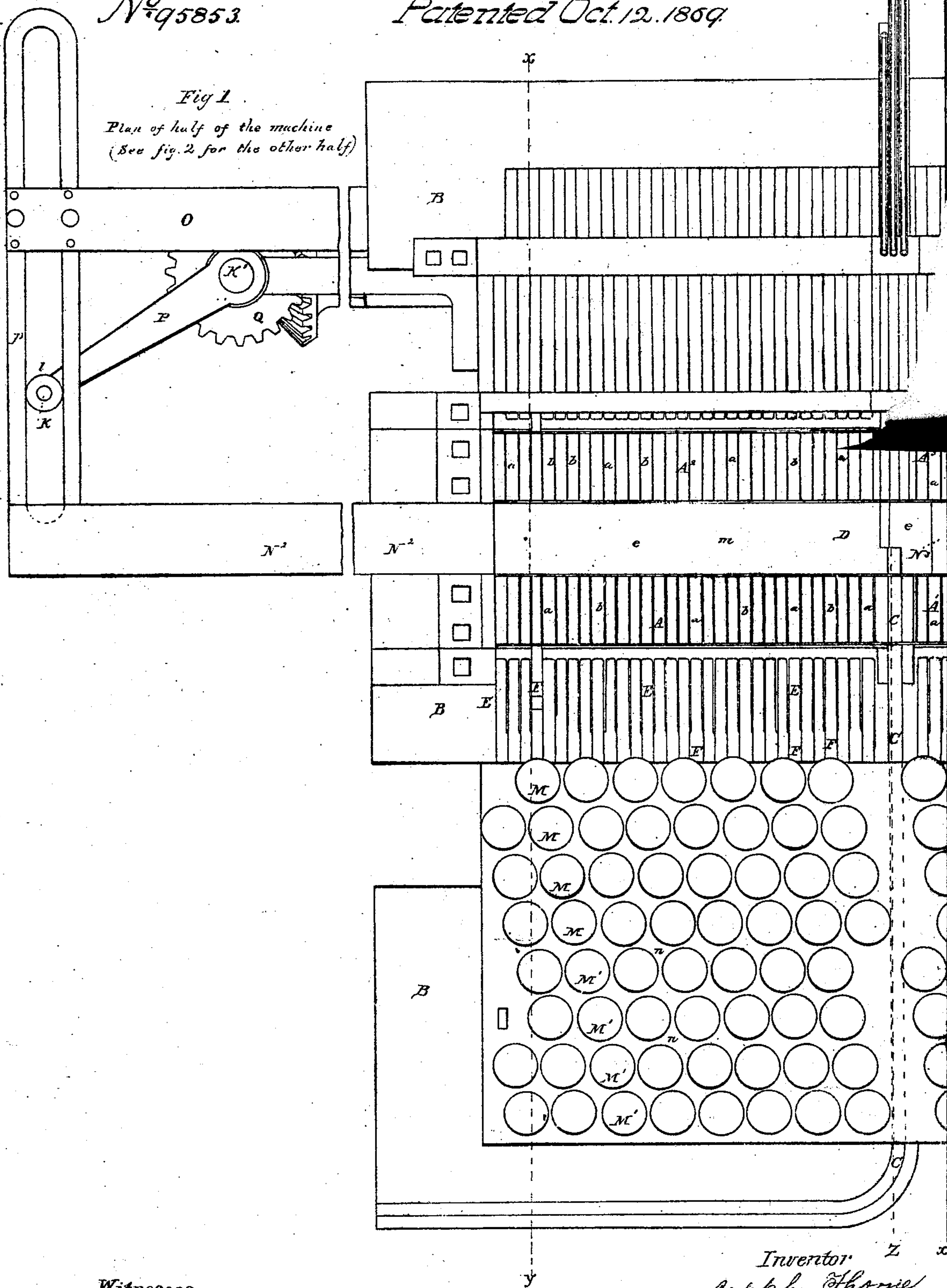


J. Thorne Sheet 1 of 5 Sheets

Type Setting Mach.

Patented Oct. 12. 1869

Nº 95853



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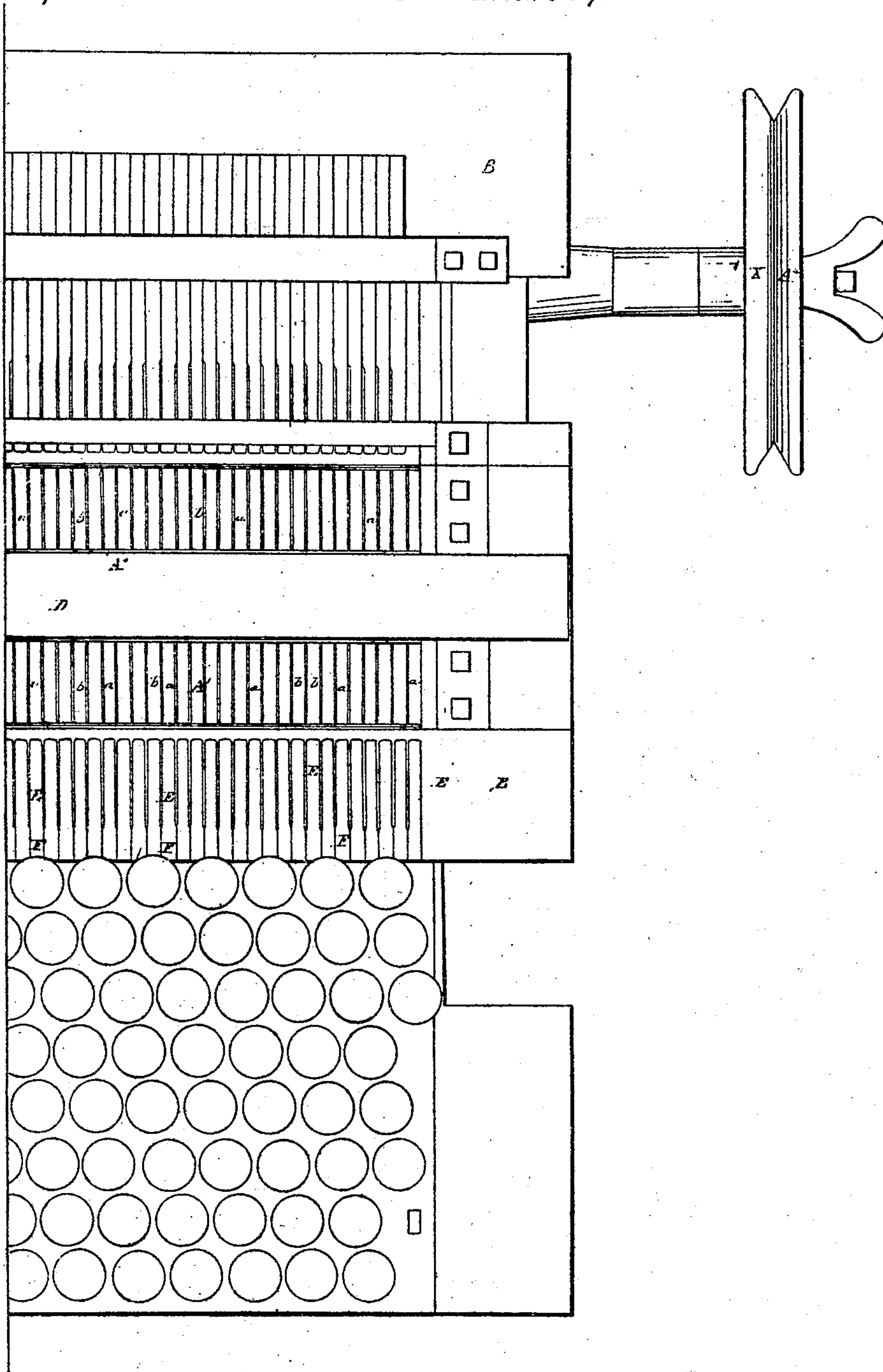
J. Thorne Sheet 2. 5 Sheets

Type Setting Mach.

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Fig. 2



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Type Setting Mach.

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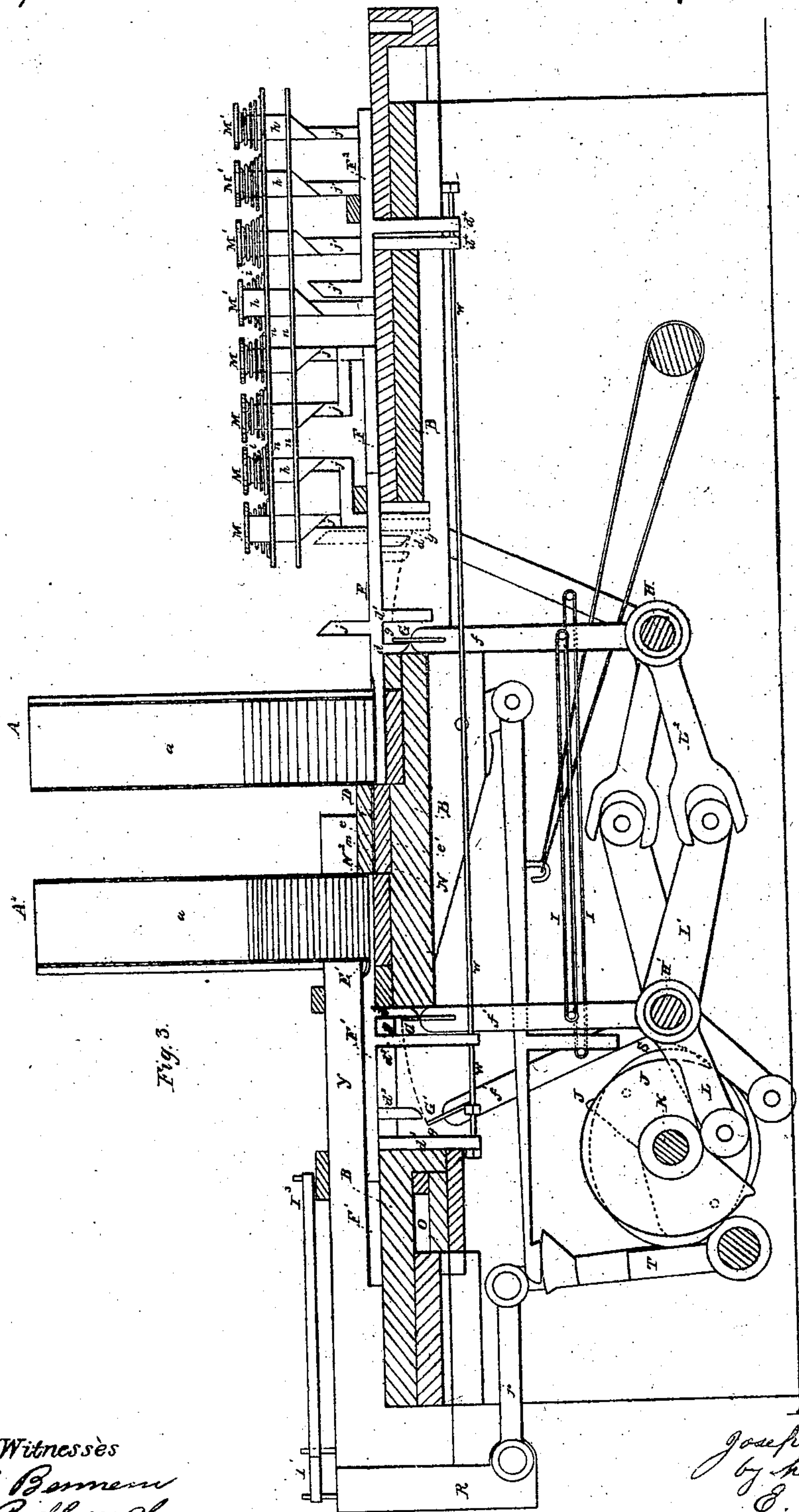


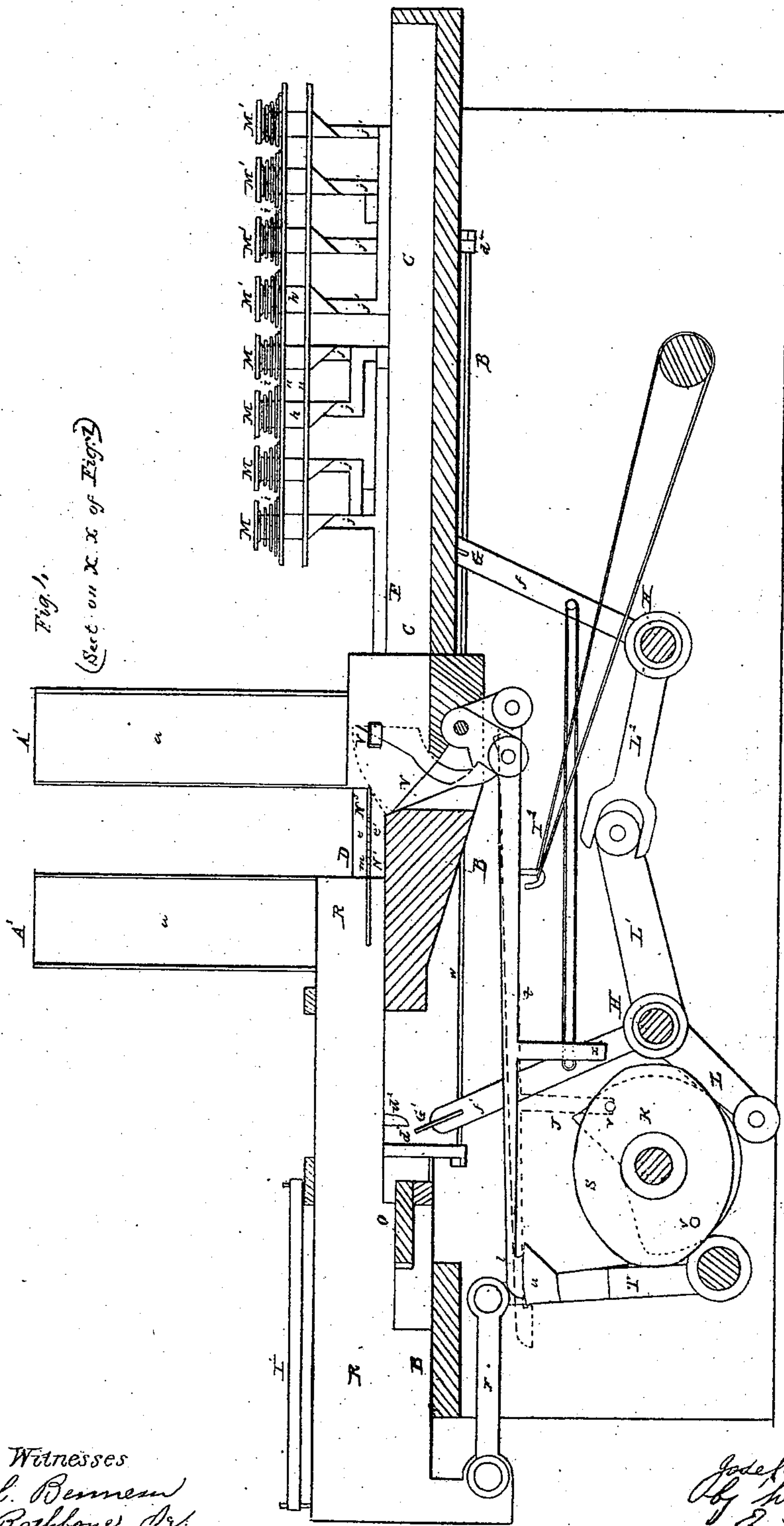
Fig. 3.

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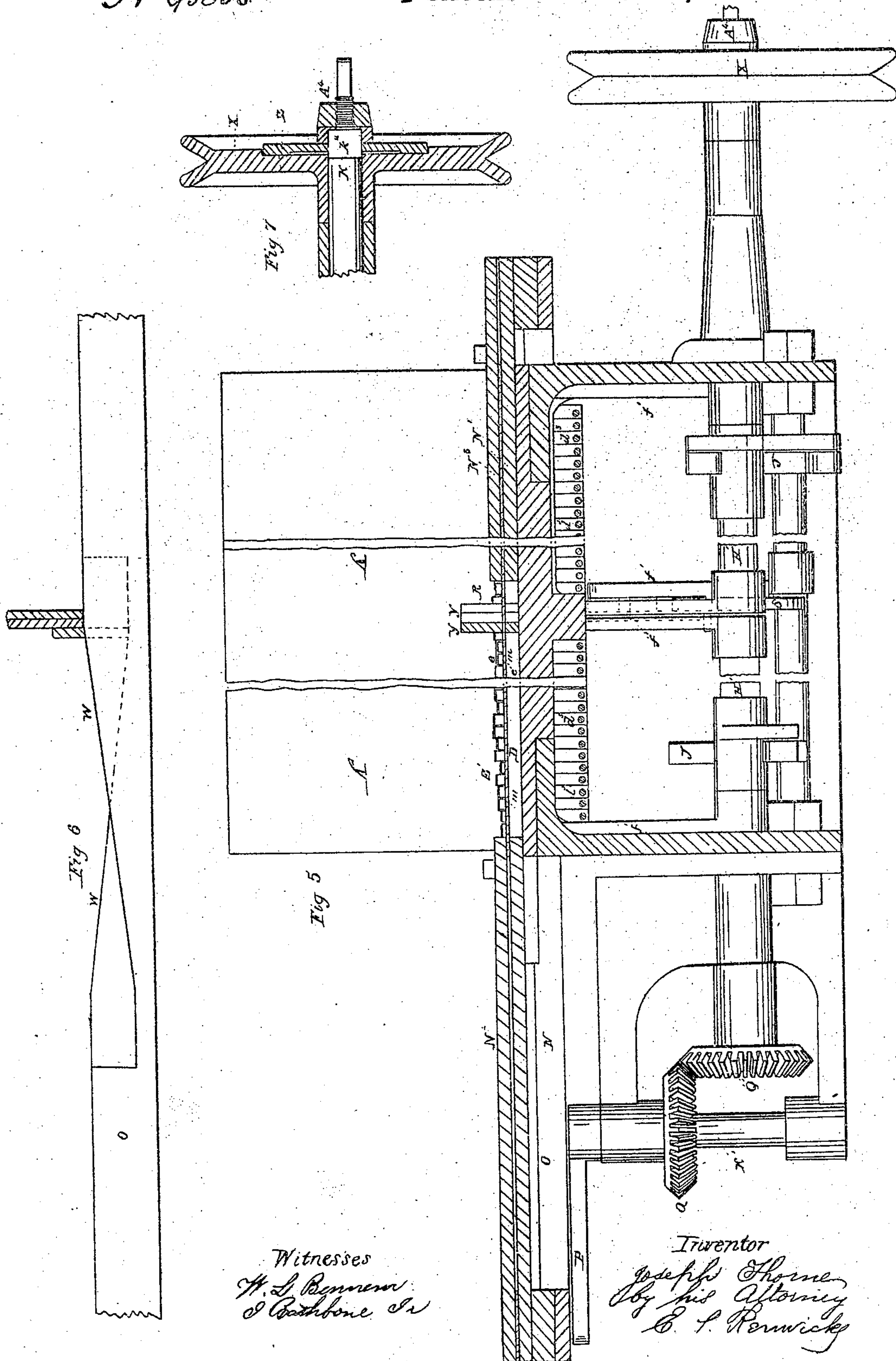
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Type Setting Mach.

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JOSEPH THORNE, OF NEW YORK, N. Y.

Letters Patent No. 95,853, dated October 12, 1869.

IMPROVEMENT IN TYPE-SETTING MACHINES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, JOSEPH THORNE, of the city, county, and State of New York, have invented certain new and useful Improvements in Machinery for Setting Types; and that the following is a full, clear, and exact description and specification of my said invention.

The object of my invention is to produce a compact machine, of small dimensions, for setting up types in line; and

My invention consists of certain combinations of the following instrumentalities, viz:

Type-holders, each containing a column of type, and each having an opening at its bottom for the admission of a finger, by which the lowermost type of the column is ejected endwise from the type-holder.

A race or conductor, extending parallel with one or more series of type-holders, and receiving the type ejected therefrom.

Ejecting-fingers, one for each type-holder, their office being to eject the types into the type-race.

One or more reciprocating carriers operated by power to move said ejecting-fingers whenever they are selected by the operator.

Keys, to select the ejecting-fingers and move them within reach of their carrier.

Type-drivers, to move the types in the type-race, positively along the same by pushing them.

A type-channel, for receiving the types from the type-race, and for holding them in line.

A type-transferrer, for transferring the types from the type-race to the type-channel.

A reciprocating type-setter, for setting up the types as they are delivered into the type-channel.

A spring-presser, to hold the types erect in the type-channel as they are set up therein.

A movable gauge, to straighten such types as may be delivered in skewed positions by the type-driver.

A friction-clutch or driver, to permit the driving-shaft to stop in case of an impediment to the movement of the members of the machine.

All my combinations are contained in the type-setting machine represented in the accompanying drawings, as an illustration of a good mode of constructing them.

Figure 1 represents a plan of half of the machine, and

Figure 2 represents a plan of the remaining half, said two halves meeting at the dividing line *z z*.

Figure 3 represents a transverse section of the machine at the line *y y* of fig. 1, and

Figure 4 represents a transverse section of the same at the line *z z* of fig. 1.

Figure 5 represents a vertical longitudinal section of the machine at the centre of the type-race.

Figure 6 represents a plan of parts of the driver-slide and of the gauges, and

Figure 7 represents a section of the driving-pulley and the friction-driver or clutch thereof.

The machine, as represented, is provided with a number of type-holders, *a a a*, each fitted to hold a column of types laid on their sides on top of one another.

These type-holders are secured to a table, *B*, and are arranged in four series or gangs, *A A¹ A² A³*. Two of these series, constituting a pair, *A A²* are arranged in parallel lines at one side of the central type-channel *C*, in which the type are set up in line, and the remaining two series, *A¹ A³*, are arranged at the opposite side of said type-channel, and constitute a second pair; hence each member of one pair of series is arranged endwise to the members of the other pairs.

The two series of each pair are separated by the type-race *D*, which extends parallel with the series, and forms the pathway along which the types are driven to the type-channel; one series, *A A¹*, of each pair being in front of said type-race, and the other series of the pair in the rear of it.

As the series of one pair, *A A²*, are endwise to the other pair, *A¹ A³*, the type-race is extended along all four series, *A A¹ A² A³*, so that a type may be brought from either pair of series to the central point at which the type-channel *C* is placed.

The cavity of each type-holder is separated from those adjacent to it in the same series, by partitions, *b b*.

Each front type-holder is provided with a sliding ejecting-finger, *E*, to eject the lowermost type. This finger is a little thinner than the type it is to operate upon, and the side of the type-holder farthest from the type-race has an opening in its bottom to permit this finger to enter, while the side nearest the type-race has a similar opening of the requisite height to permit the type to be ejected by the finger when it is pushed toward the type-race *D*.

Each ejecting-finger is connected with a slide, *F*, which is constructed to move toward and from the type-race; and each of these finger-slides is provided with two legs, *d d¹*, which depend from it, and pass through an opening in the table *B* of the machine.

Each rear type-holder, (or type-holder in the rear of the type-race,) is provided with a sliding ejecting-finger, *E¹*, like those, *E*, of the front type-holders, and connected in like manner with a slide, *F¹*, provided with legs, *d² d³*, but the ejecting-fingers *E¹* of the rear gang of type-holders are arranged at a higher level than the front fingers *E*, so as to deliver the type which they eject upon a race-plate, *m*, which divides the type-race into an upper course, *e*, and a lower course, *e¹*, the former for the types from the rear gang

A² A³ of type-holders, and the latter for the types from the front gangs A A¹ thereof.

All the finger-slides of each rear gang of type-holders are moved toward and from the type-race by one carrier, which consists of a bar, G¹, that is held at the extremities of two arms, f' f', which project from a rock-shaft, H¹, beneath. This carrier is caused to move toward the type race, (or forward,) by a spring, I, and from it (or backward) by means of a cam, J, which is secured to a cam-shaft, K, that is caused to revolve continuously while the machine is in operation.

The cam operates upon an arm, L, which is secured to the rock-shaft H¹ of the finger-slide carrier G¹, and as this carrier is connected with the rock-shaft H¹ its upper edge at every point of its length describes a circle, of which the axis of the rock-shaft is the centre. This circle is denoted in fig. 3 by the dotted line g g.

All the finger-slides of each front gang of type-holders are moved toward and from the type-race by a similar carrier, G, secured to arms f f, projecting from a rock-shaft, H. This rock-shaft is caused to rock by connecting it, through arms L¹ L², with the rear rock-shaft H¹, so that the two carriers at one side of the type-channel C, are moved simultaneously from the type-race by the same cam J, and toward the race (when the cam permits) by a spring, I.

The cam J, for the carriers G¹ G, at one side of the type-channel C, is set diametrically opposite that, J, for the carriers at the other side of the type-channel, so that the carriers, and consequently the ejecting-fingers of the two pairs of series of type-holders, are moved in alternate succession.

That leg, d¹ or d³, of each finger-slide, F or F¹, which is farthest from the type-race D, is so long that the carrier G or G¹ can act upon it during the whole of its movement, by the spring I, away from the type-race, which movement will be hereafter called the retrograde movement. Hence, whenever a finger-slide has been moved forward, or toward the type-race, it is, of necessity, moved immediately back to its retrograde position by the next retrograde movement of the carrier.

The other leg, d or d², of the finger-slide, is shorter, so that when the finger-slide has been moved to its backward position, by the carrier G or G¹, this short leg is beyond the dotted line g g, and consequently is out of the range of the carrier.

Hence, so long as each finger-slide remains in its backward position, it will remain at rest, and will not operate the type-finger E or E¹, nor eject a type from the type-holder into the type-race; but, if the finger-slide be moved a little forward, as represented in dotted lines in fig. 3, its shorter leg is thereby placed within the range of motion of the carrier, and consequently the latter, in its forward movement, will act upon it, carrying the finger-slide, from which the leg depends, forward, (toward the type-race,) and causing its type-finger to enter the type-holder and push the lowermost type into the type-race.

Hence, whenever any finger-slide is moved forward within the range of its carrier, the type corresponding thereto is immediately ejected into the type-race; and when a particular type is wanted, all that is required to have it ejected from its type-holder, is to select the finger by moving the corresponding finger-slide slightly toward the type-race.

In order that each finger-slide may be so selected or moved within the range of its carrier, a key, M M', is provided for each.

The keys for both the front and rear series of type-holders are arranged in a key-board at the front side of the front series of type-holders, and consequently all in front of the type-race, there being four rows, M M M M, of keys for a front series of type-holders, and four similar rows, M' M' M' M', for a back series, this

number of rows giving a sufficient space to enable each key to be opposite its particular finger-slide, and the type-holder corresponding thereto, when the type-holders are close together, as represented in the drawings.

The keys for the pair of series of type-holders A A², from which types are delivered for the action of one pair of type-drivers, N N², are arranged in a gang at the left side of the type-channel C, and the keys for the other pair of series of type-holders, A¹ A³, from which types are delivered to the other pair of type-drivers N¹ N³, are arranged in a gang at the right side of the type-channel; and, as the ejecting-fingers alternate in their action upon the types, the former gang of keys can be operated by the left hand of the operator, and the latter gang of keys by the right hand of the operator in alternate succession, whereby the operator can concentrate his attention, alternately, upon the work of each of his hands.

Each key consists of a piston, h, arranged to slide vertically in a frame, n, and maintained in its uppermost position by a spring, i, that is coiled about its stem.

The lower end of each piston is inclined, and the inclined end of each piston of a front gang of type-holders is arranged to operate upon the upper end of an arm, j, that projects upward, the finger-slide, beneath the arms j j j j, corresponding with each of the four rows, M M M M, of keys, being at the requisite distance from the end of the type-fingers to be operated by their respective pistons.

Hence, when a piston is depressed, its inclined end, acting upon the arm of the finger-slide, moves the finger-slide within the range of its carrier.

The pistons h, of the rear gang of finger-slides F¹, are constructed to operate upon the arms j' j' j' j', of key-slides F², corresponding in number and lateral position with the finger-slides F¹; and each key-slide is connected with its respective rear finger-slide, by a rod, w, which passes through the longer leg d³ of the finger-slide, and a corresponding leg, d⁴, depending from the key-slide F².

Hence, when one of the pistons, M' M' M' M', of the rear finger-slides is depressed, the corresponding finger-slide is at once drawn within the range of its carrier G¹.

In order that the rear finger-slides may not move the key-slides, when the former are moved forward by their carrier, each connecting-rod is constructed to slide freely in the holes in the legs d³ d⁴, but each rod is fitted with heads, so that the key-slide may draw the finger-slide forward, and that the finger-slide may draw the key-slide back to its position of rest, when the former is moved back by its carrier to its retrograde position.

Each course of the type-race is traversed by a sliding driver, there being an upper driver, N² or N³, for the upper course, at each side of the type-channel C, and a lower driver, N or N¹, for the lower course, at each side of the said channel.

The outer ends of each pair of drivers, at each side of the type-channel, are connected with a slide, O, to which a reciprocating movement is imparted by the revolution of the crank P, the crank being secured to the upper end of a short shaft, K', which is provided with a mitre-wheel, Q, whose teeth engage with those of a corresponding mitre-wheel, Q', secured to the cam-shaft K, so that the crank revolves simultaneously with the cams J J, and impels the two pairs of drivers, alternately, toward the centre of the machine.

The crank-pin k is fitted with a friction-wheel, l, which traverses the slotted frame p, secured to the end of the driver-slide O, and the throw of the crank is sufficient to move the inner ends of the type-drivers from a point a little beyond the outermost type-holders, to the edge of the type-channel C, at the inner ends of the pair of series of type-holders to which the drivers appertain.

The carrier-cams J J are so set on the cam-shaft, relatively to the position of the crank P, that the type-fingers of either pair of gangs of type-holders are pushed forward, (or toward the type-race from their retrograde position at either side thereof,) while the type-drivers N N², N¹ N³, for that pair are passing outward beyond the outmost type-holder and returning again thereto, so that any type that may have been ejected by the fingers from the type-holders lies in the type-race, either in its upper course or in its lower course, in the proper position to be pushed by the driver toward the type-channel C, and delivered at the centre of the type-race.

In order that the types delivered at the centre of the type-race may be entered into the type-channel, a transferring-instrument is provided to move the types endwise, (that is, in a direction crosswise to the length of the type-race, and to the line of movement of the type-drivers,) and deliver them into the type-channel.

This type-transferrer R is arranged to slide in a groove, and is moved backward (out of the type-race) by a cam, S, which is secured to the cam-shaft K, and acts upon a rocking arm, T, with which the shank of the type-transferrer is connected by a link, r.

The transferrer is moved forward, whenever the rotation of the cam S permits, by a spring P¹.

The cam S is double armed, so that it causes the transferrer R to operate immediately after each type-driver arrives at its innermost position, and the transferrer is forked, so as to enter each course of the type-race, and push forward the types that may be in either or both of the courses.

In order that the type, when so pushed forward, may enter readily into the type-channel, the bottom of the latter is arranged below the type-race, and a part of the lower course of the type-race, as well as a part of the race-plate m, is cut away, so that when the type in either is moved forward about two-thirds of its length, it tips, but downward, into the type-channel, and arrives therein in an inclined position.

In order that the type, so entered into the type-channel, may be set upright, a type-setter, U, is provided. This instrument is pivoted in a recess in the table or bed-plate, and is caused to vibrate upon its pivot at intervals. When at rest, it lies back in its recess, so that its forward side is inclined, (as seen in fig. 4,) and forms a way down which the type slides when pushed forward by the transferrer R.

When the type has thus arrived in front of the type-setter, it is vibrated forward until its forward side stands erect, (as represented by the dotted lines in fig. 4,) and consequently the type in front of it is set upright, and is pushed forward in the type-channel C, together with all the preceding types that have been set therein.

The forward movement of this type-setter is effected by the same cam, S, that operates the transferrer R, the shank s of the type-setter being connected, by a detachable rod, t, with a shoulder, u, on the rocking arm T, that is operated by the transferring-cam S.

The backward movement of the type-setter is effected by a spring, P², and the time of this backward movement is determined by a pin, r, secured to the transferring-cam S, which pin, by the revolution of the cam, is brought in contact with a foot, x, depending from the removable rod t, and, raising said rod, detaches its hooked end from the rocking arm T.

As the type-setter is operated, at each movement of the transferrer R, two detaching-pins r r are provided, one corresponding with each protuberance of the transferring-cam.

In order that the types which have been set up in the type-channel, by the forward movement of the type-setter, may not fall back when the type-setter withdraws from them, a spring-presser pawl, V, is

provided, to press upon the rear edge of the last type that is set, and hold the row erect. This spring-presser pawl is arranged in a socket in one of the walls of the type-channel C, and protrudes into the type-channel, when not forced back by the types or by the type-setter in their forward movement.

In order that the types moved by the type-drivers may not escape the action of the type-transferrer when delivered at the centre of the type-race, and that they may be properly entered into the type-channel C by the transferrer R, a gauge, Y, is provided, to co-operate with each type-driver.

As the types in this machine are driven in both directions toward the centre, two gauges, Y Y, are required, one for each pair of type-drivers. Each gauge is constructed to slide crosswise to the type-race, and parallel with the type-transferrer R, and its forward end is forked, so that one prong enters each course of the type-race.

Each gauge is operated by an inclined plane, W, fig. 6, formed upon the driver-slide O. This inclined plane, when the slide moves in one direction, draws the gauge backward out of the type-race, and when the slide is moved in the opposite direction, permits the gauge to be moved forward into the type-race by a spring, P³.

The inclined planes, which act upon the two gauges, are inclined in opposite directions, so that when one gauge is withdrawn from the type-race, out of the way of the type-drivers advancing toward the centre of the machine, the other gauge is in the type-race, directly in front of the types that are being pushed toward it by the advancing type-drivers, so that if the types happen to be skewed, they are straightened by being pressed against the type-gauge by the type-drivers.

Moreover, as the type-driver, being operated by a crank, moves almost imperceptibly for a brief period, when at its innermost position, the inner ends of the type-drivers are, for the moment, practically stationary, and constitute a guide at one side of the types, while they are moved forward by the type-transferrer R, while the gauge forms a similar guide at the opposite side of the types. The type-channel C is continued to the front of the table, and is then carried off laterally, so as to deliver the types in line at the side of the machine, where, if deemed expedient, a receiving-box may be arranged to receive them, and to move at intervals for the purpose of dividing the row of types into lines.

In using the machine, the types are placed in the type-holders, with their butts toward the front of the machine, the cam-shaft K, which transmits motion to the various moving members of the machine, is caused to revolve continuously by a force which is communicated to it by a belt applied to a belt-pulley, X, and this belt may be driven by power, or by a treadle-motion worked by the foot of the operator.

The pulley X is not fixed to the cam-shaft K, but is fitted to turn thereon, and is connected with said shaft by a friction-coupling or clutch.

This coupling consists of the plate Z, which is fitted to the squared end k² of the cam-shaft K, and is pressed against the face of the driving-pulley X by a nut, A¹.

In this construction, the pulley X drives the cam-shaft by the frictional contact of its face with that of the driving-plate Z, and if there be any impediment to the movement of the cam-shaft greater than the friction of the pulley on the driving-plate, the pulley will slip upon the driving-plate without turning it or the cam-shaft.

By turning the nut A¹, the friction may be regulated, so that if a type catches in any part of the machine, the pulley will slip; and the breakage of the instrument that is acting upon the type, or of the connections of said instrument, will be avoided.

When the cam-shaft is revolving, the operator depresses the keys corresponding with the types to be set, thereby selecting the ejecting-fingers as required, and the rotation of the cam-shaft, operating through instrumentalities before described, causes the types to be ejected by the said fingers into the type-race, to be driven to the centre of the machine by the type-drivers, to be transferred to the type-channel by the type-transferrer, and to be set up and moved forward therein by the type-setter.

As there are two type-drivers at each side of the type-channel, two types may be driven forward at once, one type being in the lower course of the race, and the other in the upper course thereof, and as the type from the upper course stands in advance of that delivered from the lower course when set up in the type-channel, care must be taken, when selecting two types simultaneously, to select the first in order from the rear series of type-holders. Thus, if the types for the word "it" are to be set up, the "i" must be selected from the rear series, and the "t" from the front series.

Each revolution of the cam-shaft will set up four types, two from each side of the type-channel, and the setting-up may be effected with great rapidity, because the compactness of the key-board, due to the arrangement of the keys in parallel lines, enables an operator to select letters without moving the hands any great distance, all the fingers and the thumbs being used to play upon the keys.

In using the machine, it is expedient to place the types which are most required, such as the vowels and quadrates, near the centre of the machine, and to use two or more type-holders for each, so that the desired type may be taken either from a front type-holder or from a rear one, and at either side of the type-channel.

The mode of imparting motion to the various members of the machine may be greatly varied, and but a portion of the improvements may be used; but it is preferred to use all the improvements in connection, as experience with the machine represented in the drawings has proved it to be well adapted to the purpose to be performed by it.

What is claimed as the invention to be secured by Letters Patent are the following combinations of instrumentalities, viz:

1. The combination of the pair of parallel series of type-holders with the type-race arranged between the pair, and with type-drivers traversing said type-race, and constructed to push the types along the same, substantially as before set forth.

2. The combination of two series of type-holders, arranged endwise to each other, with a type-race extending along both, and with type-drivers traversing said type-race in opposite directions, so as to deliver the types at a central point, substantially as before set forth.

3. The combination of two type-holders, arranged at opposite sides of a type-race, with a type-race divided into two courses, one course for the types ejected from each series of type-holders, substantially as before set forth.

4. The combination of a type-holder with an ejecting-finger, a key to select said finger, and a reciprocating carrier, operated by power separately from the key, to move said finger when it is selected, substantially as before set forth.

5. The combination of two series of type-holders with two series of ejecting-fingers and reciprocating carriers, operated in alternate succession, substantially as before set forth.

6. The combination of two series of ejecting-fingers with reciprocating type-carriers, operated in alternate succession, and with keys arranged in two gangs, one for each hand of an operator, substantially as before set forth.

7. The combination of the series of type-holders, type-race, and type-driver, with a reciprocating type-transferrer, to transfer the types from the type-race, the whole constructed to operate substantially as before set forth.

8. The combination of the series of type-holders with the type-race, type-transferrer, type-channel, and reciprocating type-setter, the whole constructed to operate substantially as before set forth.

9. The combination of the type-channel with a reciprocating type-setter and spring-presser pawl, the whole constructed to operate substantially as before set forth.

10. The combination of a type-race and type-driver with the movable gauge, substantially as before set forth.

11. The combination of the ejecting-fingers with a friction-driver for the shaft, which imparts motion to said fingers by connecting-mechanism, the whole constructed to operate substantially as before set forth.

12. The combination of the reciprocating type-driver with a friction-driver for the shaft, which imparts motion to said type-driver by connecting-mechanism, the whole constructed to operate substantially as before set forth.

13. The combination of the type-driver and movable gauge with a friction-driver for the shaft, that imparts motion to said movable gauge by connecting-mechanism, the whole constructed to operate substantially as before set forth.

14. The combination of the reciprocating type-transferrer with a friction-driver for the shaft that imparts motion to said type-transferrer by connecting-mechanism, the whole constructed to operate substantially as before set forth.

15. The combination of the reciprocating type-setter with a friction-driver for the shaft that imparts motion to the said type-setter, by connecting-mechanism, the whole constructed to operate substantially as before set forth.

In testimony whereof, I have hereto set my hand, this 11th day of October, 1867.

JOSEPH THORNE.

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