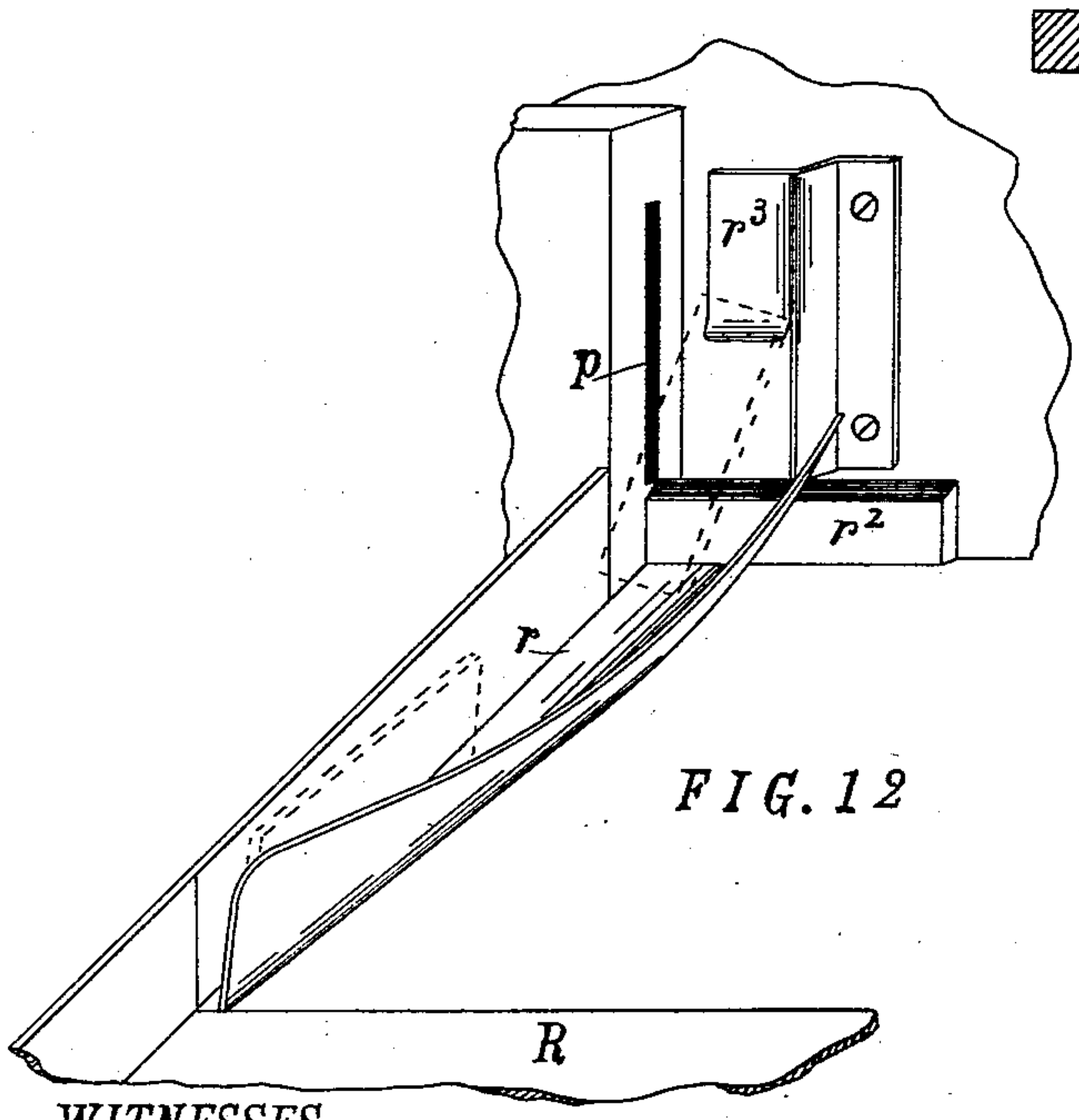

FIG. 12

WITNESSES.

J. Griswold.

Nellie M. Wood.

INVENTOR.

Charles Forth

By Wing & Thurston

his attys

UNITED STATES PATENT OFFICE.

CHARLES FORTH, OF CLEVELAND, OHIO, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE FORTH GRAPHOTYPE COMPANY, OF SAME PLACE.

LINOTYPE-CASTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 562,955, dated June 30, 1896.

Application filed February 15, 1894. Serial No. 500,253. (No model.)

To all whom it may concern:

Be it known that I, CHARLES FORTH, a citizen of the United States, residing at Cleveland, in the county of Cuyahoga and State of Ohio, have invented certain new and useful Improvements in Linotype-Casting Mechanisms; 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 machines adapted to be used with a line of assembled matrices, or with a line-matrix (meaning a strip or block of impression material in which a line of printing-characters has been impressed) for the purpose of casting a single type, bearing in relief on its printing edge the same characters as are found in the matrix-line; or, to more briefly express it, the purpose of the machine is to cast linotypes.

The machine, as organized and shown in the drawings, is especially designed to be used in casting linotypes from a line of matrices which is spaced by spacers having transversely-movable wedges in the impression-line. Such matrices and spacers may be assembled in line in the clamp shown in Fig. 11, by hand or by suitable mechanism; and the clamp containing the matrix-line is placed in the machine hereinafter described in the manner stated. It will be apparent, however, to those skilled in the art that certain novel parts and combination of parts of the mechanism shown may be used either in the form shown, or with slight modifications therein, to form linotypes from line-matrices, or from assembled matrix-lines spaced by spacers differing from those referred to.

The invention consists in the combination of parts hereinafter described, and pointed out definitely in the claims.

In the drawings, Figure 1 is a side elevation of the machine, viewed from the right. Fig. 2 is a front elevation of the machine. Fig. 3 is a rear elevation thereof. Fig. 4 is a central vertical longitudinal section. Fig. 5 is a vertical section through the driving-shaft in the plane indicated by line 5 5 of Fig. 3, viewed from the left. Fig. 6 is a side view of the front part of the machine, viewed from the left. Fig. 7 is a rear view of the mold and its operating mechanism. Fig. 8 is a top view of the slides G and M and a part of the head when the top plate which retains said slides in position has been removed. Fig. 9 is a front view of the nozzle. Fig. 10 is a horizontal sectional view of the nozzle. Fig. 11 is a perspective view of the clamp with which this machine is especially adapted to be used. Fig. 12 is a perspective view of the devices for conveying the finished type-bar from the mold to the galley.

Referring to the parts by letters, A represents the frame of the machine, which is of suitable form for supporting the parts of the mechanism in the described relation to each other.

At the rear side of the machine the driving-shaft C is mounted in suitable bearings, and it carries five cams c', c^2, c^3, c^4, and c^5, which operate different parts of the mechanism, as hereinafter described.

The melting-pot B is supported by the side brackets F' F^2 and the rear bracket F. Below the melting-pot is a gas-burner H, by means of which the type-metal in the melting-pot is melted. In the melting-pot is a cylinder b', in which a piston b^2 operates. A channel b^3 extends from said cylinder to the nozzle b, which nozzle is located just behind the mold. This nozzle has a flat front face, through which is a row of small perforations b^6, in line with the type-slot in the mold. When the mold is moved against the nozzle, said nozzle closes the rear edge of the type-slot, into which molten metal flows through the perforations b^6. The channel $b^\times$ in the nozzle is fan-shaped, being widest just behind the perforations; and the height of the channel is substantially equal to the width of the type-slot in the mold. Because of this fan-like shape of the channel in the nozzle, the molten metal enters the type-slot in the mold through all of the perforations b^6 at substantially the same time; and the result is the formation of a homogeneous slug.

In the cylinder b' are one or more holes b^4, through which the molten metal flows from the pot into the cylinder when the piston is raised. The piston in descending closes these holes. The piston-rod b^5 is connected with a

lever I, which is pivoted to the brackets F. This lever is moved in the direction to force the piston down into the cylinder (and thus causes the molten metal to flow through the channel b^3 to and through the perforations in the nozzle) by means of a powerful spring i', which is compressed between the rear end of the lever and a projection from the bracket F. The lever is moved in the contrary direction by the cam c', acting on a bar i, which is pivoted at its upper end to the rear end of said lever I. The driving-shaft passes through a slot in the lower end of the bar i, and a pin i^2 on said bar engages with the periphery of said cam. The cam is so shaped that the bar i is moved down slowly, and then allowed to rise very suddenly, as the spring i' abruptly operates the lever I.

Secured to the brackets $a\ a'$, which project forward from the front of the frame, is the head D. Extending longitudinally through said head is a cylindrical hole in which is mounted the mold-shaft e, and the mold E is secured to the rear end of said shaft. The shaft is longitudinally movable in its bearings in the head, and it is subjected to a constant force drawing it forward by a coiled spring e^2, which surrounds the forward projection of said shaft and thrusts against the front side of the head and a nut e^3 on the front end of the shaft. This spring tends to hold the mold against the rear face of the head. By reason of the described movement of the mold-shaft, the mold is axially movable to and from the nozzle.

A gear-segment e^4, Fig. 7, is secured to the mold-shaft, and preferably said segment is an integral part of the mold, as shown; and this gear-segment is in mesh with the gear-segment J. This segment is pivoted to the rear side of the head and it has a downwardly-extending arm j, which is connected by a link k with an arm k' on the rock-shaft K. This rock-shaft is mounted in suitable bearings and has on its rear edge a crank-arm k^2; and on this crank-arm is a pin k^3, which enters the cam-groove in the periphery of the cam c^2, whereby said rock-shaft is rocked.

A longitudinally-movable slide G is mounted in a longitudinal groove in the upper side of the head, between the two flanges d. A lever g, which is pivoted to the under side of the head, extends up through a vertical slot in said head, and the upper end of said lever-arm, which is rounded, extends into a recess in the under side of the slide G. As the lever is rocked the slide is moved backward and forward, toward and from the nozzle b. A bar g' is pivotally connected with the lower end of said lever and extends back to the driving-shaft, which shaft passes through a slot g^3 in said bar. A pin g^4 on said bar (shown in dotted lines on Fig. 4) enters the cam-groove in the side of the cam c^3, whereby said bar and the lever g, to which it is attached, is operated, with the result of moving the slide. On the rear end of the slide G are means for holding the matrix-line for presentation to the mold. As before stated, the machine is organized with especial reference to casting a linotype from a line of matrices which are held in a clamp U, substantially like that shown in Fig. 11. When this clamp is held in a slide, its ends lie in the vertical grooves $G^2\ G^2$, wherein it is held by the fingers g^2. The impression-line on the matrices is then in line with the type-slot in the mold.

In the top of the slide G is a longitudinal groove in which the spacer-operating slide M lies and moves. This slide is directly behind the ends of the spacer-wedges, that is to say, in the plane of the impression-line. The slide M is forced forward by a spring m, which lies in the barrel m', and the barrel is screwed into the front end of the slide G. The spring thrusts endwise against the end of said barrel and a flange m^2 on the front end of the slide, thereby exerting a constant force to move the slide M forward upon and independently of the slide G. A lever N is pivoted to the slide G. Its inner end is rounded and enters a transverse slot m^3 in the side of the slide M. The outer end of the lever extends outside of the slide G to a position where, as the slide G is moved forward, the end of the lever will strike the pin d', secured to the head. This will cause the lever to move so as so draw the slide M back upon slide G in opposition to the force of the spring m.

The mold E oscillates on its pivot back and forth between its vertical position, as shown in Figs. 4 and 7, and the horizontal position, as shown in Figs. 1, 2, and 6, making a quarter of a revolution at each movement. A type-slot E′ extends through the mold, and this slot is of exactly the dimensions of the type to be formed. When a linotype is being cast, the front of the said type-slot is closed by the nozzle b. A block P is secured to the left side of the head, and in it is formed a vertical slot p, which, when the mold is in its horizontal position, is directly in front of the slot e in the mold, so that the slug in the mold may be pushed into slot p.

r represents an inclined chute which is secured to the frame of the machine just forward of the block P and below the slot p, so that when a type-bar is pushed forward from the slot p it will fall into said chute. The rear side of the chute is substantially straight and vertical, but the bottom and the front side are formed of one piece, which gradually curves upward, as shown. The front side of the chute also curves toward the rear side from the upper to the lower end of the chute until, close to the galley, the distance between the two sides is only slightly greater than the thickness of the type-bar. At the upper end of the chute the distance between the two sides of the chute is slightly greater than the height of the type-bar.

Secured to the frame of the machine, in the upper end of the chute, is a plate r^2, having a beveled upper edge. Above this beveled

plate is a bracket r^3, which extends to the left of the slot p. When a type-bar is pushed out of the slot p, its lower end engages with the inclined upper edge of the plate r^2, wherefore said lower end slides downward and outward on said inclined surface into the chute. The upper end of the type-bar is prevented from falling outward by the bracket r^3, which lies outside, that is to say, to the left of the upper end of said type-bar. The lower end of every type-bar, therefore, first enters the chute, and said type-bar when it first enters the chute lies on one side. As it slides down the chute, the type-bar is gradually turned by the curved bottom and side of the chute until it rests upon its lower edge, and in this position the type-bars leave the chute and enter the galley R, which is secured to the side of the frame.

Mounted on the inner side of the bracket a', on the left side of the machine, is a longitudinally-movable ejector-slide S, which is adapted to move forward into the type-slot E′ when the mold is in its horizontal position, and thereby push the slug out of the type-slot into the slot p. This slide is operated by a lever s, which is pivoted to the frame of the machine, and has its lower end connected by a pivot to the longitudinally-movable bar s'. The driving-shaft passes through a slot s^2 in this bar, and a pin s^3 on the bar enters a cam-groove in the side of the cam c^4.

Projecting into the galley, through its rear end, is a reciprocating slide r, which is held by a bracket a^2 to the side of the frame, and its rear end engages with and is operated by the cam c^5. The purpose of this slide is to push forward, out of the way of each new type as it slides down the chute, all of the type which have accumulated in the galley.

Secured to the right side of the mold is a scraper e^5, which, as the mold moves to its horizontal position, sweeps across and in contact with the face of the nozzle, thereby cleaning it. Secured to the bracket a' is a shearing-knife V, so placed that the rear face of the mold just touches it as the mold is swung to its horizontal position. This knife trims off the lower edge of the slug which is then in the mold.

A supplemental gas-burner h is supported by straps h' below the nozzle, and thereby the metal therein is prevented from freezing.

A longitudinally-movable pin e^8 passes through a hole in the top of the mold and enters the type-slot a very short distance, say a thirty-second of an inch, and it is forced downward into said slot by means of a spring e^6. This pin lies in the type-slot, as described, when the metal to form the linotype is injected therein, and this pin prevents the movement of the linotype in said type-slot until the pin is removed. Pivoted to the top of the mold is a lever e^7, one arm of which is pivoted to the upper end of the pin e^8. The other arm of this lever e^7 is adapted to engage with a beveled block e^9, secured to the bracket a on the left side of the machine, when the mold is moved to its horizontal position, thereby withdrawing the said pin from the type-slot.

The main shaft C is driven by means of a shaft C′, the two shafts being operatively connected by means of beveled gears C^2 C^3. A crank C^4 on the forward end of the shaft C′ affords the means for revolving the shaft C′.

In forming a linotype in the machine shown in the drawings, as heretofore described, the parts operate as follows: The clamp containing the assembled line of matrices X is placed in that end of the slide G which faces the mold in the grooves G^2 behind the fingers g^2. The operator by revolving the crank-shaft C′ revolves the driving-shaft. The cam c^3 thereon first operates through the described mechanism to move the slide G backward toward the nozzle. The first effect of this movement is to release the lever N from its engagement with the fixed pin d', whereupon the spring m forces the slide M backward against the rear ends of the spacing-wedges W, thereby expanding the line of matrices. When the slide G is farthest from the nozzle, the mold E is in its horizontal position. As the slide G begins its movement toward the nozzle the cam c^2 operates the rock-shaft K, thereby through the described intermediate mechanism swinging the mold to its vertical position, in which position it is held until the type is cast. The slide G, continuing its rearward motion, strikes the mold and moves it toward and into contact with the nozzle, the mold-shaft sliding in its bearings to permit this action. The cam c now permits the spring i' to operate the plunger to force the molten metal out through the perforations in the nozzle. The continued motion of the driving-shaft causes the slide G to move from the nozzle, and the lever N is brought into contact with the pin d' and the slide M is thereby drawn forward. As the slide G is thus moved forward it moves away from the mold, withdrawing the matrix-line from contact therewith, and the mold is thereupon drawn away from the nozzle by the spring e^2, surrounding the mold-shaft e. The cam c^2 now again operates the rock-shaft, thereby, through the intermediate mechanism, swinging the mold to its horizontal position. The lever e^7 engages with the beveled block on the bracket a and the pin e^8 is withdrawn from the mold. The cam c^4 next moves the ejector-slide S forward, thereby pushing the type out of the mold into the slot p. If a type before this operation were in the slot p, it would be pushed out into the chute r'. The slide r, just before the last-described movement of the slide S, has been moved forward by the action of cam c^5, thereby pushing the linotypes in the galley forward to make room for that just pushed out of the slot p. This completes the operation of the different parts of the machine, which parts are now in readiness to repeat the described operations.

Having described my invention, I claim—

1. In combination with a stationary nozzle and mechanism for forcing molten metal to and through said nozzle an oscillating pivoted mold axially movable to and from said nozzle, a slide adapted to sustain a line of matrices for presentation to the mold, and mechanism for moving said slide toward the nozzle, thereby first bringing the matrices against the mold and then moving the mold against the nozzle, and away from the nozzle to return the slide to its first position, and mechanism for withdrawing the mold from contact with the nozzle, substantially as and for the purpose specified.

2. In combination, a stationary nozzle and mechanism for forcing molten metal to and through said nozzle, a slide adapted to support a line of matrices, a mold-shaft movable longitudinally in its bearings, a mold secured thereto and adapted to lie between the slide and the nozzle, mechanism for moving said slide toward the nozzle, thereby bringing, first, the matrices against the mold, and, second, the mold against the nozzle, a spring surrounding the mold-shaft and exerting its force to withdraw the mold from contact with the nozzle, and mechanism for oscillating the mold-shaft, substantially as and for the purpose specified.

3. In combination, a stationary nozzle and mechanism for forcing molten metal to and through said nozzle, a slide movable toward and from said nozzle, a pivoted mold axially movable to and from said nozzle and adapted to lie between it and said slide, a second slide mounted on the first and independently movable in the same directions, and mechanism for independently moving said slides, substantially as and for the purpose specified.

4. In combination, a stationary nozzle and mechanism for forcing molten metal to and through said nozzle, a slide movable toward and from said nozzle and adapted to support a line of matrices, a pivoted mold axially movable to and from said nozzle and lying between it and said slide, a second slide mounted on the first slide and independently movable in the same directions, a spring adapted to move the second slide in one direction, a lever pivoted to the first slide and engaging at one side of its pivot with the second slide, and a fixed stop adapted to engage with said lever on the opposite side of its pivot, substantially as and for the purpose specified.

5. In combination, a pivoted mold having a type-slot through it, mechanism for oscillating said mold, a sliding pin mounted in the mold and entering said slot, a lever pivoted to the mold and engaging at one end with said pin, a beveled block adapted to engage with the other end of said lever and thereby move the lever so as to withdraw the pin from said slot, and a spring for moving said pin in the opposite direction, substantially as and for the purpose specified.

6. In combination, a longitudinally-movable mold-shaft, a mold having a type-slot through it secured to said shaft, a gear-segment secured to said shaft, an oscillating gear-segment in mesh with the gear-segment first named, a rock-shaft and mechanism connecting said rock-shaft and the last-named gear-segment, substantially as and for the purpose specified.

7. In combination, a fixed nozzle and mechanism for forcing molten metal to and through the same, a slide movable toward and from said nozzle and having, on the edge opposed to said nozzle, fingers adapted to temporarily retain on said slide a clamp full of matrices, an oscillating pivoted mold between said slide and nozzle and axially movable to and from said nozzle, substantially as and for the purpose specified.

8. In combination, a fixed nozzle, mechanism for forcing molten metal to and through said nozzle, a slide adapted to support a matrix-line movable toward and from said nozzle, an oscillating pivoted mold having a type-slot through it, movable axially to and from said nozzle lying between the nozzle and slide, a fixed slotted block P, and an ejector-slide movable into and out of the type-slot and adapted to force the type therefrom into the slot in the block P, and an inclined chute placed at one side of the slotted block P and adapted to receive a type as it is pushed out of the slot in said block P, and mechanism for moving the movable parts herein mentioned in the manner substantially as described.

9. In combination, a fixed nozzle, mechanism for forcing molten metal to and through said nozzle, a slide movable toward and from said nozzle, a pivoted mold axially movable to and from said nozzle, a pivoted lever engaging in a vertical slot in said slide, a bar connected with the lower end of said lever and a revolving cam for actuating said bar, substantially as and for the purpose specified.

10. In combination, a pivoted mold, a gear-segment secured thereto, a pivoted gear-segment in mesh with that first named, having a rocker-arm rigidly connected therewith, a rock-shaft having a rigid arm, a link connecting this arm with the said rocker-arm, a cam, and a second arm secured to the rock-shaft engaging with said cam, substantially as and for the purpose specified.

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

CHARLES FORTH.

Witnesses:
E. L. THURSTON,
C. L. NEWELL.