

(Model.)

J. THORNE.

5 Sheets--Sheet 1.

Type Setting and Distributing Machine.

No. 232,157.

Patented Sept. 14, 1880.

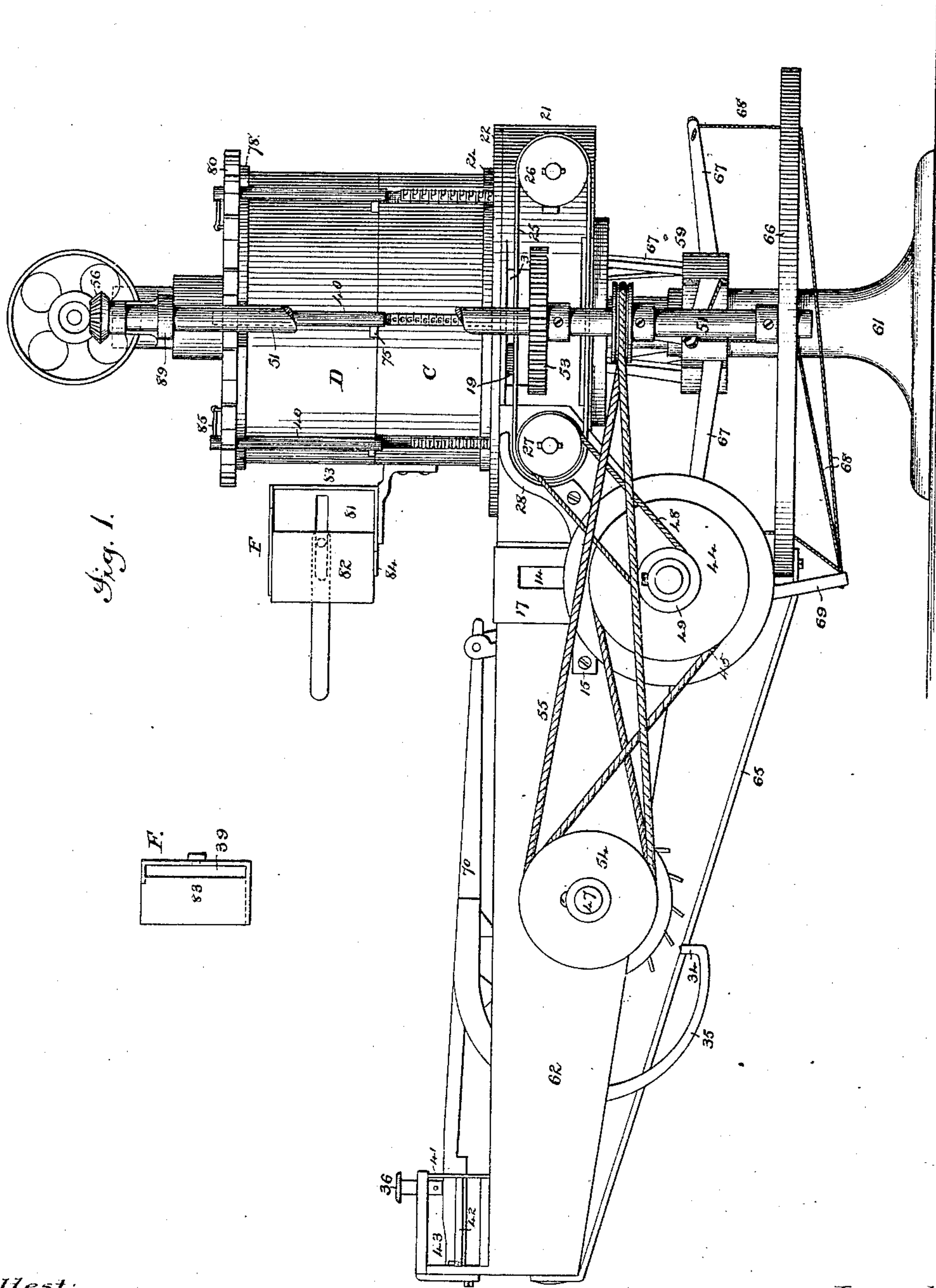


Fig. 1.

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(Model.)

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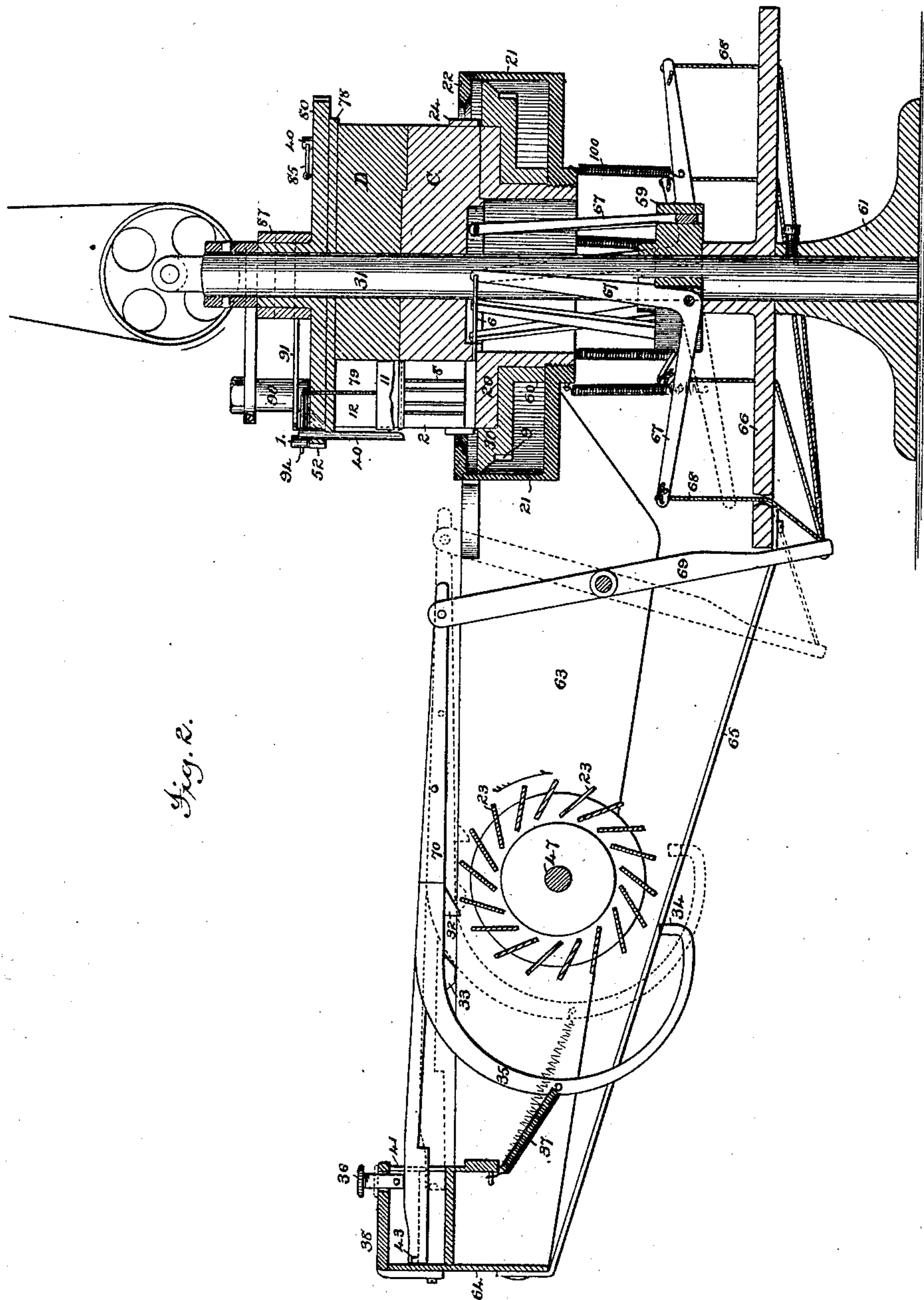


Fig. 2.

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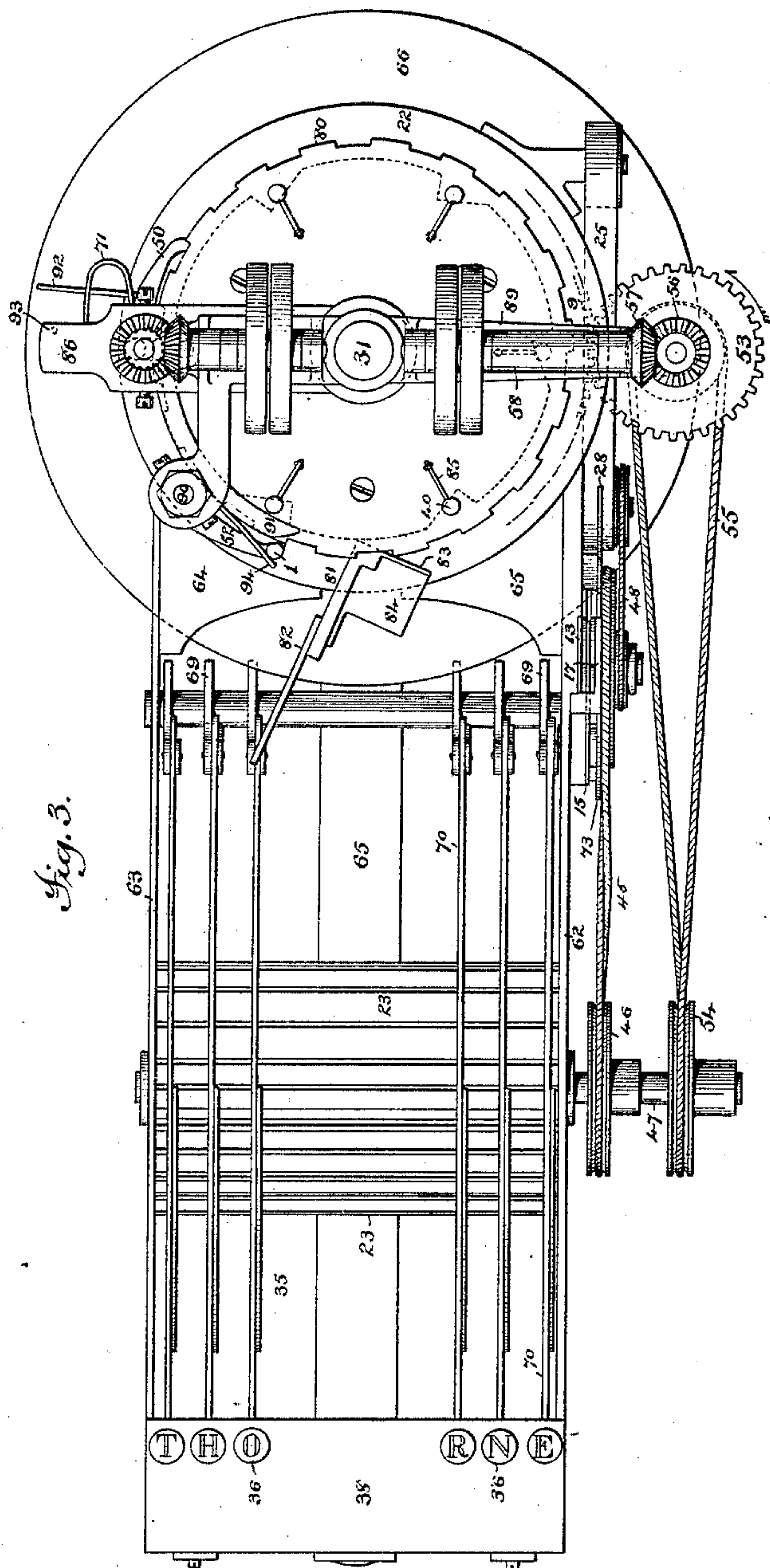


Fig. 3.

Fig. 11.

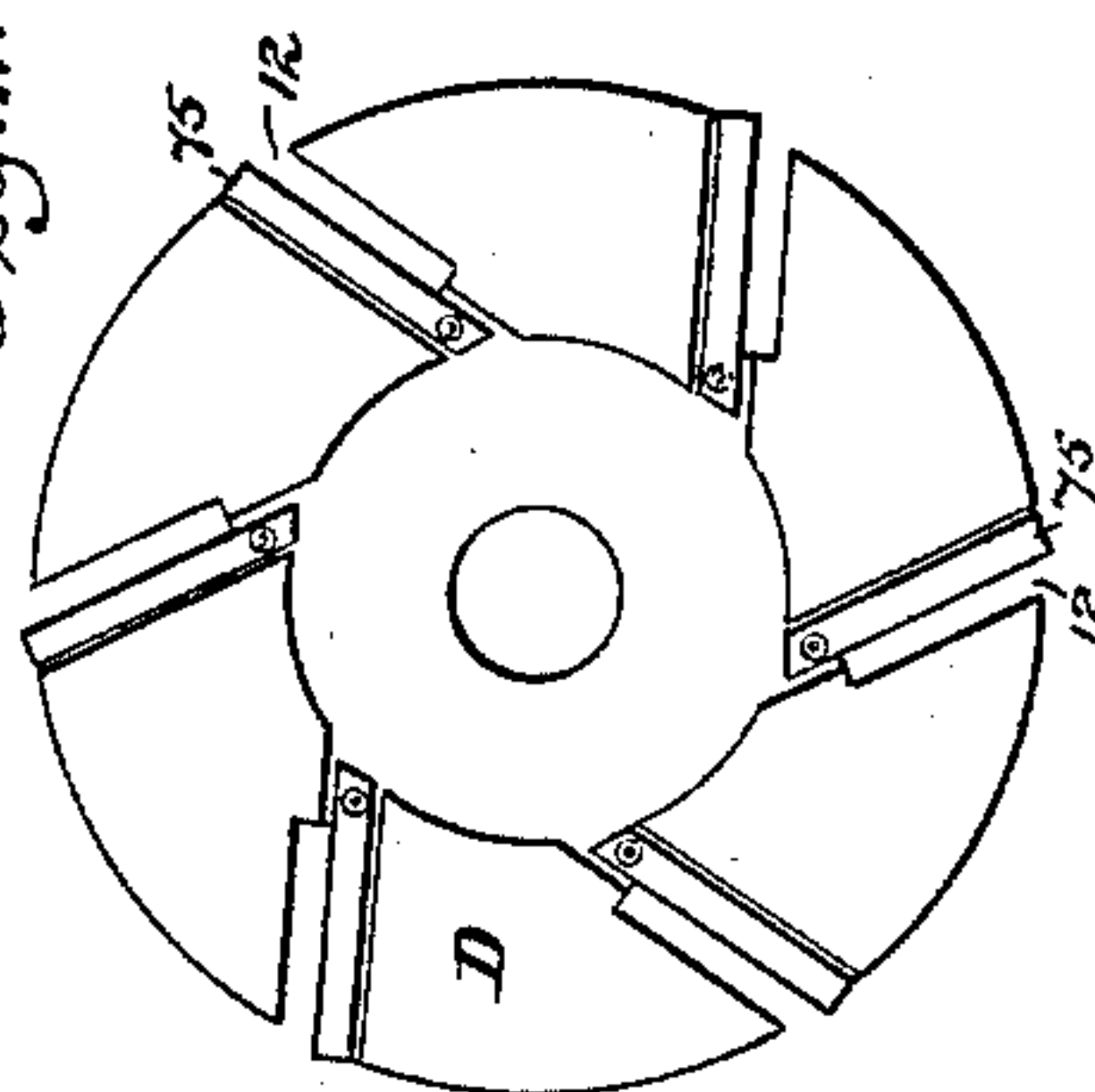


Fig. 10.

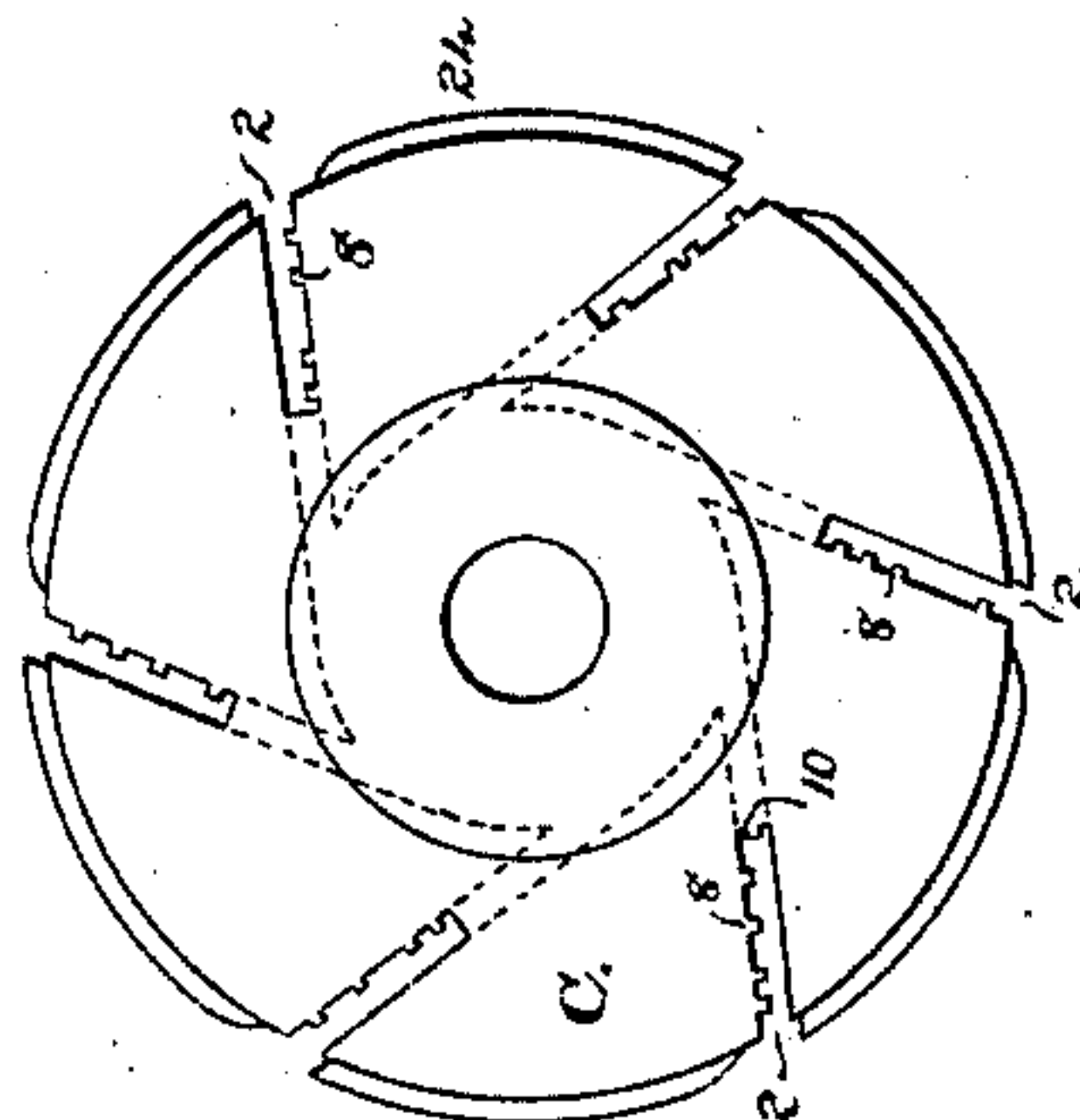
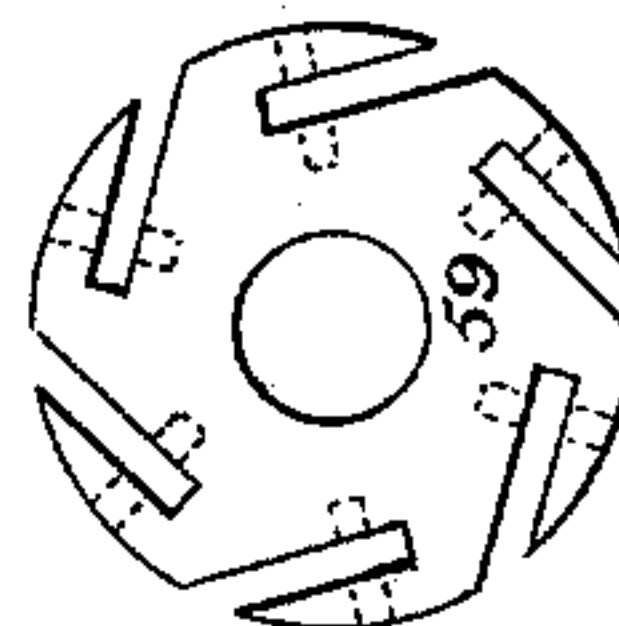


Fig. 9.



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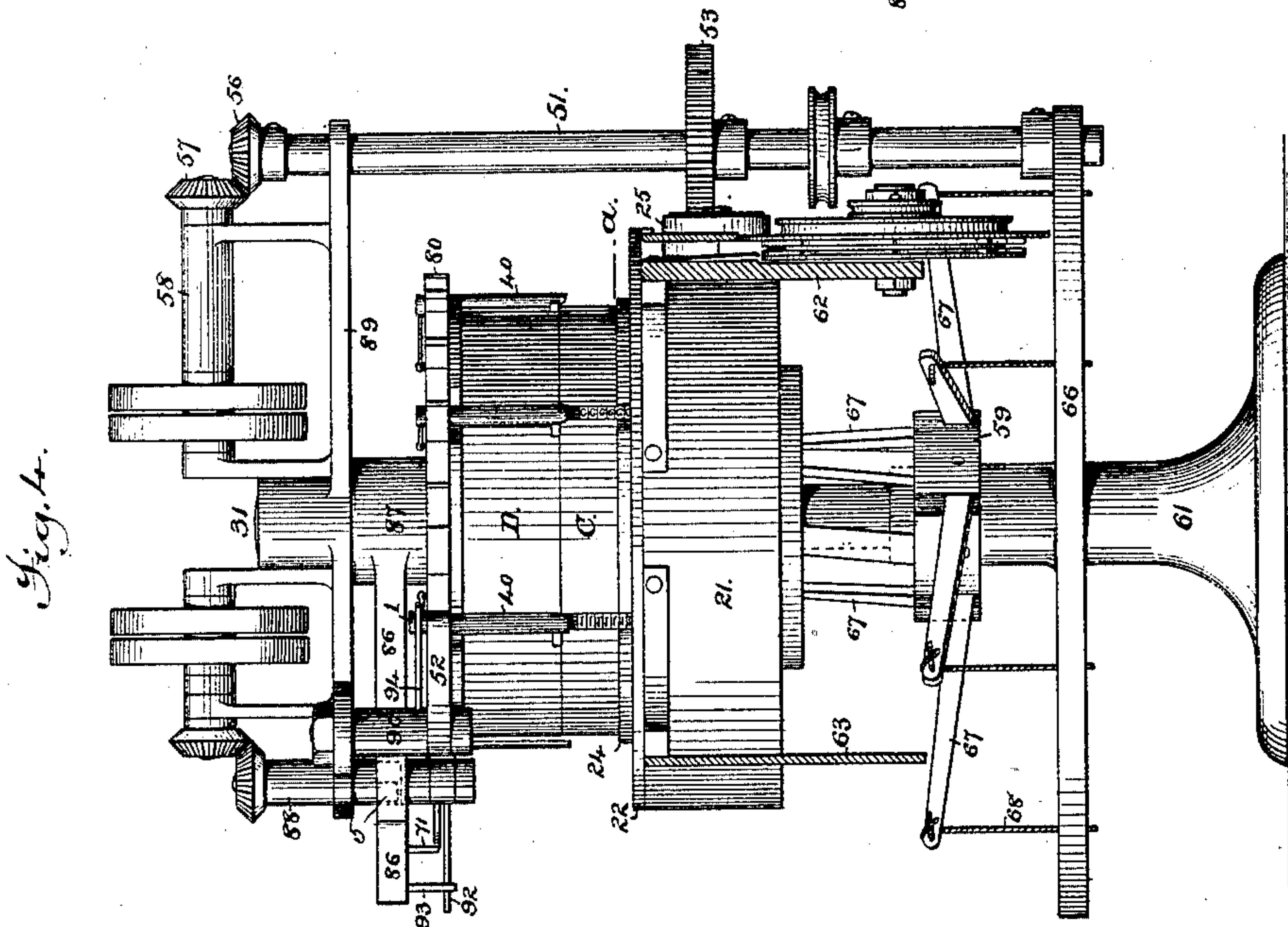
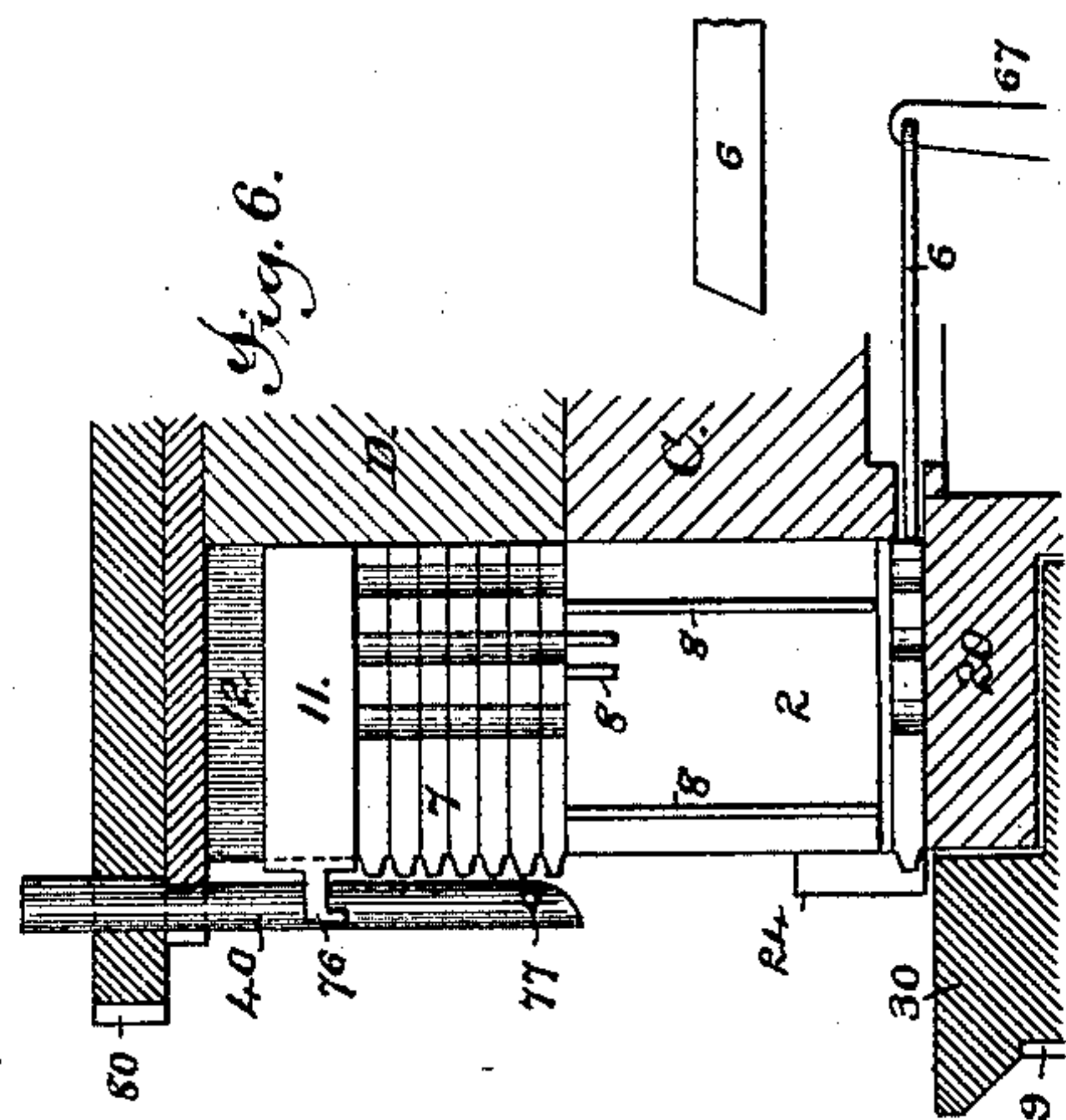
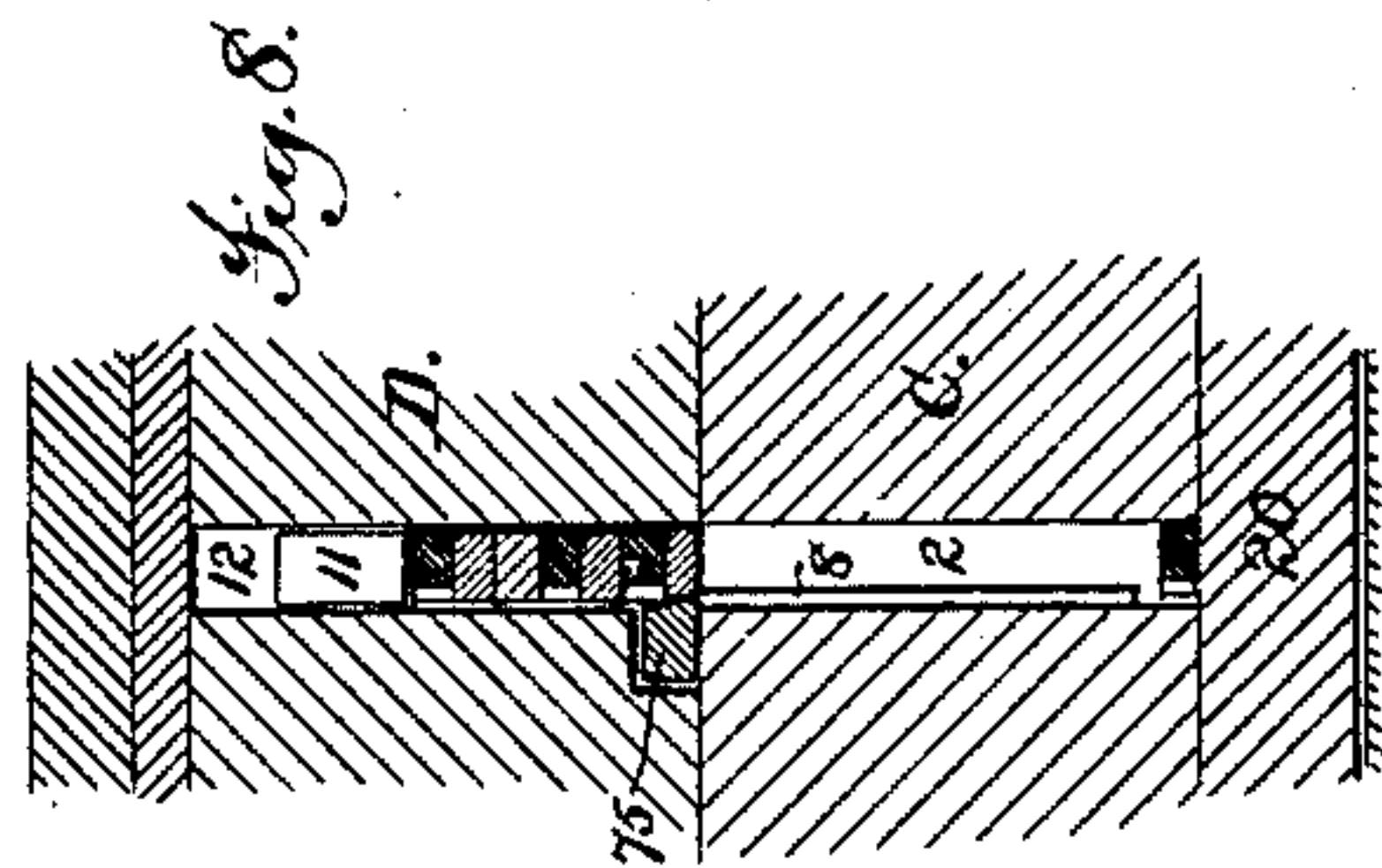
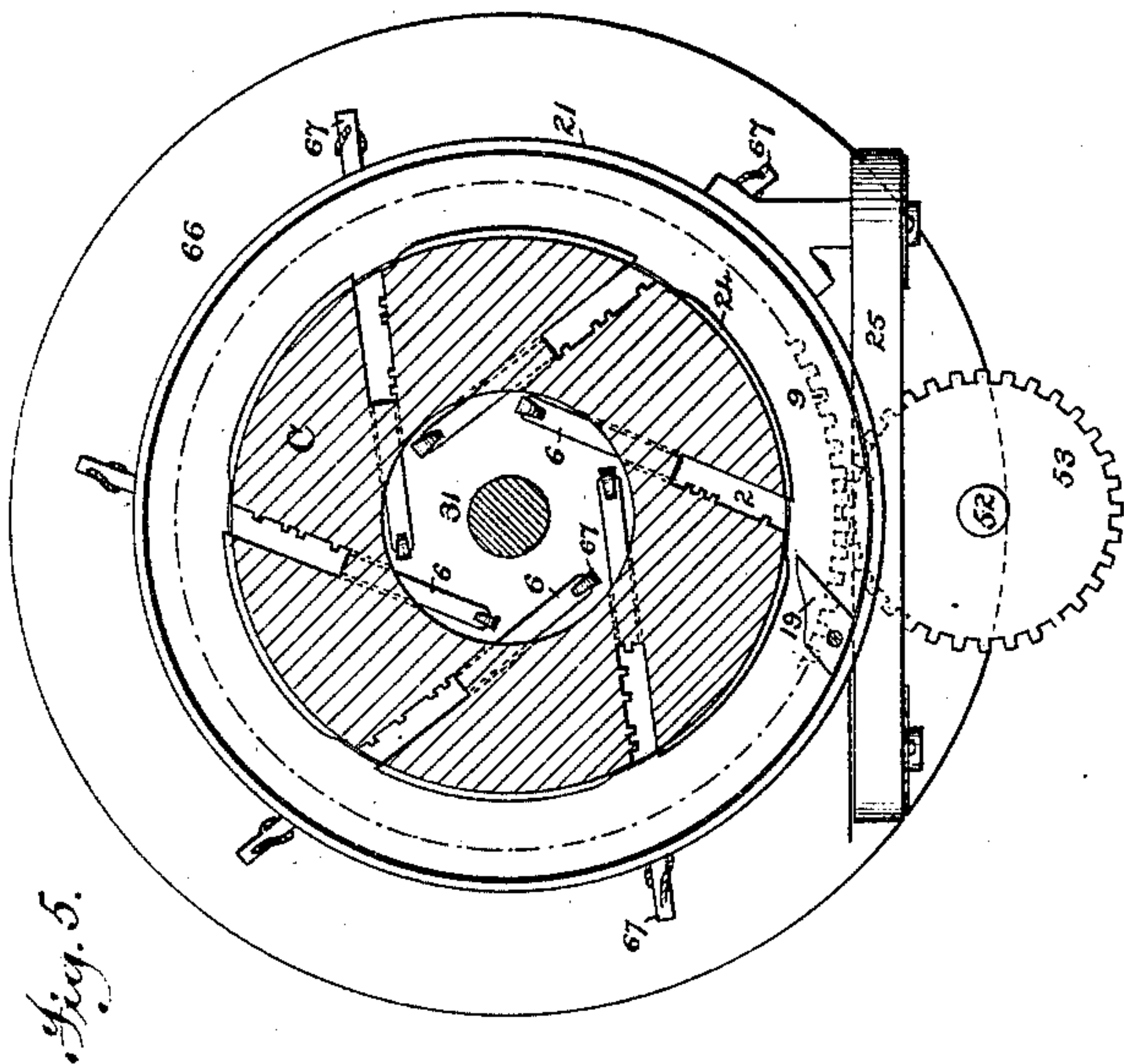
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(Model.)

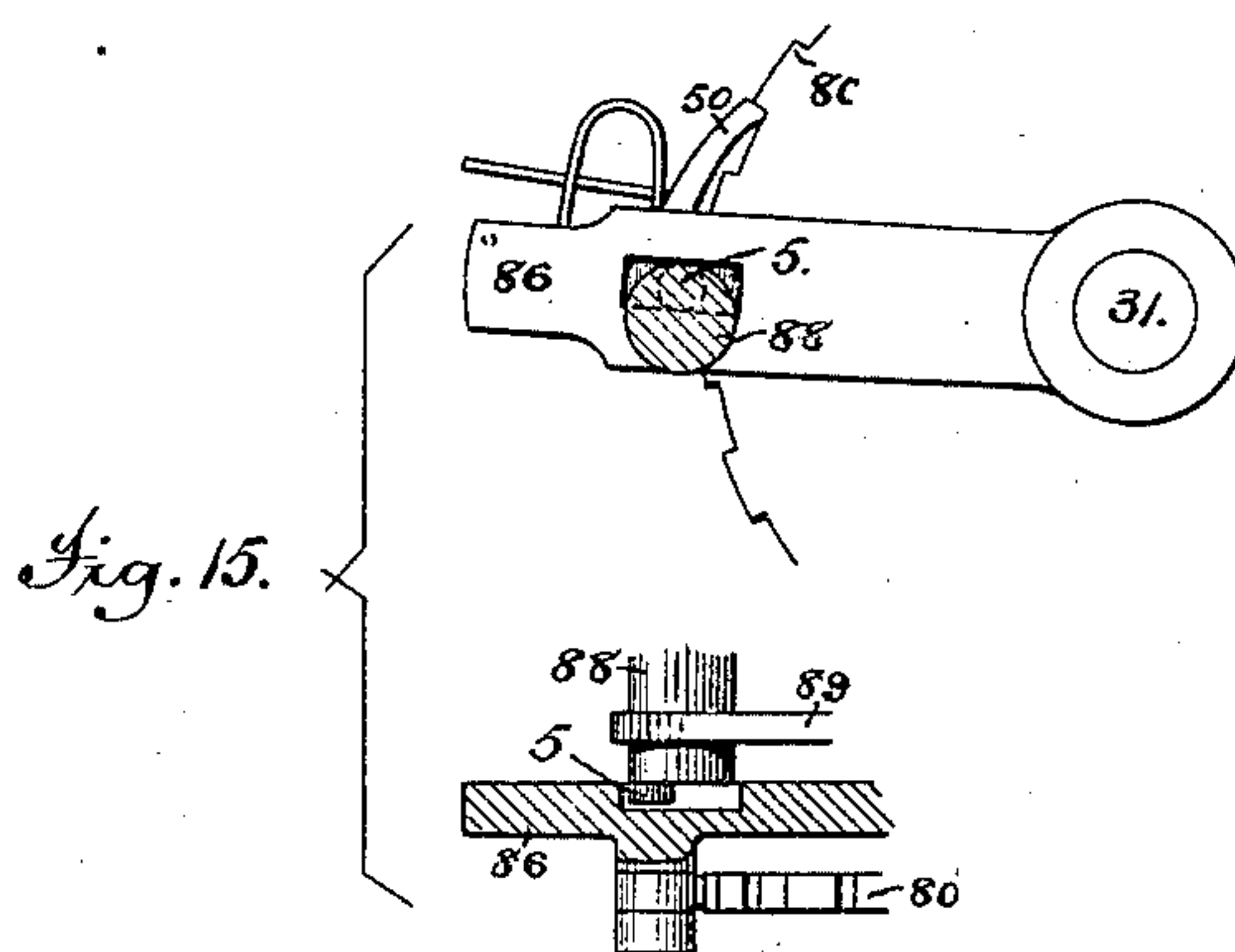
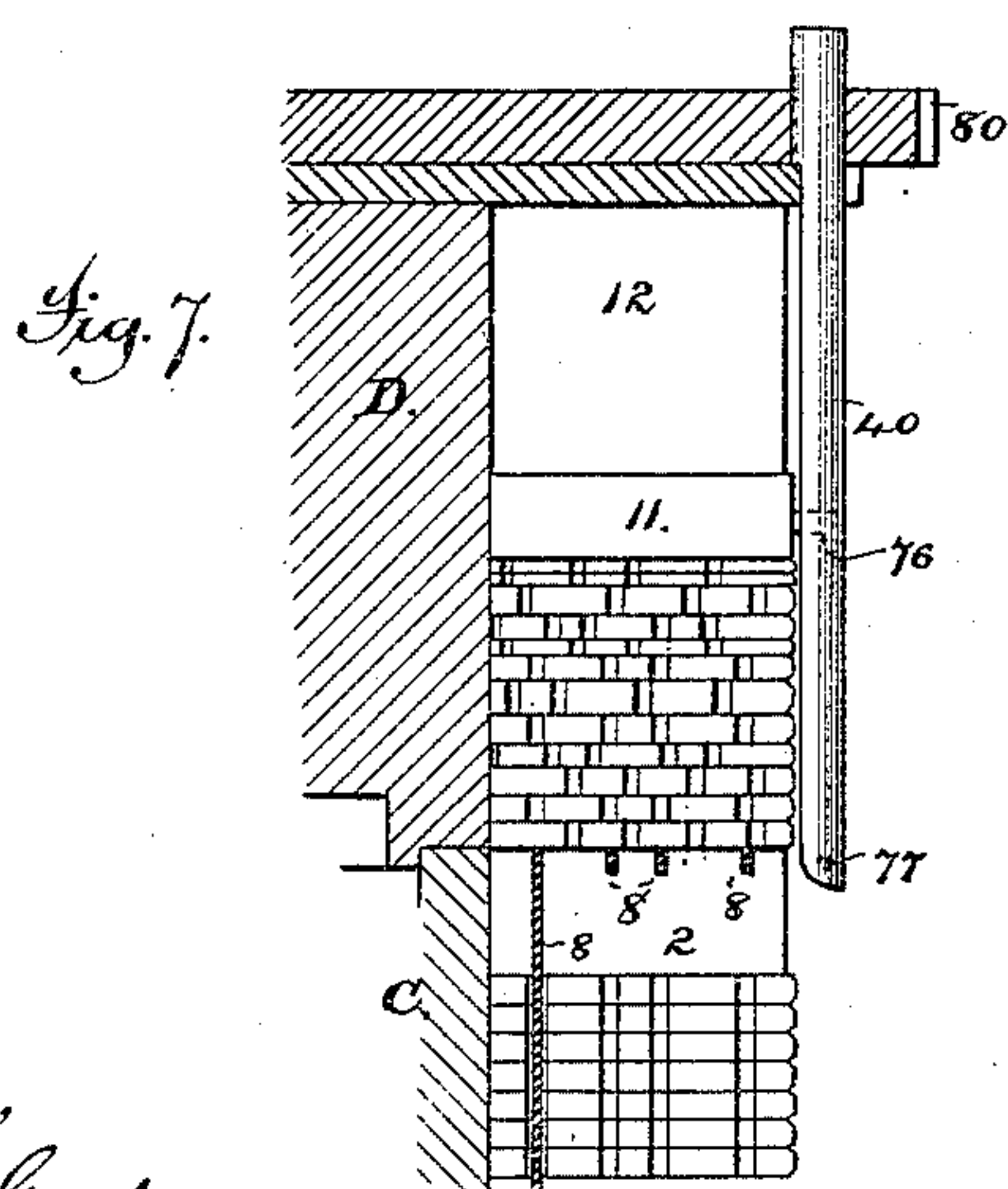
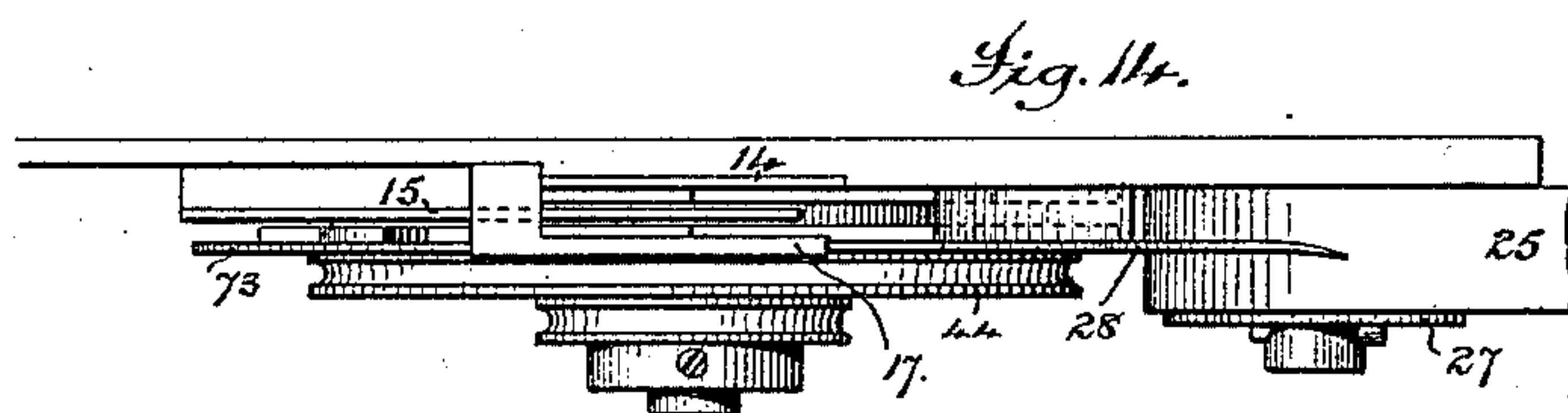
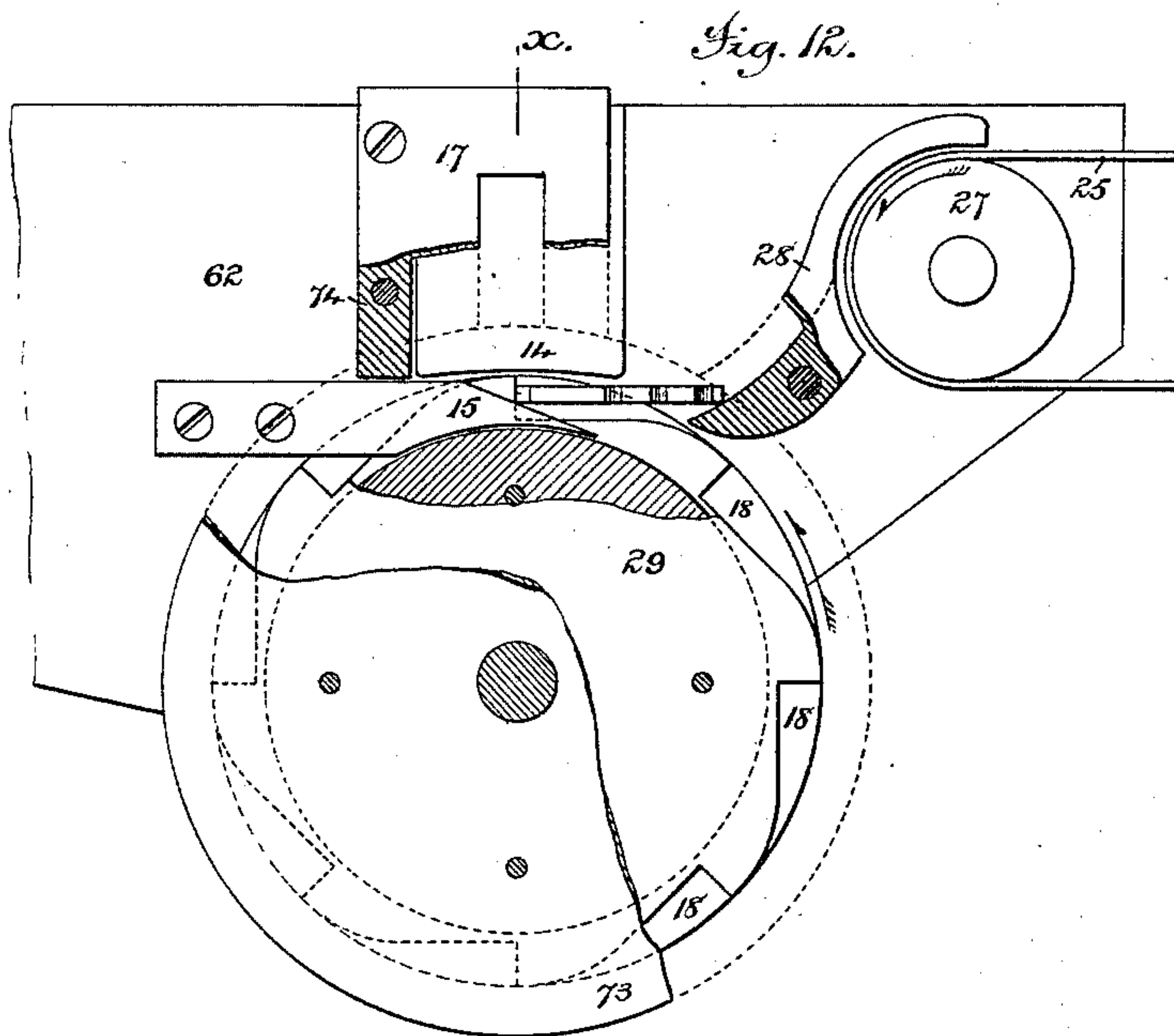
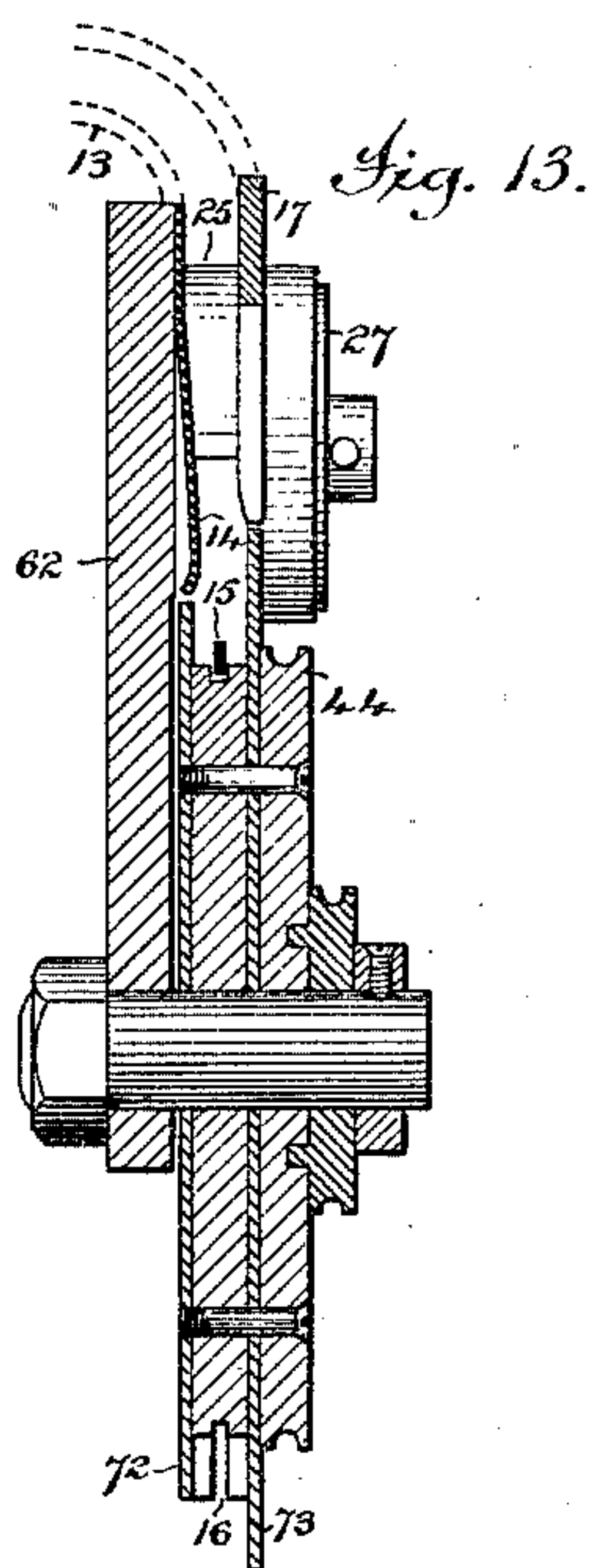
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Type Setting and Distributing Machine.

No. 232,157.

Patented Sept. 14, 1880.



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UNITED STATES PATENT OFFICE.

JOSEPH THORNE, OF PORT RICHMOND, NEW YORK.

TYPE SETTING AND DISTRIBUTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 232,157, dated September 14, 1880.

Application filed March 30, 1880. (Model.)

To all whom it may concern:

Be it known that I, JOSEPH THORNE, a citizen of the United States, residing in the town of Port Richmond, county of Richmond, and State of New York, have invented certain new and useful Improvements in Type Setting and Distributing Machines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

In said drawings a machine embodying my said improvements is represented in Figure 1 by a side elevation, in Fig. 2 by a longitudinal sectional elevation, in Fig. 3 by a top or plan view, and in Fig. 4 by a rear-end elevation. Fig. 5 is a cross-sectional plan on the line *a* of Fig. 4. Fig. 6 is an enlarged vertical sectional elevation of so much of the composing and distributing type-cases and appurtenances as is necessary to illustrate the operation of distributing type, of which Fig. 7 is a view looking in the opposite direction, and Fig. 8 a view taken at right angles to that of Figs. 6 and 7. Fig. 9 is a plan view of the hub in which the bell-cranks are pivoted. Fig. 10 is a plan view of the type-case of the composing apparatus. Fig. 11 is a plan view of the bottom of the distributing type-case. Fig. 12 is an enlarged front elevation, partly in section, of the line-forming mechanism, of which Fig. 13 is a vertical central sectional elevation, and Fig. 14 a plan view. Fig. 15 shows details of the crank-motion.

The machine embodying my present improvements comprises in its organization a type-composing mechanism the case containing the vertical type-channels whereof is stationary, and a type-distributing mechanism the case containing the vertical type-channels whereof has a step-by-step movement, which mechanisms are capable of operating conjointly or independently of each other—that is to say, the type-composing mechanism may be in operation while the distributing mechanism is at rest, and vice versa, or both mechanisms may be simultaneously in operation.

The mechanisms each embody a type-case provided with vertical type-channels adapted to contain lines of superposed types, and from the bottom ends of which the types may be removed, the remaining types gravitating ver-

tically as space is provided for such movement of them.

The type-channels in the distributing type-case have plane sides, so that they may receive lines of type composed of different letters, such as those constituting words and phrases, and the type-channels in the composing type-case are provided with wards arranged in such number and position as to provide each channel with a distinctive form that corresponds with the shape given to particular types by nicks cut into their bodies, into the upper ends of which type-channels appropriate type may enter and descend vertically, and from which channels the bottom type may be removed by an ejector, for the reason that the wards terminate at a proper point to leave the lower letter in each type-case free to be removed longitudinally.

In the arrangement of the mechanism the disposition of parts is such that gravity is utilized as a means for carrying the types into position to be operated upon by various sets of devices. Thus the types held in the distributing-case rest one upon another in the type-channels thereof, and descend therein by their gravity whenever they are permitted to move by reason of the lowest type of a line contained in such channel arriving over its appropriate type-channel in the composing-case, enters the same, and, descending therein, affords it moving space; and when a type is so caused to enter a channel in the composing-case and descends therein by its gravity it gravitates down until it rests upon the bottom of such channel, or upon other types forming a line in such channel, and when a type is ejected from a channel in the composing-case and its ejector is retracted the types remaining therein descend by gravity, so as to present the lowest one of them before the ejector.

The invention consists, primarily, in a distributing type-case constructed to move with a step-like movement in order to carry its vertical type-channels into coincidence with those of a stationary type-composing case, the mouths of the type-channels in the composing-case being provided with wards determining the character or letter that may enter them, by means of which instrumentalities the distribution of type is effected.

It also comprehends the combination, with such instrumentalities, of various devices and mechanisms for effecting the entering of composed lines of type into the channels of the distributing-case, rotating said case, and properly delivering type from its channels; for ejecting the types from the composing-case; for carrying such ejected types to the line-forming mechanism, and for forming such types into a composed line.

It also includes a peculiar key-bar-driving and type-ejector-operating mechanism and various combinations of parts, too fully hereinafter set forth to need further preliminary description.

In order to a clear understanding of these improvements, the principal mechanisms will first be described, together with their functions, in order that their conjoint action or co-operation, which will then be explained, may be the better understood.

The type-composing mechanism consists of a stationary type-case, C, preferably of circular form, that is provided with vertical type-channels 2, Figs. 5 and 6, arranged tangentially, which channels may be of any number according to the variations of the characters contained in the font or fonts used, and though these channels are shown to be few in number and are situated at wide distances apart, it will be understood that in practice the type-case C will be of such large dimensions as will enable a large number of channels to be arranged closely together with narrow walls or partitions separating them. A practical machine is thus provided with seventy-two channels in a case twelve inches in diameter.

The type-channels 2 are so formed in the type-case as to be open at their upper or mouth ends, and they are closed at their bottom ends by means of the base 20, which constitutes a rest-block supporting a line of type lying in said channels. The base 20 is, for convenience of manufacture, preferably constructed in a separate piece from the case C, and it is provided with a hollow central chamber in its under side, as is the case itself, to admit the proper movements of the bell-cranks 67, that actuate the type-ejectors. (See Fig. 2.) These type-channels are all furnished on one side with one or more wards, 8, which are variously arranged so as to correspond with nicks made in the types. Thus each channel in which the types descend by their own gravity has a peculiar form suited to the position of the nicks, and consequently to the shape of the particular type it is to hold, and such of the type-channels as are to contain types with small or narrow bodies—as the lower-case letters l, i, l, thin spaces, and the like—are also furnished at their rear ends with a ward, 10, as in Fig. 10, which fits a nick in the foot of the type, and so guides such thin type as to prevent it from turning or canting as it descends in the type-channel.

The type-conveying mechanism consists of a

type-carrying table, 30, the type-receiving surface of which lies in the same horizontal plane as that occupied by the bottoms of the type-channels formed by the base 20, is mounted so as to revolve with the center of the type-case for its center of movement, and thus is adapted to receive type from the channels 2 upon its surface and carry the same around with it in its circular path of travel.

A circular vertical guard, 21, forms the outward limit to which the types may be forced or moved, said guard being fixedly attached to the base 20, and so as to project slightly above the face of the table 30—that is to say, to a height at least equal to the thickness of the largest type used in the machine, and said vertical guard is supplemented by a horizontal guard, 22, that is fixed upon it so as to project inwardly and nearly cover the type-race that is formed by the type-case, the table, and the vertical guard.

The lower end of the type-case is furnished with guards 24, covering the space between the type-channels, that prevents type in process of composition from turning rearwardly and becoming jammed between the guard 21 and the type-case C or the types in its channels, as will more fully hereinafter appear. The said raceway is provided with a throat, 3, cut through the guard 21, at one end of which throat is placed a deflector, 19, that has an inclined guiding-face and rigidly projects from the guard 21, so as nearly to cross said raceway.

As shown herein, the revolving type-carrying table 30 is constructed in the form of a ring, from the bottom of which a hub, 60, projects inwardly to embrace the contracted circular portion of the base 20, which thus provides the axial bearing for said table, and the proper vertical position of this table is maintained by means of the horizontal bearing-surfaces provided by the under face of the base 20 and the upper face of the vertical guard 21.

The type-case C and the mechanisms and devices sustained by it are supported in place by means of a central shaft, 31, that is fixedly mounted in a bed-piece, 61, and by the framework that carries the keys and their mechanisms, the side plates, 62 63, of which framework are attached to the vertical guard 21, while its head-plate 64 is connected, by a brace-bar, 65, to a disk, 66, that is fixed to the bed-piece 61 or to the shaft 31.

The means for revolving the type-carrying table 30 is a vertical shaft, 51, journaled at one side of the machine in the disk 66, and a cross-bar, 89, projecting from the shaft 31, which shaft 51 carries a spur-wheel, 53, that engages the toothed perimeter 9 of said table. This shaft 51 may be revolved in any suitable way, as by means of bevel-gears 56 57 from a cross-shaft, 58', properly mounted above the machine, and supplied, as usual, with a driving and a loose pulley.

The type-ejecting mechanism is constructed

as follows: Each type-channel of the type-case C is provided with a type-ejector, 6, each of which ejectors consists of a flat plate of metal of a width adapted to that of the type-channels and of a thickness less than that of the type it is to operate upon. These ejectors all have beveled face ends, and are carried at the ends of bell-crank levers 67, that are pivoted in recesses of a fixed hub, 59, and held normally in the positions shown in Fig. 2 by springs 100, the movement of which bell-cranks causes the ejectors to reciprocate horizontally in the bottom ends of said type-channels, and during each forward movement to push the lowermost type out of a channel onto the revolving type-carrying table, and during each rearward movement to clear the channel, so that the types remaining therein may gravitate to present the lowermost type before said ejector. The face ends of these ejectors are beveled from front to rear, (see detached view, Fig. 6,) so that as they press the types forward and the same have sufficiently cleared the sides of the type-channels they will cause such type to incline forward, or in the direction of the travel of the carrying-table.

The bell-cranks 67 are attached, by means of cords 68, fast to the lower ends of rocking levers 69, to the upper ends of which latter the key-bars 70 are pivoted. These key-bars are provided about centrally with tappets 32 33, attached to their bodies so as to be above the plates 23 of a rotating type-bar driver, and with a tappet, 34, that is carried by a curved arm, 35, so as to be below the plates 23 of said type-bar driver. This rotating type-bar driver consists of suitable heads attached to a carrying-shaft, 47, and provided with a multiplicity of angularly-arranged plates, 23, and it is constantly rotated by means of a pulley, 54, and a belt that runs over a pulley on the vertical shaft 51. The key-bars are capable of being moved vertically as well as horizontally, and when carried downward their tappet 32 will be engaged by one of the revolving plates 23, which will thus move the depressed key-bar forward and carry its tappets 33 and 34 into their foremost position. When the key-bar is thrown so far forward that the plate 23 which propelled it passes off from the tappet 32 it will have brought its tappet 33 into a position to have its rear face engaged by another of the plates 23, which plate, in moving over the inclined rear face of said tappet 33, presses the same upward and raises the key-bar to which it is attached, thus lifting the tappet 34 high enough to be engaged by one of the plates 23, which will then, by means of the arm 35, carry the type-bar back to its rearward position, when it will be held by its sustaining-spring in the raised position shown in Fig. 2. Each of these key-bars has its front end guided in a vertical slot in the plate 41 and the division-plate 42 of the key-board frame, and it carries at its front end a small cross-stud, 43,

that will pass through a slot at the front end of the division-plate 42 when the key-bar is pressed downward, and forms a riding-guide bearing against the under side of the division-plate 42 as the key-bar is carried rearward or inward. At its rear end this division-plate has another slot that permits the upward passage of the stud 43, and consequently allows the key-bar to rise at the end of its rearward stroke, so that it may be moved forward with its stud 43 riding upon the top of said division-plate.

Each key-bar is surmounted by a key, as 36, which keys are held in vertical guide-slots in the top-plate, 38, of the key-board frame, and so as to rest upon the upper surfaces of the key-bars.

When a key is depressed it forces a key-bar downward, thus bringing its tappet 32 into position to be engaged by one of the plates 23, the slot in the front end of the division-plate causing the stud 43 not to obstruct such movement. When a key-bar, 70, is thus moved downward a plate, 23, engages its tappet 32 and forces the bar rearward by a positive movement, the stud 43 then bearing against the under face of the division-plate 42, and with it acting as a guide, holding said key down and the tappet 32 in engagement with the said plate. The rearward or inward movement of a key-bar, 70, moves a lever, 69, and rocks a bell-crank, 67, the latter forcing a type-ejector, 6, outward and causing it to expel a type from its type-channel. The type thus ejected is received upon the rotating carrying-table 30, and is carried around with it face foremost, said type being forced outward against the guard 21 by centrifugal action imparted to it by the rotating table 30 until it reaches the throat 3, through which it is propelled onto a type-conveying belt, 25, running over pulleys 26 27, which is arranged to travel with its edge in the same plane as that of the table 30, so as to properly receive the type therefrom without canting the same. Such of the ejected types as are not thus propelled against the guide 21 will be engaged by the deflector 19, that stands across the race-way, the inclined guiding-face of which deflector will direct said types off from the table through the throat 3 in the guide 21 and onto said carrying-belt. This belt travels at a speed slower than that of the carrying-table, and thus conveys the type to an inclined guiding-chute, 28, whence it is conveyed to the line-forming mechanism with a momentum that will not cause its face to be battered or injured.

The line-forming mechanism consists of a type-carrying wheel, a type-elevator, and a setting-stick.

The type-carrying wheel 29 has a number of steps or receivers, 18, cut in the periphery of its body, each step or receiver having its sides formed by the projecting flanges of disks

72 73, carried on opposite faces of said wheel, and being of the proper size to receive and support a single type.

The type-elevator 15 is formed by a narrow plate of metal having an inclined forward portion, and it is fixed to the side frame so as to stand in a groove, 16, that is cut into the periphery of the wheel 29, so that its point is constantly below the surface of each step or receiver 18, where it will intercept a type supported in the same and elevate it into the setting-stick above it. This setting-stick is formed by a bar, 74, and side plates, 13 17, fixed to the plate 62 of the frame-work of the machine. The plate 13 terminates at its lower end in an inwardly-pressing spring, 14, that just clears the perimeter of the disk 72, and the plate 17 has a lower edge adapted to fit over the perimeter of the disk 73, a continuous guideway being thus formed from the steps or receivers 18 to the setting-stick.

The type-carrying wheel is rotated in proper time by means of a pulley, 44, fast upon its side, and a belt, 45, running over it, and a pulley, 46, fast upon the shaft 47 of the type-bar driver, and the pulley 27 is actuated by a similar belt, 48, running over a pulley, 49, attached to the shaft of the pulley 44.

The type-distributing mechanism is constructed as follows: A circular type-case, D, is provided with vertical type-channels 12, equal in number and position with those of the setting-case C, and is arranged to revolve on the shaft 31 with a step-by-step movement, so that its type channels will at each movement of it be carried into a position of register with those of the type-composing case C, where the channels of the cases C and D stand in the same vertical planes and form continuations of each other. These type-channels are of a width that is suited to the bodies of the largest types that may be used in the machine. They are provided at the forward sides of their bottom ends with frictional drag-blocks 75, (see Fig. 11,) which are pivoted at their inner ends to the case D, (see Fig. 11,) and play in recesses provided for them, their faces being beveled, (see Fig. 8,) so as to bear upon the thinnest as well as the thickest type. The outer or front sides of these channels are open for the purpose of receiving the line of type each is to hold, as well as to enable the said line to be readily reached and freed from any disarrangement it may receive, and these open sides of the channels are protected by flat-faced fenders 40, that depend in front of them and form guides against which the face of the lines of type may bear as they descend in the said channels, the flat faces of said fenders being held in proper relation to the type-channels by means of properly-shaped sockets in the plate 78.

Each channel, 12, is provided with a weight or follower, 11, that fits the channel, and, resting on the top of a line of type therein, insures

its proper descent, the said follower being provided on its outer end with a stop, 76, that engages a stud, 77, fixed at a proper point on the fender 40, so that said follower may be raised with the fender. This, however, may be accomplished by suspending the followers by a cord, 79, running through the top plate, 78, and wheel 80, and attached to arms 85, extending from the upper ends of the fenders 40. (See Figs. 2 and 3.)

The rotative step-by-step movement of the distributing-case is accomplished by means of a toothed wheel, 80, attached to the top plate, 78, of the said case, in the teeth of which an actuating-pawl, 50, engages. This pawl is pivoted to the under side of a rocking arm, 86, that in turn is journaled to its hub 87 on the hub of the wheel 80, said pawl being pressed forward to duty by a spring, 71. The arm 86 is vibrated, and with it the pawl 50, (see Fig. 15,) by means of a crank-pin, 5, carried by a vertical shaft, 88, that is journaled in the cross-bar 89 and otherwise supported as may be necessary, which crank-pin engages in a slot in the said arm 86, so that each revolution of the shaft will cause a vibration of the pawl 50, and hence move the wheel 80 one tooth and carry the type-channels 12 of the type-case D from one position of register with the type-channels of the type-case C to another such position.

In order to limit and determine the forward movement of the wheel 80, a stop-pawl, 52, is provided, such pawl being pivoted to a spindle, 90, carried by the cross-bar 89, and held to duty by a spring, 94, that bears against a toe, 1, on its end. This pawl 52 engages against one of the teeth of the wheel 80 as such wheel reaches the end of its part rotation at each step-like forward movement, and remains in that position until the backward movement of the carrying-arm 86 is being accomplished, during which backward movement, by means of an unlocking-arm, 91, rigidly connected to the said carrying-arm 86, which thus has its curved face engaged with the stud 1 and pressing the same outward, the said pawl 52 is withdrawn from engagement with the wheel 80, thus permitting the forward movement of the pawl 50 to engage with and press forward the wheel 80, as before. This pawl 52 is thus disengaged from the wheel 80 during a part of the forward movement of the pawl 50, but is released by the arm 91 in proper time to engage the said wheel and limit its rotation. By these means, so long as the shaft 88 is rotated the case D will have slight rotation imparted to it step-like in character, and hence will have its channels 12 successively carried into register with the channels 2 in the type-case C, a single revolution of the case D sufficing to carry each separate channel it contains into register with each separate channel contained in the case C.

If it is desired at any time to arrest the movement of the type-case D without stopping

the movement of the shaft 88, as will be the case practically, it may be done by holding the pawl 50 out of position to engage with the teeth of the wheel 80. This is provided for by means of a spring-bar, 92, that projects from said pawl, and which may be rested against a pin, 93, projecting from the bar 86. Thus held the pawl 50 will move inoperatively with said bar.

It is to be observed that the throw of the pawl 50 is such as to always carry the channels 12 over the channels 2, and that the pawl 52 holds them in such position; and, further, that though the spring-bar 92 may be carried behind the pin 93 before the forward stroke of the pawl 50 is finished, the friction between the end of such pawl and the tooth of the wheel 80 will be sufficient to cause such pawl to finish its forward stroke before it is withdrawn from engagement with such tooth.

A line-feeding device is arranged to deliver lines of type into the channels 12. It consists of a galley, F, fixed upon a bracket attached to the case C in such a position that the vertical feeding-plate 82, that slides upon its end plate, 81, will push the forward line of type, forming part of a mass of matter held within the galley by being supported upon the plate 84 and against the side plate, 83, endwise through the slot 39 in said side plate, 83, and into one of the type-channels 12. This galley will be constructed of a height sufficient to accommodate a mass of types the composed lines of which are nearly as long as are the channels 12, which types will rest upon the bottom plate, 84, and be pressed forward against the end plate, 81, and before the feeding-plate 82 by a sliding follower, in a manner common in this class of devices.

Operation: To charge the type-channels 12 of the distributing-case D it is stopped at the forward end of one of its step-like movements by suspending the action of the pawl 50, which is done by placing its spring-bar 92 behind the stud 93. The channel 12, then standing before the galley F, is opened by raising its fender 40, and with it the weight 11. The forward line of a body of types, 7, in the galley F is then pushed forward by the feeding-plate 82, and the type composing it pass feet foremost into said channel. The fender 40 is then replaced by being lowered into place, which movement of it allows the weight 11 to descend and rest upon the line of types 7 in the channel 12. (See Fig. 6.) A rotative movement of the case D will bring other channels successively in front of the galley F, to be in like manner charged with lines of types, in which will be contained the various characters composing words. As the type-case D is revolved it carries the lines of types in its channels 12 with it, said types gravitating or pressing downward and resting upon the upper face of the case C as the channels 12 are moved from one position to another over the channels 2; and as each character or letter is provided

with nicks peculiar to itself, which correspond in position with the wards 8 in the particular channel 2 designed to receive a given character, it follows that when the bottom letter contained in a type-channel, 12, is brought over its appropriate channel 2 it will, by reason of its nicks coinciding with the wards 8 of such channel 2, enter into such channel and descend therein until it lies on top of the line of types already accumulated therein, and whenever the bottom letter of a line of types in a channel, 12, is a character not belonging to the channel 2 which it overlies, it will, by reason of the non-coincidence of its nicks with the wards of such channel, be supported by the upper faces of such wards, aided by the frictional drag-block, and thus make no movement of descent. So long as there are types in the channels 12 and the step-like movement of the case D is kept up said types will be brought over their appropriate channels 2 and enter therein, thus filling said channels 2 each with letters of like character; and whenever one or more channels 12 have discharged their types the case may be stopped and said channels be recharged with lines of type. The channels 2 of the composing-case are thus automatically supplied with appropriate letters, each channel containing like characters. To set or compose these so as to form words is accomplished by the operator touching the keys 36 in proper succession. Each key depressed sets its key-bar 70 downward far enough to have its tappet 32 engaged by one of the plates 23, and thereby be forced positively forward to reciprocate the appropriate one of the ejectors 6. This movement will necessarily be a rapid one, and the lowermost type of a line of them in such channel 2 will be thrust face foremost out into the raceway and upon the revolving carrying-table 30. As the main portion of the body of the outwardly-moving type comes onto the surface of the table, and is thus mainly free from the walls of the type-channel 2, the beveled end of the ejector causes its head to turn forward, or in the direction the table is moving. It thus receives a correct initial direction to cause it to be carried properly forward by the carrying-table. In this forward movement of the type upon the carrying-table the centrifugal action of such table tends to throw the type outward to the guide 21, against the face of which such type travels as it is carried onward toward the line-forming mechanism. The ejected types will generally take the movements described; but sometimes, as practice has demonstrated, there are letters which will leave the guide 21 and move, heads foremost, toward the case C. In so moving these types come into contact with the guards 24 and are by them redirected into proper position. The types thus ejected from their channels enter successively onto the table and lie thereon, one behind another. As the table rotates and brings these types against the deflector 19 its inclined face acts as a guide,

forcing such type to move outward through the throat 2 and onto the belt 25, the motion of which, aided by that imparted to the types by the table, causes them to enter, head foremost, into the chute 28. This chute guides them downward into one of the receivers 18 of the wheel 29, where they overlie the elevator 15, and as the type is carried onward under the setting-stick by the rotation of the wheel 29, aided by the inclined face of the chute 28 and the rising part of the wheel 29, that forms the base of the succeeding elevator, the said type is caused to rise into the setting-stick, where it is supported by the elevator and the spring 14. As each type is thus forced into the setting-stick it is pressed against those that have preceded it, and with them forms a line.

The stick may be continued for any length and be twisted so as to conduct the line of types in any direction, or to a position convenient to enable such line to be adjusted in column or page form as a body of printing-matter.

The deflector 19 is not an essential element in the composition of types, though it is useful in directing such types as have not traveled far enough to, or otherwise have failed to, receive sufficient centrifugal movement to project them against the guard 21. If dispensed with, however, that portion of the type-case C nearest to the throat 3 would be without type-channels 2.

As the types are carried by the table 30 to the point where the throat 3 is provided the centrifugal force imparted to the types will cause them to pass bodily through such throat and onto the belt 25, and the forward movement of the belt will carry them to the line-forming mechanism. Though this belt has been described as delivering such types to the chute 28, it is obvious that such chute may be omitted and the belt 25 extended forward over a small pulley set near the peripheral line of the wheel 29, and thus wholly convey the types from the table 30 to the receivers of said wheel.

The type-channels might be arranged radially in the type-cases or in any other angular position with respect to each other and the type-carrying table; but it is preferable that they shall lie so that when they deliver the types onto the table such types shall be pointed in the general direction they must travel with such table.

The type-cases may, of course, be polygonal in their peripheral outlines, and yet have vertical type-channels arranged at an appropriate angle therein.

The type-distributing case might be constructed in such form as to adapt it to receive a vibrating or reciprocating movement over a similarly-arranged type-composing case, the carrying-table being appropriately moved.

The vertical guard 21 is not essential to the perfect operation of the apparatus, and may therefore be omitted if the table 30 is made

wide enough to prevent the types ejected upon it from being thrown over its edges. Practically this could be done only at the sacrifice of speed, and it is preferable, therefore, to employ the guard, and thus make the machine compact and effective.

The horizontal guard 22 is not essential to the perfect operation of the apparatus; but as it is desirable to avoid the possibility of the ejected types either jumping out of the machine or being turned over on the carrying-table, it is preferable to employ such guard, the function of which is to prevent such defective operations.

Any other structure of parts for actuating the type-distributing case and the other rotating parts may be employed.

What is claimed is—

1. A distributing type-case having vertically-arranged type-channels in which the types descend by gravity, and which is constructed so as to move with a step-like action, whereby its said type-channels are periodically brought into register with and to a state of rest over the type-channels of a composing-case, all substantially as described.

2. The combination, with the vertical type-channels of a composing-case which are constructed with wards determining the character or letter which may enter them, of a distributing type-case provided with vertical type-channels, each adapted to contain types bearing various characters, which distributing type-case is constructed to be moved with a step-like action, so as to periodically bring its channels into register with and to a state of rest over those of the composing-case, all substantially as described.

3. The combination, with the stationary composing type-case C, having vertical channels 2, that are provided with wards governing their mouths, of the distributing type-case D, having vertical type-channels 12, and provided with means for imparting to it a step-like rotative movement, all substantially as described.

4. The combination of the horizontally-moving distributing type-case D, having vertical channels 12, with the stationary composing type-case C, having vertical channels 2, that are provided with wards governing their mouths, and with horizontally-reciprocating type-ejectors, substantially as described.

5. The combination, with the horizontally-moving distributing type-case D, having vertical channels 12, the stationary composing type-case C, having vertical channels 2, that are provided with wards governing their mouths, and with horizontally-reciprocating type-ejectors, of the horizontally-moving carrying-table that transfers the ejected types to the line-forming mechanism, substantially as described.

6. The combination, with the type-channels, of the distributing-case having open outer or front sides, and in which channels the types gravitate, of the removable fenders arranged

a distance from said open sides, whereby the types may be introduced into and held in the channels and the condition of the same inspected, substantially as described.

5 7. The combination, with the vertical type-channels of a moving distributing-case, of the frictional drag-blocks 75, substantially as described.

10 8. The combination, with the type-channels of a stationary type-composing case, of a distributing type-case arranged to move over the same, the type-channels whereof are provided with frictional drag-blocks, substantially as described.

15 9. The combination, with the channels of the type-distributing case, of a line-feeding device consisting of a galley fixedly supported vertically before said type-case and at an appropriate angle relative to its type-channels, and provided with a feeding-plate, substantially as described.

20 10. The combination, with a composing type-case having vertical type-channels from which the types are ejected, of a horizontally-moving table that receives the types and carries the same to the line-forming mechanism that communicates with the edge of the said table opposite to that upon which the types are received, substantially as described.

25 11. The combination, with a composing type-case having vertical type-channels and type-ejectors reciprocating therein, of a horizontally-moving type-carrying table and a conveying-belt, as 25, substantially as described.

30 12. The combination, with a composing type-case having vertical type-channels and type-ejectors reciprocating therein, of a horizontally-moving type-carrying table and a type-conveying chute, the said table receiving the types at one edge of its surface and delivering them to the chute over the opposite edge, substantially as described.

35 13. The combination, with a composing type-case having vertical type-channels and type-ejectors reciprocating therein, of a horizontally-moving type-carrying table, a carrying-belt, as 25, and a conveying-chute, substantially as described.

40 14. The combination, with a composing type-case having vertical channels 2, ejectors reciprocating therein, and rotating type-receiving carrying-table, of a guard, as 21, situated a distance in front of said channels and having a throat at 3, substantially as described.

45 15. The combination, with the composing type-case, the horizontally-moving type-carrying table, and the conveying-chute 28, of the deflector 19, the said table receiving the types at one edge of its surface and delivering them to the chute over an opposite edge, substantially as described.

50 16. The combination, with the type-case C and the ejectors 6, that reciprocate in its type-channels, of the horizontally-moving type-receiving carrying-table 30, and a guard, as 21,

that is situated a distance in front of said channels, substantially as described.

17. The combination, with the type-case C and the ejectors 6, that reciprocate in its type-channels, of the horizontally-moving type-receiving carrying-table 30 and guards 21 22, substantially as described. 70

18. The combination, with the type-case C, its type-channels, and type-ejectors, of the moving carrying-table 30 and the guard 24, substantially as described. 75

19. The combination, with the vertical type-channels and a receiving-table, of the type-ejectors having beveled ends, substantially as described. 80

20. The combination, with the vertical channels of the type-case, the type-carrying table, and its guard 21, of the reciprocating type-ejectors having beveled ends, substantially as described. 85

21. The combination, with the vertical channels of the type-case, the type-carrying table, and its guards 24, of the reciprocating type-ejectors having beveled ends, substantially as described. 90

22. A line-forming mechanism consisting of a type-carrying-wheel having type-receiving steps, an inclined stationary type-elevator, 15, and a setting-stick, substantially as described. 95

23. The combination, with the type-conveying chute 28, of the type-carrying wheel having receiving-steps, the inclined stationary elevator, and the setting-stick, substantially as described. 100

24. The combination, with the type-conveying belt, of conveying-chute, stepped carrying-wheel, inclined stationary elevator, and setting-stick, substantially as described.

25. The combination, with the type-channels of the case C and their ejectors, of the rotating carrying-table, the deflector, belt, stepped carrying-wheel, inclined stationary elevator, and setting-stick, substantially as described. 105

26. The combination, with the type-channels in the case C and their ejectors, of the rotating carrying-table, the deflector, conveying-chute, stepped carrying-wheel, inclined stationary elevator, and setting-stick, substantially as described. 110

27. The combination, with the stepped type-carrying wheel, inclined elevator, and setting-stick, of the spring 14, substantially as described. 115

28. A type-ejecting mechanism consisting of a reciprocating ejector, a vertically-vibrating type-bar having tappets 32 33 34, and a rotating driver, the latter being constructed with a multiplicity of angularly-arranged plates that engage said tappets to propel the type-bar forward and disengage from the tappets to permit the rearward movement of said type-bar, substantially as described. 120

29. The combination, with the ejectors 6, the 125 130

key-bars 70, and their tappets 32 33 34, of the rotating type-bar driving-plates 23 and retracting-springs 37, substantially as described.

30. The combination, with the keys 36, the
5 key-bars 70, and their studs 43, of the slotted plates 42, having rearward and forward recesses, whereby a key-bar, when depressed, may be held down during its forward movement, and at the end of its stroke rise and be
10 held upward during its rearward movement, substantially as described.

31. The combination, with the keys 36, the

spring-seated key-bars 70, their studs 43, and the slotted and recessed division-plates 42, of the rotating type-bar driving-plates 23 and
15 the tappets 32 33 34, substantially as described.

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

JOSEPH THORNE.

Witnesses:

T. H. PALMER,

GEO. H. GRAHAM.